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Analysis of Sugarcane Supply/Value Chain in Some Major Sugarcane Producing Provinces in the Philippines

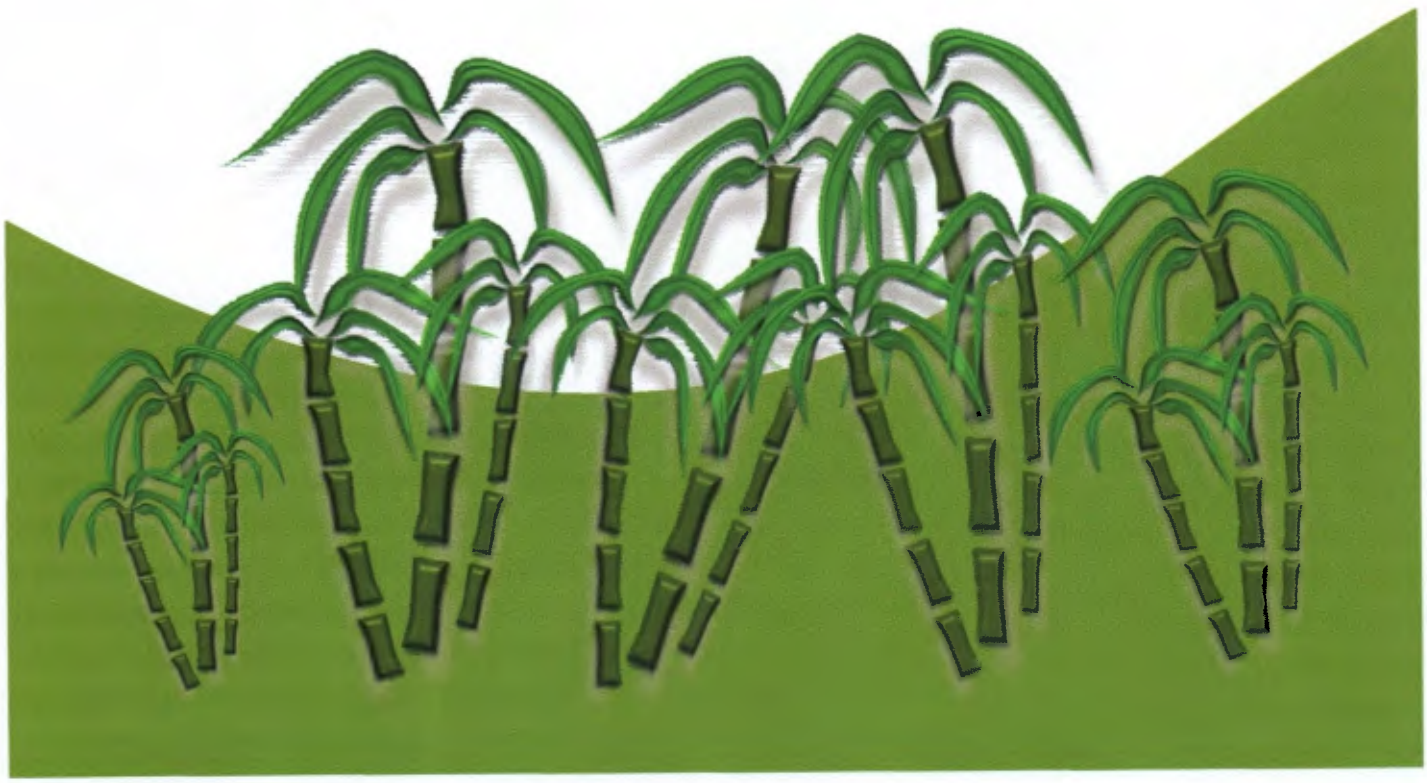

TABLE OF CONTENTS

Executive Summary

The sugarcane industry is one of the major pillars of the Philippine economy. A multi-product industry, it produces cane sugar, bioethanol as green energy and power. Sugar is a mainstay of the country's export products, thus, the industry has significant contribution to the country's foreign earnings and Gross Value Added to the agriculture sector from the sale of sugar and molasses. The industry has more than 80,000 sugarcane farmers, majority of them are small farmers and there are also about 5 million people who are directly and indirectly dependents of the industry.

At present, the industry undertakes major programs and projects to improve its global competitiveness. The best way to strengthen and rehabilitate the industry is to make the entire sugarcane supply chain work well, eliminate the bottlenecks and sources of inefficiencies in all nodes of the supply chain from input suppliers to end users.

Hence, this project of sugarcane supply value chain analysis is being implemented to identify and institute measures to make the sugarcane industry achive global competitiveness competitive and to improve the income of stakeholders involved in the supply chain.

Our Objectives

Development. Making significant improvements in the efficiency and competitiveness of the sugarcane subsector, as well as improvement in the income of people involved in the sugarcane supply chain.

Immediate

- To identify the major strengths and weaknesses of the key players in the sugarcane supply chain, as well as the opportunities and threats in the sugarcane supply chain;
- To identify the best (technically and economically) production, postharvest, processing, and marketing practices;
- To identify problems, constraints, and opportunities in the provision of business development services relating to technology, transportation, financing, and information; and
- To formulate upgrading strategies for the selected value chains to make the sugarcane subsector efficient and competitive.

The Project Team

- Funding Agency - Sugar Regulatory Administration (SRA)
- Implementing Agency - College of Economics and Management, Department of Agricultural and Applied Economics, University of the Philippines at Los Baños (UPLB)

The Funding Source. Sugarcane Industry Development Act (SIDA)

The Project Location. Five major sugar producing provinces are represented in the project.

- Batangas Province

  Don Pedro Mill District – Municipalities of Nasugbu, Calatagan, Lian, Tuy
  Balayan Mill District – Municipalities of Calaca, Balayan, Tanauan, Alitagtag, Ibaan

- Negros Occidental Province

  La Carlota Mill District – Municipalities of La Carlota, Pontevedra, La Castellana
  Victorias Mill District – Municipalities of Cadiz City, Victorias City, Manapla

- Tarlac Province

  Tarlac Mill District – Municipaties of Bamban, Capas, Concepcion, Gerona, Moncada, Paniqui, Pura, San Miguel, Tarlac City, Victoria

- Negros Oriental Province

  Bais-Ursumco Mill District – Municipalities of Bais City, Pamplona, Tanjay City
  Tolong Mill District – Municipalities of Bayawan City, Sta. Catalina, Siaton

- Bukidnon Province

  Bukidnon Mill District – Municipalities of Maramag, Kalilangan, Don Carlos, Valencia City, Pangantucan, Quezon

The Methodology

- Benchmarking
- Value Chain Analysis
- Productivity, Efficiency, and Profitability

The Status of Implementation

- The project has started in March 2017 and will be completed on July 2019.
- Benchmarking of information from the World and Southeast Asia is completed.
- Preliminary analysis data gathered in Batangas, Negros Occidental, Negros Oriental and Tarlac in progress.
- Data gathering in Bukidnon Province is on-going

I. PROJECT DETAILS

Project Title	: **ANALYSIS OF SUGARCANE SUPPLY VALUE CHAIN IN MAJOR SUGARCANE-PRODUCING PROVINCES IN THE PHILIPPINES**
Funding Agency	: Sugar Regulatory Administration
Implementing Agency	: College of Economics and Management, Department of Agricultural and Applied Economics, University of the Philippines at Los Baños (UPLB)
Project Duration	: 28 months (March 22, 2017 to July 2019)
Project Location	: Batangas, Negros Occidental, Bukidnon, Tarlac, Negros Oriental
Project Cost	: P 4,565,000.00

II. RATIONALE OF THE PROJECT

The sugarcane industry is one of the principal drivers of the Philippine economy. Sugarcane is a major traditional export crop and a principal source of foreign exchange earnings. It is the lifeblood of the economies of the major sugarcane-producing provinces in the country. About 700,000 people in the farms and more than 25,000 people in the sugar mills and refineries are directly dependent on the industry for their income and employment. There are also about five million people who are indirectly employed in the industry.

The sugarcane industry currently faces a number of problems that need to be addressed immediately. Foremost of which is the lack of competitiveness especially now that the real threat to the industry is at hand given the ongoing market globalization and ASEAN economic integration.

The industry needs to be strengthened and rehabilitated if it is to survive the stiffer market competitions. The best way to strengthen and rehabilitate the industry is to make the entire sugarcane supply chain work well, eliminating the bottlenecks and the sources of inefficiencies in all nodes of the supply chain from input suppliers to end users. Hence, this project of sugarcane supply value chain analysis is proposed with the end in view of identifying possible measures that can be instituted to make the sugarcane industry competitive and to improve the income of those people involved in the supply chain.

III. OBJECTIVES OF THE PROJECT

The major development objective related to the project is that of making significant improvements in the efficiency and competitiveness of the sugarcane subsector, as well as improvement in the income of people involved in the sugarcane supply chain.

IMMEDIATE OBJECTIVES

The immediate objectives of the project are:

1. To identify the major strengths and weaknesses of the key players in the sugarcane supply chain, as well as the opportunities and threats in the sugarcane supply chain;

2. To identify the best (technically and economically) production, postharvest, processing, and marketing practices;

3. To identify problems, constraints, and opportunities in the provision of business development services relating to technology, transportation, financing, and information; and

4. To formulate upgrading strategies for the selected value chains to make the sugarcane subsector efficient and competitive.

IV. REVIEW OF RELATED LITERATURE

The Sugar Regulatory Administration (SRA), an agency under the Department of Agriculture (DA) receives its mandate from the Executive Order No.18 or Creating of Sugar Regulatory Administration on May 28, 1986. It states that the policy of the state is to promote the growth & development of the sugar industry through greater participation of the private sector and to improve the working conditions of the laborers. This leads the SRA as a member of National Biofuel Board (NBB) to develop and implement policies supporting the Philippine Biofuels Programs and ensure security of domestic sugar supply known as Republic Act 9367 s. 2006 (Biofuels Act of 2006).

This section focuses on sugarcane, its products, by-products and the sectors involved in the sugarcane industry. Considering the significance of sugarcane, the SRA have authorized the Department of Agricultural and Applied Economics (DAAE) in University of the Philippines Los Baños (UPLB) in conducting a Supply/Value Chain Analysis on sugarcane. Supply/Value Chain Analysis is used in identifying key players and intermediaries as well as their corresponding functions involved in the chain. This involves the flow and the value added as the product moves along the chain. Furthermore, this study also incorporates benchmarking, productivity, efficiency and profitability analyses.

Supply/Value Chain. Supply value chain captures the complex interactions of processes and firms needed to create and deliver products to end users. It is a concept formed from combining the supply chain and value chain. However, these two are not synonymous with each other.

Supply chain is the physical flow of raw materials to be transformed to finished products for the end consumers. It refers to a network of independent organizations working together to control, manage, and improve the flow of inputs or materials, products and transformation from suppliers to consumers (Lantican, 2010). The supply chain not only includes the manufacturer and suppliers but also transporters, warehouses, retailers, and customers themselves.

On the other hand, Kaplinsky and Morris (2001) defined value chain as —the full range of activities which are required to bring a product or service from conception, through the different phases of production (involving a combination of physical transformation and the input of various producer services), delivery to final consumers, and final disposal after use.‖ Value chain analysis is essential for a successful business operation and in doing such an analysis. Porter (1985) claimed that it will be helpful to model the firm as a chain of value-creating activities that when carefully assessed and addressed can create a competitive advantage. Two general categories of activities can be named: primary and support activities. Primary activities include inbound logistics (transportation, input material handling, storage/warehousing); operations (include value-creating activities that transform the inputs into the final product); outbound logistics (activities required to get the finished product to the customer); marketing and sales (channel selection, advertising, pricing); and service activities (activities that maintain and enhance the product's value) that add value to the production of the product. In contrast, support activities indirectly affect the final value of the product and these can be linked to the primary activities to achieve competitive advantage.

In terms of structure, Kaplinsky and Morris (2001) said that value chain includes all the firms in the chain that fall under any of the following: end markets, business and enabling environment, vertical linkages, horizontal linkages and supporting markets. End markets are people who determine the characteristics which include the price, quality, quantity and timing of a successful product or service. The business and enabling environment at the local, national and international levels includes norms and customs, laws, regulations, policies, international trade agreements and public infrastructure that either facilitate or hinder the movement of a product or service along the value chain. Vertical linkages facilitate the delivery of benefits and embedded services and the transfer of skills and information between firms up and down the chain. Horizontal linkages, on the other hand, involve ties with firms that perform similar functions in a value chain which can help small firms to generate economies of scale. Supporting markets, considered to be the key to firm-level upgrading, include financial services, cross-cutting services such as business consulting, legal advice and telecommunications, and some sector-specific services.

Generally, the supply value chain analysis is done to determine the different strengths, weaknesses, opportunities and constraints in the production and marketing process to further improve the efficiency, profitability and competitiveness of an industry.

Literatures available on supply value chain of sugarcane focused mainly on muscovado. One of these studies was conducted by the Department of Agriculture Philippine Rural Development Project (DA-PRDP) in Antique, Iloilo and Negros Occidental. The result consists of value chain mapping, key players and functions, nature of interfirm relations, and price and cost structure. For the value chain mapping, generally, farmer-producers bring their harvests to the small or big millers and get their shares of muscovado based on the quedan system. These shares are sold to the local market or processors through traders or directly by the farmers. Some muscovado millers in Negros Occidental and Iloilo are selling muscovado in the export and domestic markets.

Figure 1 shows the supply chain segments and players involved in muscovado sugar in Antique and Negros Occidental. The chain starts with the input provision. Sugarcane seedlings, fertilizers, farm equipment and machineries, fuel and oil, mill supplies, credit, and farm and mill labor services are the inputs needed in the production of sugarcane. The farmers require good farm practices in land preparation, planting, farm management and harvesting to have a better yield with the help of the different enablers such as DA, LGU and NGO. Most of the millers also serve as traders with established contract buyers both in the local and international markets. Millers like Alter Trade sell directly to retailers. The final sale leads to the various outlets from supermarkets to the local stores in the province and nationwide.

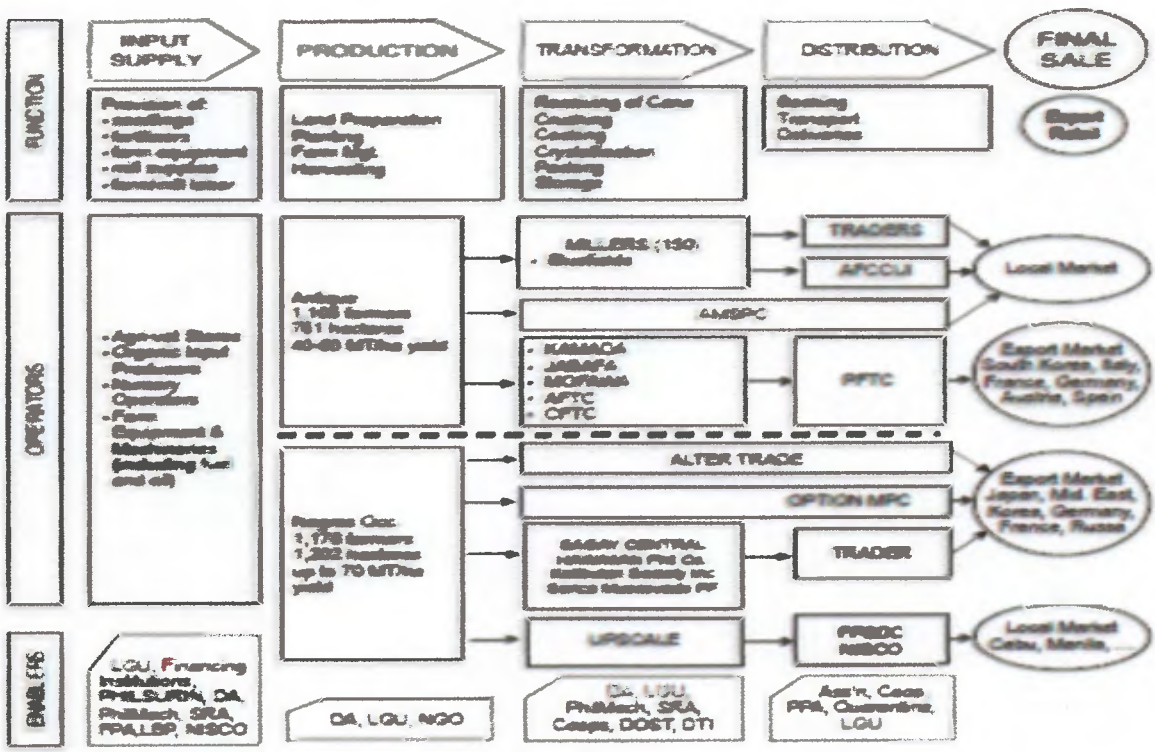

Figure 1. Value Chain Map of Muscovado Sugar in Antique and Negros Occidental.
Source: Department of Agriculture Philippine Rural Development Program (DA-PRDP)

In Antique, horizontal relations of millers can be noticed with the formation of Antique Muscovado Sugar Producers' Marketing Cooperative (AMSPMC) while millers in Iloilo and Negros Occidental do not collaborate with each other. In terms of vertical relationship, the interfirm relations is characterized by a relational or network-type of value chain governance where there is transfer of information and services between PFTC suppliers and buyers.

The selling price of sugarcane farmers to muscovado millers range between P1,100-P1,200 per ton (Lkg/TC) while sugar centrals pay P1,196.85. For every hectare, sugarcane farmers can earn a net income of P28,800. However, farmers who employed ratooning can only earn a net income of P17,150 per hectare.

The study recommended expanding the area planted of sugarcane and implementing of GAP for sugarcane farming to increase the production of sugarcane. Establishing of community-based service providers is also a necessary.

Lizada and Tan (2015) analyzed the supply chain of muscovado sugar in Antique, Philippines. The study identified key processes, actors, flow of the product, payment, market information, external influences along the chain, and issues and concerns as perceived by respondents. Core processes in muscovado industry include input acquisition from distributors and dealers of farm inputs, sugarcane production, primary processing for the conversion of sugarcane to muscovado sugar, secondary processing for producing modified food products, distribution to the institutional or household buyers and consumption. The study reported that traders or millers were the only ones who have the knowledge of the market information such as prices, volume and supply and demand, among others. Furthermore, almost 95% of the respondents agreed that national government agencies, local government units and non-government organizations had not given any assistance for Antique muscovado program. Majority of the problems encountered by the farmers were pests and diseases, low price of muscovado, and high cost of farm inputs. On the other hand, opportunities identified were export quality characteristics of the muscovado and its high demand in local market. Therefore, the study recommended that government should establish intervention programs to improve productivity in sugarcane production for continuous supply of muscovado in the market. Value adding processes should also be further explored.

Moreover, as reported by the SRA (2015) on supply value chain analysis of sugarcane, value addition in the Philippines is higher than in Thailand because it uses more labor even for weeding and harvesting. Small farms of sugarcane in the Philippines have varying amount of production costs with Negros being the highest at P583.13 per Lkg. It is slightly higher than large farms with P577.92 per Lkg. During the processing of sugarcane, Batangas sugar mills have the highest cost at P288.71 per Lkg which comprised the cost of cane, cane transport and milling. Using cost and return analysis, the study reported that large farms have higher profits compared to small farms due to higher average yield by large farms.

Value chain analysis is also being used in other agricultural commodities such as calamansi and cashew nut. The Asian Partnership for the Development of Human Resources in Rural Asia (AsiaDHRRA, 2008) examined the value chain analysis of calamansi in the Philippines. The production costs categorized into cash costs (production inputs), non-cash costs (laborers that are paid in kind and lease rental) and imputed costs (family laborers, depreciation, interest on operating capital, rental value of owned land). On the other hand, marketing costs from the farm up to the retail level include labor, transportation, material inputs, other operating expenses and depreciation. The common flow of commodity is that the farmers sell their produce to assembler or distributor and then supply it to the retailers in the areas. The final sale would come to the ultimate consumers. On average, the farmgate, wholesale and retail prices of calamansi are P11.67 per kg, P19.90 per kg and P29.41 per kg, respectively.

With the aim of identifying main leverage points and key strategies to improve Palawan's cashew nut competitiveness, the DA-PRDP (2015?) conducted another study about value chain analysis for roasted cashew nut. Generally, the value chain consists of input provision, production, trading, processing, marketing and final sale. The key players involved in the chain of cashew nut are farm input supplier, cashew producers, assemblers or traders, processors, wholesalers or retailers and buyers. After analyzing the horizontal relationships between key players, the study reported that the farmers have no formal ties or coordination with consolidators or traders and processors. In the farm level, there is no existing cashew-related association or organized group. Using cost and returns analysis, processors which are also the wholesalers or retailers have the highest net returns. Farmers are only getting 5% of the income share while retailers cornering 53%.

Benchmarking. Benchmarking is used to compare the performance of the best performing farm to other farms and implementing improvement programs based on the result (Franks and Collis, 2003). The performance levels of such entities are measured in terms of physical performance and financial performance. Physical performance indicators are related to production, yield and inputs while financial performance indicators are usually relate to profitability, liquidity and solvency (Wilson, Charry, and Kemp).

The Sugarcane Roadmap 2020 by the SRA (2015) compared the Pensumil mill district (as typical farm) with Victorias mill district (as model farm) using local benchmarking analysis. It was found out that Pensumil mill

district has low farm productivity due to the financial incapability, its farm management practices and the absence of a High Yielding Varieties (HYV) nursery in the district. On the other hand, Victorias mill district practiced better farm management and establish HYV nurseries. In terms of mill performance, sugar mill in Pensumil ranked as the most underutilized and most inefficient mill in contrast to Victorias having a capacity utilization of almost 80% and sugar recovery of 85%.

The University of Asia and the Pacific analyzed global benchmarking of the Philippine sugar industry with Thailand's as cited by the SRA (2015). According to the study, the Philippines has lower productivity at 59 tons per hectare than Thailand with 70 tons per hectare. The cost of labor, land lease, cost of fuel, bank interest rate, milling cost, and wholesale and retail prices are higher in the Philippines than in Thailand. Although it was observed that input costs are high in the Philippines, sugarcane farms profits are still relatively higher in the country than in Thailand. There are more mills in Thailand resulting to increased in refined sugar production. In addition, sugarcane in Thailand is directly purchased by the mills from the farmers while the Philippine cane farmers follow the sugar quedan system.

Productivity, Efficiency, and Profitability. Productivity, efficiency and profitability are interrelated concepts whereas a farm that efficiently utilized inputs can lead to improvement in productivity resulting to increase in profit.

Productivity is defined as an output per unit of input‖. It is generally considered to be the results of a more efficient use of the factors of production in terms of physical, socioeconomic, institutional and technological (Dharmasiri, 2009).

Efficiency refers to the ability of a system to achieve maximum level of output using the least amount of resources (Quilloy, 2015). In production, it may be measured in terms of technical, allocative and economic efficiency. Technical efficiency refers to the use of productive resources in the most efficient manner. It implies that the maximum possible output can be produced from a given set of inputs or technology (Worthington, 2010). Allocative efficiency, on the other hand, is concerned with attaining the proper combination of inputs for production. It is influenced by the prices of input and output since the two dictates the marginal cost and marginal benefit of production. These concepts will be useful in determining whether the inputs are under or over utilized. The proper combination of inputs is necessary to achieve optimum profit. By achieving allocative efficiency we are able to optimize our inputs making it more efficient in terms of costs in production. If the efficiencies mentioned are achieved by a farmer then he is said to be economically efficient, obtaining both optimal production and optimal profit (Carambas, 2013).

Profitability is defined as positive return to working capital and capital invested in various productive assets including land‖ (Srinivasan, 2007). It should ensure that the rate of return to capital is equal to or greater than the prevailing interest rate in the market. The main driver of productivity is profitability therefore if the farm is able to produce the same or more output using less or same input hence will result to increase in profit.

The productivity and efficiency of the individual farms can be analyzed using stochastic frontier analysis (SFA) and data envelopment analysis (DEA). Stochastic frontier analysis is a parametric model developed by Aigner, Lovell, and Schmidt (1977). It can be used in —modeling functional relationships where you have theoretical bounds: estimation of cost functions and the study of cost efficiency, estimation of revenue functions and revenue efficiency and multi-output and multi-input distance functions.‖ (Rao, n.d.). The advantage of using SFA is that it accounts for the random effect and inefficiency component specific to every producer (Ali & Jan, 2017). On the other hand, data envelopment analysis is a non-parametric technique developed by Chanes. One of the advantages of using DEA is that it specifies shape of production frontier from observed data that does not impose any kind of restriction on the structure of production frontier (Mishra, 2015). Instead it can simply use data of inputs and outputs used by the decision making unit (Lestari et al, 2016). According to Fernandez and Nuthall (2009), the results from DEA on the sources and level of inefficiency are obtained for individual farms, which can be used in giving advice to individual farmers in improving their efficiency.
Several studies have used stochastic frontier analysis to determine the technical efficiency in the agricultural farming. One was done by Khai and Yabe (2011) on rice production in Vietnam. Using the Cobb-Douglas Production Function, the study measured the average technical efficiency level to be 81.6% which indicates that an increase in output and decrease in cost could be gained using available technology. The tobit model was used to analyze the factors affecting rice technical efficiency. It was concluded that intensive labor on rice land is the

most important factor in increasing the efficiency of rice production followed by the irrigation. Higher education level characteristic of a farmer could also lead to a higher technical efficiency level. The recommendations mainly focused on encouraging the rice farms to be more labor intensive to attain technical efficiency.

The study conducted by Khanna (2006) used Stochastic Production Function Analysis to estimate technical efficiency of sugarcane farmers in Uttar Pradesh (one of the major sugarcane producers of India). Results showed that education, land area and distance of water source from farm contributes to technical inefficiency. The author recommended that different institutions provide more training to farmers on best practice techniques and how inputs should be handled properly to make up for the low educational attainment of some farmers. Land area specifically land fragmentation was also seen as a contributing factor in technical inefficiency because farmers are unable to effectively utilize investments made to increase farm efficiency through economies of scale. The study also made an emphasis on the importance of water application as a contributor to technical inefficiency. Farms far from water source depend on water pumps generated by electricity to irrigate their fields. In times of power shortage, they are unable to provide water for their sugarcane and this becomes a problem especially in times of drought. To compensate, farmers in the area over apply water to make up for the times when water application was not done. It was recommended that a partnership between owners of tube wells (common water source) as well as buyers of tube wells be formed to come up with an efficient way to distribute water for the farmers. Sugarcane farmers in the area have average technical efficiency of 85%. This means that they are still able to increase their production by 15%.

Data envelopment analysis (DEA) is also being used to investigate sugarcane farm's efficiency. Fernandez and Nuthall (2009) used DEA in assessing the production of sugarcane in Central Negros Area in the Philippines wherein there were 127 farmers included in the analysis. Only 24 farms were considered as DEA-efficient. These efficient farms were using lesser inputs and achieved higher yield than inefficient ones. The mean efficiency level was 0.777 which indicates almost 22% of the production is being lost due to technical inefficiency. Additionally, the pure technical, scale and overall technical efficiency indices were 0.7580, 0.9884 and 0.7298, respectively. Tobit model was also used to determine what influences inefficiency by regressing the DEA scores with farm specific characteristics. It was found out that farmer's experience, access to credit and farm size have significant positive relationship with farmer's technical efficiency while coefficients of farmer's age, soil type and N-fertilizer showed negative signs. With the result of efficiency, the study concluded that the production could increase through the proper application of N-fertilizer and seed inputs. Credit assistance should also be given focus given that it is necessary to induce production efficiency. Since soil type and N-fertilizer have negative relationships with the efficiency, soil analysis programs and information dissemination on proper application of fertilizers should be extended to the farmers.

Another study which Mishra (2015) examined the technical efficiency of the cooperative sugar mills in Uttar Pradesh, India using the Data Envelopment Analysis (DEA). 23 sugar mills have been selected in the study. Overall technical efficiency (OTE), pure technical efficiency (PTE) and scale efficiency (SE) were measured. Out of 23 mills, only 4 (17%) were considered as overall technically efficient and scale efficient which indicates that these mills are working on the efficiency frontier and at optimal size. It was also found out that these 4 mills are operating under constant returns to scale (CRS). Almost 74% of mills are facing increasing returns to scale implying that most of the mills are too small relative to the optimum size, which reflects that mills can use their resources efficiently but they are constrained by the inappropriate plant size. Therefore, the study recommended that cooperative sugar mills should be guided by the policy of continuous assessment and improvement in the operations.

For profitability, costs and returns analysis is usually used. It is an analytical tool which involves estimating all costs (cash or non-cash costs) entailed from performing farm activities and revenues derived from sales of farm harvests. Doloriel (2014) evaluated the productivity and profitability of sugarcane farming by farm size and by a number of ratoon crops. Sugarcane farmers were stratified into first, second, and third ratoon crop farmers with a total of 90 respondent. Cobb-Douglas production function and cost and returns analysis were used in the analysis. The results showed that the average productivity of inputs in sugarcane farms were 51.949, 125.693 and 135.945 piculs/input for small, medium and large farms, respectively. It implies that large sugarcane farms were the most productive compared to other farm sizes. Additionally, the first ratoon was the most productive with 618.67/piculs/unit of input compared to second and third ratoons, significantly for cane points and man-labor inputs. First ratoon is considered as secondary tillers which are desirable since these were closer to the soil and could absorb more nutrients and thus achieving more productivity in the farm. After comparing the net

return above all costs per picul by farm size and by a number of ratoon crops, it was concluded that large sugarcane farms and first ratoon were significantly the highest and most profitable. The result is also evident in the study of SRA (2015) where large farms have higher profits compared to small farms due to higher average yield by large farms. According to Fernandez and Nuthall (2012), the higher input usage by the large farms tends to increase the quantity produce and, with the low price of inputs, generates a larger profit per hectare.

V. METHODOLOGY

A. Benchmarking

Benchmarking is the process of identifying "best practices" in relation to both the products and the processes by which products are created and delivered (http://tutor2u.net). This will be done to understand and evaluate the current status of the sugar industry in relation to "best practices". Areas and means of improving production performance will also be identified. The study will (1) document current practices and technologies adopted and (2) evaluate actual practice and farm performance (total production and yield) relative to best practices/techniques and/or benchmark/model farms. The best practice/benchmark/ model farm will be identified. Specifically, they will be the ones that operate on the production function frontier.

Initially the study will benchmark Philippine sugarcane production, area planted/harvested, and yield with the top ranking producers in Asia and the world. This will situate the Philippines' competitiveness in sugarcane/sugar production vis-à-vis its competitors.

B. Value Chain Analysis

The value chain is the entire range of activities required to bring a product from the initial input-supply stage, through various phases of production, to its final market destination (UNIDO, 2009). It categorizes the generic value-adding activities involved in production and marketing. This component of the study will identify: (1) the key actors/participants/stakeholders in the value chain, their roles/functions, and interrelationships; (2) the enabling environment for business development, the services required, and the adequacy and accessibility of these services; and (3) the prices, costs, and value-addition along the chain. Benchmarking competitiveness and economic performance analysis will be done in each segment of the chain using costs and returns, value addition, and cost shares. Based on the results of these, recommendations on how to increase product competitiveness will be formulated.

C. Productivity, Efficiency, and Profitability Analyses

These will be done mainly at the sugarcane farm production level. Detailed information on individual farm production inputs and output, prices paid for inputs, price received for outputs, investment cost on fixed assets, varieties planted, farm practices, biophysical characteristics of the farm, socio-economic characteristics of the farm operator/manager, support services availed, and problems and constraints faced by the farm operator/manager will be collected from 120 to 150 sample farms in each of the provinces. Stratified random sampling will be applied in drawing the sample farms in each mill district. The farm size (small, medium, and large) will be the basis for stratification.

The productivity and efficiency of the individual farms will be analyzed using stochastic frontier analysis (SFA) and data envelopment analysis (DEA). The sources of productivity and causes of technical inefficiency will be identified. The best practice farms, which will serve as benchmark farms, will be identified, too, in the process. As previously mentioned, they will be the ones operating on the production frontier. The input use, output level, and profitability of small, medium, and large farms will be compared statistically, and the economically optimal farm size will be determined. An analysis of whether the rates of input use by the sample farmers are economically optimal given the current input and output price levels will be done.

Based on the results of above component studies, the strengths and weaknesses of the industry as well as the threats and opportunities available in the industry will be identified. They will also serve as the bases for coming

up with upgrading strategies in order to develop the competitiveness of the industry and improve the income or welfare of the key actors in the supply chain.

VI. PRELIMINARY RESULTS OF METHODOLOGY

A. BENCHMARKING: WORLD

World – Sugarcane Production and Area

The largest producer of sugarcane is Brazil representing 37% of world sugarcane production in 2014. Together with India (18%) and China (6%), the three countries represent two thirds of world sugarcane production in 2014 from an area of 17,195,805 ha. Thailand recorded the highest production growth rate increasing annually by 10.1% from 2010 to 2014. The country contributes 5% to world sugarcane production. The productions of the mentioned countries were all increasing from 2010 to 2014 and can be attributed to increased plantation areas.

Brazil being the largest producer of sugarcane is responsible for 70% of the world sugar demand. Its South Central Region is accountable for 90% of the country's total sugarcane production. Since the liberalization of price and production of sugar in Brazil in 2000 (Mitchell, 2004), sugarcane production has been increasing steadily until 2014. Production growth rate is recorded to be increasing by 5.6% annually. In these years, annual average production amounted to 554,268,670 MT which is 18 times higher than Philippine sugarcane production. A spike in sugarcane production was observed in 2007 and 2008 with growth rates of 15.1% and 17.4% from the previous years. In these years, production areas also increased by 11.4% and 14.9%. The increases in sugarcane production were brought by increased demand rising from the domestic and international market for sugar and bioethanol (Valdes, 2007).

India is the second largest producer of sugarcane in the world and the largest producer of sugarcane in Asia. The country contributes 18% to the world sugarcane production. The top producing provinces of India are Maharashtra, Uttar Pradesh, Punjab and Bihar. India's annual sugarcane production from 2000 to 2014 amounts to 307,319,490 MT with an annual average growth rate of 1.9%. The country's sugarcane production is 10 times higher than Philippines. A spike in sugarcane production amounting to 281,171,800 MT was observed in 2006. This is an increase of 18.6% from the previous year. Harvested areas also increased by 14.7%. Landes (2010) attributed the increases to the high support prices provided by the Indian government. The support prices resulted to oversupplies of cane and decreased prices of domestic sugar. This however was unfavorable for mills because of the falling market prices which led to mills defaulting their payments to sugar planters.

China's production is mostly concentrated in its south and southwest regions. The country contributes 6% to the world sugarcane production with an annual production of 104,259,140 MT from 2000 to 2014. In these years, production was seen to be increasing by 4.7% annually. The highest recorded production for China was in 2013 amounting to 128,734,550 MT from a production area of 1,824,940 HA. Sprecher and Junyang of USDA (2013) attributed the high production in this year to increased production areas. Huge increases in production were observed in years 2007 and 2002 with growth rates of 21.9% and 18.2% respectively. The increases were attributed to evenly distributed rainfall (Zhao and Li, 2015). China's sugarcane production is 3 times higher compared to Philippines.

Thailand posted the highest growth in sugarcane production from 2010 to 2014 with an annual increase of 10.1%. Despite the drop in sugar prices, Thailand remained resilient and was able to improve their exports by 70%. The improvement of its sugarcane industry is attributed by the American Sugar Alliance (2015) to Thailand's government support. The budget for the country's development of sugar industry amounts to $1.3 billion per year which includes input subsidies, export subsidies and soft loans for farmers. Other policies attributed to the improvement of Thailand's sugar industry include; guaranteed domestic sugar prices for growers and millers, setting quotas for each mill's sales to domestic market with no limitations to world market, providing border protection for domestic producers against cheaper sugar outside the country and subsidies for ethanol producers. From 2000 to 2014, the country produced 71,450,770 MT annually with an annual growth rate of 6.2%. The largest increases in sugarcane production were observed in years 2007 and 2011 with growth rates of

35.1% and 39.5% respectively. In these years, Thailand's sugarcane area of production also increased by 4.7% and 28.8% respectively.

Pakistan which is a competitor in the ASEAN region because of its proximity is consistently mproving its sugarcane production. Production is concentrated in Punjab province. Pakistan's annual production averaged 53,250,750 MT from 2000 to 2014. The highest recorded increase in the last 5 years was in 2011 and from there, the industry continued to increase its production annually by 8.2%. Area harvested also increased by 5.6% annually in these years. The increases were attributed by the Pakistan Sugar Mills Association (2011) to favorable weather conditions and adequate supply of water in the country. Pakistan's production is 1.7 times higher than Philippines' sugarcane production in 2014.

In 2014, Philippines ranked 13th in sugarcane production and was able to contribute 1% to the world sugarcane production. From 2010 to 2014 average sugarcane production in the country only increased annually by 0.3%. Compared to the top sugarcane producing countries in the world, the country posted the lowest growth in sugarcane production.

World – Sugarcane Yield

In 2014, the countries with the highest sugarcane yield were Peru, Senegal and Egypt with yield amounting to 126 mt/ha, 118 mt/ha and 115 mt/ha respectively. The high yields of the aforementioned countries can be attributed to optimum conditions of climate and soil quality in growing sugarcane.

India, China, Thailand and Pakistan all reported increasing yields from 2010 to 2014. Only Brazil posted an annual decline of 2.3%. The decreased sugarcane yield of Brazil is attributed to a long period of drought in its South Central region (Sugarcane.org, 2014). A study conducted by Matthieson (2007) as cited from the study of Zhao and Li (2015) explained the effects of drought in pest and diseases that can affect yield. It was reported that increased in temperature resulted to an increased occurrence of some pest and diseases. Smut and ratoon stunting disease were some of these diseases.

Brazil ranks 33rd with an annual average yield of 75.2 mt/ha from 2010 to 2014. The highest productivity of the country was recorded to be in 2009 amounting to 80.3 mt/ha. Sugarcane productivity however continued to decline by 2.5% annually after 2009. The lowest recorded productivity in the last decade is 70.1 mt/ha in 2014.

India ranks 34th with an annual average yield of 69.5 mt/ha. Unlike Brazil, India's productivity showed positive growth from 2010 to 2014 but only minimal. Sugarcane yield of India is recorded to be increasing annually by 1.8% from 2010 to 2014. The highest recorded increase in India's sugarcane yield was in 2010 amounting to 70.0 mt/ha. This is an increase of 8.5% from the previous year.

China ranks 32nd with an annual average yield of 68.7 mt/ha. Sugarcane productivity of China is increasing annually by 1.2% from 2010 to 2014 with the highest recorded yield in 2014 amounting to 72.2 mt/ha. On the other hand, the lowest recorded yield was in 2010 amounting only to 65.8 mt/ha.

Thailand ranks 26th with an annual average yield of 75.4 mt/ha. Sugarcane productivity of Thailand posted an increasing trend growing annually by 1.4% from 2010 to 2014. The highest increase in sugarcane yield was recorded in year 2006 amounting to 65.3 mt/ha from the previous year's 50.6 mt/ha. This is an increase of 29.1%.

Out of the top 5 sugarcane producing countries, Pakistan posted the lowest yield of 55.8 mt/ha putting it in the 55th position. The country's productivity is below the average cane productivity which is 57.3 mt/ha.

Philippines ranks 53rd with yield amounting to 58 MT/hectare in 2014 which is half of Peru's productivity. Philippines also reported declining sugarcane productivity at a rate of 1.1% annually from 2010 to 2014.

World - Centrifugal Raw Sugar Production

World sugar production is looking bright brought by increased competition in the Asian region. Global sugar production is expected to increase over the decade despite the current downtrend of world sugar production. Increasing demand for sugar used for the food and beverage industry as well as bioethanol production are seen

to be the reasons (FAO, 2016). In 2014, Brazil accounts for 20% of the world's sugar producing a volume of 37,300,000 MT.

Brazil is the leading producer of sugar in the world market with an annual production of 31,333,000 MT. Production is also recorded to be increasing by 6% annually from 2000 to 2014. Production is seen to be on an increasing trend with only minimal declines in productions over the years. The Brazilian sugar industry has faced financial problems brought by high levels of debt. The borrowings were used for industry developments in terms of mechanizations, increases in wages and improvements to credit access. Mills however have gone bankrupt because of debts and low returns which made ethanol production as a more profitable business venture (FAO, 2016).

India, China and Thailand are the top sugar producers of Asia. India's sugar production is one of the fastest of the top sugarcane producing countries growing at a rate of 11.8% annually from 2010 to 2014. The fast growth of the country's sugar industry is brought by their sugar and ethanol policies (FAO, 2016). A huge decline of 44.3% in sugar production was observed in the year 2009. The country however improved its production in succeeding years. India was able to contribute 14.1% to total raw sugar production in 2014.

China was able to contribute 6.1% to world raw sugar production in 2014. Sugar production of China only grew by 0.4% from 2010 to 2014. In 2011 and 2012, huge increases in sugar production was observed but this is offset by the huge decline of sugar production in 2014. Sugar production in 2014 declined by 20.6% from a volume of 14,507,000 MT to 11,517,000MT. The decline is attributed to high labor costs, small farm sizes and low farm productivity. Massive importations have occurred in the country because of said farm inefficiencies (FAO, 2016). The country however plans to renovate its sugar industry formulating a 2015-2020 plan for production and development of main producing sugarcane areas (Guangxi and Yunnan). Irrigation rate in the regions will be increased to 39% as well as increasing farm mechanization. This is expected to increase sugar production by 24% (FAO, 2016).

Thailand, the largest sugar producer in SEA and the third largest producer of Asia have increased its sugar production by 37.7% in 2004 to 2014 from 2004's production of 7,281,300 MT to 2014's 10,024,000 MT. Annual sugar production of Thailand amounts to 7,454,300 MT from 2000 to 2014. Over the years, sugar production growth rate is 5.3%. Thailand is one of the fastest growing sugar producing countries with an annual production growth rate of 8.0% from 2010 to 2014 (FAO, 2016). In fact, Thailand's growth has been very promising that it is now the second largest exporter of sugar in the world. The surge of sugar production was observed in 2011. In this year, sugar production increased by 39.5% from the previous year. Thailand was able to contribute 5.3% to world raw sugar production in 2014.

Pakistan is the fastest growing sugar producing country of the top 5 sugarcane producing countries. The country's sugar production posted an annual average increase of 12.5% in 2010 to 2014. The country posted the largest increase in sugarcane production in the year 2011 after the passing of the 18th Constitutional Amendment by Parliament wherein the Ministry of Food and Agriculture was abolished and its functions were given to provincial offices. Because of the continued efforts of the provincial government and by using its different agencies, researches, trainings to farmers and technology transfers were more efficient (USDA, 2012). Pakistan was able to contribute 3.2% to world raw sugar production in 2014.

The Philippine Sugar Industry ranked 15th in terms of sugar production in 2014 and showed a decline of 3% annually from 2012 to 2014. The country only contributed 1% to the world sugar production.

World - Bioethanol Production

Of the top sugarcane producers, Brazil took the lead in terms of bioethanol production (second to USA) and produced 65,591,580 L per day on the average from 2010 to 2014. A decreasing trend however was observed declining at a rate of 0.3% annually in the said years. The biggest decline in bioethanol production was observed in the year 2011 when bioethanol decreased by 17.5% from the previous year. The year 2007 posted the highest growth rate in the last decade for Brazil producing a volume of 61,847,110 L/day. This is an increase of 27.1% from the previous year's production which is 48,650,940 L/day. The country mandates a 27% use of biofuel in all liquid fuels sold (USDA, 2016). This mandate increased the domestic demand of bioethanol which in turn improved the sugarcane industry of Brazil as sugarcane is used as the main feed stock of bioethanol production

in the country. The year 2005 to 2009 proved to be the most productive of Brazil in bioethanol production growing at a rate of 12.8% annually.

Of the top sugarcane producers, China came in distant second only producing 721,900 L/day. Bioethanol production of the country is recorded to be increasing by 3.9% annually from 2010 to 2014. From the year 2000 to 2004, China's bioethanol production was the highest growing annually by 100.7%. Bioethanol production continued to increase over the years except for year 2010 when production dropped by 3.0%.

India posted its highest bioethanol production in 2014 amounting to 1,452,440 L/day which is an increase of 708% from 2013's 179,710 L/day. The year 2011 also recorded to be a prosperous year for the bioethanol industry because of the increase in production by 109.13% from the previous year. This is attributed to the implementation of India's Biofuel Policy that mandates the blend of bioethanol to 5% of petroleum fuel. The biofuels policy targets the blend of biofuel to petroleum fuel up to 20% but will require them to have more than 6.6 billion liters of ethanol (USDA, 2015).

Pakistan on the other hand, despite its very high production of sugarcane produces only small amounts of bioethanol relative to the productions of the top sugarcane producing countries. Pakistan only produces an amount of 27,400 L/day. Philippines' bioethanol production is 6 times higher than of Pakistan.

World – Export of Centrifugal Raw and Refined Sugar

Exports of Brazil are driven by the continued estimated deficit of sugar in the world market. Brazil is the top exporter of raw centrifugal sugar with an annual growth rate of 14.2% from 2000 to 2014. In these years, the country exports 13,366,110 MT annually. In 2013, Brazil exported 21,521,890 MT of raw centrifugal sugar which is 6.5 times of Thailand, the second largest exporter of raw centrifugal sugar and 45.6 times that of Philippines. Refined sugar exports showed otherwise. Refined sugar exports of Brazil were seen to be on a decreasing trend from 2010 to 2013 declining at a rate of 1.6% annually. In these years, refined sugar exports amounted to 5,692,400 MT annually. The main export destinations of Brazilian sugar exports are India, China, Algeria, Bangladesh, Indonesia and Malaysia (USDA, 2017).

India is the 4th largest exporter of sugar in the world, and its exportation has increased tremendously over the period of 14 years. Exportation in the country grew by 189.9% annually for raw sugar and 11.12% for refined sugar. The largest exported value was recorded in the year 2007 with a volume of 2,422,200 MT for raw sugar and 7,060,790 MT for refined sugar. The country has the potential to export to major Indian Ocean markets. In the year 2013, India's major trade partners are UAE, Sri Lanka and Malaysia constituting 12.9%, 6.9% and 4.2% respectively of the country's total sugar exports (Balasaheb, 2013). In the last 10 years, India has been a net exporter of sugar recently however, the country is planning to put a 25% tax on sugar exports to protect its local sugar supplies (Reuters, 2016).

Despite being one of the largest sugarcane producers, raw centrifugal sugar exports of China is only minimal. It experienced continued declines of 38.3% from 2008 until 2010 but recovered in the year 2011 for raw sugar exports. Sugar export destinations of China are Hong Kong, Malaysia, USA and Canada (CIE, 2012). China's raw sugar exportation is also increasing from 2010 to 2013 but only at 2.59%. Refined sugar exports on the other hand experienced continued declines of 16.68% from the same years. Raw sugar exports in the said years amounted to 7,100 MT and 77,800 MT.

Pakistan raw sugar exportation grew by 42.2% and 18.3% for refined sugar annually from 2010 to 2013. The largest increase in sugar exports were observed to be in 2012 amounting from a volume of 4,390 MT in 2011 to 13,400 MT, The largest export for refined sugar was in 2013 amounting to 1,000 MT. The Pakistan government to move supplies from the domestic market to the world market and generate additional income for millers established an export subsidy of 100 $/MT. (USDA, 2015).

World – Import of Centrifugal Raw and Refined Sugar

Brazil, Thailand and Pakistan only import minimal raw centrifugal raw sugar while India and China are in the top 10 importers of centrifugal raw sugar.

Brazil recorded annual importations of raw sugar amounting to 400 MT and refined sugar amounting to 300 MT from 2010 to 2013. Despite being the largest sugar producer in the world, Brazil still seek support from other countries to satisfy its domestic demand. The importations are brought by its huge responsibility to supply sugar for the food and beverage industry and the continued popularity of bioethanol.

India recorded annual importations of 729,500 MT of raw sugar and 85,900 MT of refined sugar from 2010 to 2013 with an annual increase of 203.7% and246.7% respectively. The importations are also brought by unsatisfied domestic demand. The importations corresponds to the deficits in India's domestic sugar market (Meriot, 2016).

China is one of the leading sugar importers in the world market purchasing a volume of 3,365,550 MT of raw sugar and 607,300 MT of refined sugar on average from periods 2010 to 2013. Importations of China have been growing steadily in the said years at a rate of 36.1% and 10.9% annually. The importations is brought by high domestic demand, decreasing sugar production brought by high production costs, and the elimination of support prices (USDA, 2016).

Pakistan's sugar importation dropped significantly over the years from importing an average of 141,800 MT of raw sugar in 2005 to 2009 to 900 MT in 2010 to 2013. Pakistan's importation is also on a decreasing trend declining at a rate of 33.7% annually.

BENCHMARKING: SOUTHEAST ASIA (SEA)

SEA-Sugarcane Production and Area

In 2014, the leading producers of sugarcane in South East Asia were Thailand, Indonesia, Philippines, Viet Nam and Myanmar having a share of 55%, 15%, 16%, 10%, and 6% to SEA's sugarcane production. Increasing sugarcane production was observed from all of the mentioned countries.

Thailand is among the largest exporters of sugar in the world and the main supplier of sugar in SEA. It contributes 54.9% to SEA's sugarcane production. From 2010 to 2014, Thailand produced an average of 93,390,240 MT annually. Its sugarcane production is 4.1 times that of Philippines and is observed to be increasing annually by 10.1%. It is the fastest growing sugarcane industry in SEA and is attributed to the different support provided by its government to the different stakeholders of the industry. The price support of Thailand sugarcane farming also plays an important role here because it encourages farmers to take risk in planting despite the chance of lower yield because of drought.

Philippines is the second largest sugarcane producer in SEA with an annual production of 30,867,600 MT from 2010 to 2014. Sugarcane area in these years averaged 419,400 hectares planted in 10 regions of the country. Sugarcane production covers 29 mill districts – seven in Luzon, three in Mindanao, four in Panay, two in Central Visayas, two in Negros Oriental and 11 in Negros Occidental. The country recorded the slowest growth compared to the top sugarcane producing countries of SEA with an annual growth rate of only 0.3% despite the 2% annual increase in sugarcane production area. The country contributed 16.5% to SEA's total sugarcane production in 2014.

Indonesia, the third largest producer of sugarcane in SEA contributed 14.6% to SEA's total sugarcane production. Sugarcanes are mainly cultivated in Java followed by Sumatra. From years 2010 to 2014, sugarcane production of Indonesia recorded to be increasing annually by 2.1% amounting to 27,260,000 MT. A bumper harvest was observed in the year 2012 amounting to 28,400,000 MT and is attributed to favorable weather conditions and high retail prices of sugar which gave farmers the incentive to produce more (USDA, 2014).

Viet Nam contributed 10.1% to SEA's total sugarcane production in 2014. The largest producing region in the country is located in the North Central Coast contributing 24% to the national output. Viet Nam's sugarcane output is recorded to be 19,822,900 MT in 2014. From 2010 to 2014, the country's sugarcane production has been increasing by 4.9% annually with an annual production of 18,534,500 MT. The largest production was recorded in the year 2013 amounting to 20,131,100 MT. Philippine sugarcane production is higher by 1.6 times.

The country's low level of production is attributed to low mechanization level of only about 10% to 20% (Pham, 2014).

Despite being the fifth largest producer of sugarcane in SEA and a neighbor of Thailand, Myanmar is only able to contribute 6% to SEA's sugarcane production. On the average, the country is able to produce 9,987,500 MT annually from 2010 to 2014 with an annual growth rate of 2.9%. According to U Soe Lin, chairman of Myanmar Sugarcane Dealers Association, the reason the country is only able to produce small volumes of sugarcane compared to Thailand is because of their difference in policy and investments. The chairman emphasized that investments in machineries and equipment as well as extension supports of Thailand to its sugarcane industry are its strengths (MyanmarTimes, 2013).

SEA-Sugarcane Yield

In 2014, the highest sugarcane yielding countries in South East Asia were Thailand (77 mt/ha), Viet Nam (65 mt/ha), Myanmar (63 mt/ha), Indonesia (61 mt/ha) and Philippines (75 mt/ha). All of the mentioned countries have increasing yields from 2010 to 2014 except for Philippines. Viet Nam posted the highest growth rate in yield growing annually by 2.0%. Thailand came 2nd with an annual yield growth rate of 1.4%.

Thailand posted the highest sugarcane yield of the ASEAN countries with an average annual yield of 75.4 mt/ha from 2010 to 2014. Sugarcane yield has been growing by 1.4% annually from 2010 to 2014. The highest increase in sugarcane yield was recorded in year 2007 amounting to 65.3 mt/ha from the previous year's 50.6 mt/ha.

Average sugarcane yield of Indonesia is seen to be decreasing over the years. The country's yield only averaged 60.4 mt/ha from 2010 to 2014 which is a decrease of 7.3% from its average yield in 2005 to 2009 which is 65.1 mt/ha. The highest sugarcane yield was observed in 2004 amounting to 77.6 mt/ha while the lowest yield was in 2011 only amounting to 55.2 mt/ha.

Philippines is one of the top sugarcane competitors of Thailand with an average annual yield of 73.6 mt/ha from 2010 to 2014. In these years, Philippines is the only country of the top 5 with negative growth rate in yield decreasing by 1.1% annually. Highest sugarcane yield was recorded to be in 2004 amounting to 86.2 mt/ha.

Vietnam's sugarcane productivity is slowly increasing with an annual growth rate of 2.0% from 2010 to 2014. The highest recorded yield was in 2014 amounting to 65 mt/ha. Myanmar's sugarcane productivity is also slowly increasing with an annual growth rate of 0.5% from 2010 to 2014,

SEA – Centrifugal Raw Sugar Production

In 2014, the leading producers of sugar in South East Asia are Thailand, Philippines, Indonesia, Viet Nam and Myanmar.

Thailand is the largest producer of raw sugar in South East Asia with a share of 63% to South East Asia's sugar market. Thailand produced an average of 9,374,940 MT annually from 2010 to 2014. This is 400% higher compared to Philippines' sugar production which only averaged 2,310,200 MT from 2010 to 2014. Thailand's high sugar production can be attributed to its high sugarcane production, large area of production and the establishments of newer and more efficient sugar facilities (USDA, 2016).

Indonesia only ranked 3rd in sugar production and contributes only 13% to the sugar market of South East Asia. The country also is relatively slow in growth of sugar production relative to its south east Asian counter parts only increasing by 2.1% annually from 2010 to 2014. The slow growth of the Indonesian sugar industry is attributed to its aging sugarmills. Indonesia currently has 63 sugarmills with the majority of them (40 sugarmills) over 100 years old (USDA, 2016). Underinvestment in the improvement of the sugarmills resulted to low sugar productivity. Indonesia's sugar factories currently has a total capacity of 245,000 ton cane/day which is very low compared to Thailand's 50 sugarmills but has a capacity of 940,000 ton cane/day (Global Business Guide Indonesia, 2016).

Philippines is the second largest sugar producer in SEA with an annual production of 2,310,200 MT from 2010 to 2014. It is also the second fastest growing raw sugar producer with an annual growth rate of 3.6%. Main

producers of raw sugar are Bukidnon Mill District, Victorias Mill District and BISCOM Mill District contributing 15.6%, 9.6% and 8.1% respectively. Lowest raw sugar production in the last decade was seen in 2010 amounting to 1,716,510 MT. Sugar production decreased by 7.3%. Highest raw sugar production was observed to be in the year 2011 when sugarcane production are highest. In this year, raw sugar production increased by 51%. The country contributes 14.5% to SEA's sugar production.

Vietnam is also a large contributor of sugar to total raw sugar production of SEA. The country contributes 9.4% producing 1,500,000 MT in 2014. Viet Nam's sugar production is seen to be increasing by 0.8%, the slowest growth out of the top sugarcane producing countries of SEA. Viet Nam's sugar production however is lower by 33.9% compared to Philippines' sugar production. In the last decade, the highest sugar production of Viet Nam was observed in the year 2013 which is an increase of 8% from the previous year. The lowest recorded production on the other hand was observed in year 2005 which is a decrease of 18.1% from a volume of 1,434,300 MT to 1,174,600 MT.
Myanmar which is the fifth largest producer of sugarcane in SEA was only able to contribute 0.1% to SEA's total raw sugar production only producing annually of 22,730 MT from 2010 to 2014. The biggest decline in sugar production was observed in 2009 amounting to only 20,300 MT from the previous year's production of 28,410 MT.

SEA – Bioethanol Production

In South East Asia, Thailand is the leading producer of bioethanol producing at an annual average of 1,948,880 L/day from 2010 to 2014. Bioethanol production is observed to be increasing at a rate of 22% annually from 2010 to 2014. Production continues to grow in line with consumption because of the mandatory use of biofuels. From the year 2005 to 2009, Thailand bioethanol production was recorded to be 613,700 L/day. In these years, annual production growth rate of the country is 267.2%. Since the implementation of its bioethanol policy, production of bioethanol in the country posted consistent increases from 2004 to 2015. Thailand targets the use of bioethanol at 9 million liters/day. Molasses is the main feed stock of bioethanol comprising 70% of the total ethanol production. The other 30% is from cassava. The improvement of Thailand's bioethanol industry is mainly because of its 10 year Alternative Energy Development Plan (2012 – 2021) with the goal of increasing the share of renewable fuels from 9% of energy consumption to 25% by 2021.

Philippines came in distant second producing an average of 206,930 L/day annually from 2012 to 2014. Indonesia and Philippines have posted very high growth rates in bioethanol production growing at rates of 247% and 295% annually. Philippines was able to produce 343,890 L/day of bioethanol in 2014 but is one of the fastest growing bioethanol producers in the world. Bioethanol production increased by 131.8% annually from 2010 to 2014. The high increase in bioethanol production is attributed to the continuous investments to improve the bioethanol industry brought by high domestic demand. The implementation of the Philippines Biofuels Act of 2006 which mandates the blend of bioethanol to liquid fuels by 10% increased the demand of biofuels in the country. From 2012 to 2014, the country imported an average of 316,000,000 L of bioethanol annually. Importation is also increased yearly by 9% from 2012 to 2014. It shows that there is still a large portion of unsatisfied domestic demand for bioethanol in the country. The Philippines currently has 13 bioethanol distilleries with a total capacity of 351,000,000 L (USDA, 2015).

SEA – Export of Centrifugal Raw and Refined Sugar

Thailand is the largest exporter of raw and refined sugar which is seven times that of Philippines in 2013. Thailand posted increasing growth rates of raw sugar export by 28% annually from 2010 to 2013. An increase of 98% of raw sugar exports were recorded in 2011 amounting to 4,122,700 MT. An increase of 68.1% of raw sugar exports were recorded in 2007 amounting to 2,091,600 MT. With the export subsidy guaranteeing a high price for sugar producers within Thailand, sugar producers are able to afford exportation to the world market.

Philippines on the other hand showed one of the highest growth rates of centrifugal raw sugar export out of the top sugarcane producing countries in South East Asia growing at 170.7% annually from 2010 to 2013. Refined sugar export growth rate is 32.4% in the said years. The country exports 332,000 MT annually from 2010 to 2013 for raw sugar and 4,100 MT for refined sugar. The country exports centrifugal raw sugar, refined sugar, muscovado and panocha. Philippines export destinations are mainly in US, Korea and Japan.

Viet Nam only exports small volumes of raw and refined sugar relative to Philippines only averaging 640 MT and 3,280 MT respectively from 2010 to 2013. Despite its low export volumes, raw and refined sugar exports have been increasing by 196.6% and 140% respectively from 2010 to 2013.

Myanmar is the only country in the top 5 that posted declining exports of raw and refined sugar. Raw and refined sugar exports were seen to decline by 18.44% and 97.42% respectively.

SEA – Import of Centrifugal Raw and Refined Sugar

In 2013, Indonesia is the top importer of centrifugal raw sugar in South East Asia and the second largest importer in the whole world second to China. Imports of Indonesia have been increasing by 30.8% and 91.3% from 2010 to 2013 amounting to 2,363,400 MT of raw sugar and 91,500 MT of refined sugar. Indonesia regulates raw sugar importation by only allowing registered importers who will use it for refining to order but because of the 1.4% population growth and the growing demand from the food and beverage industry, Indonesia granted import licenses to different companies to import additional raw sugar (USDA, 2011).

Thailand and Philippines only import very minimal raw sugar. Importation is also decreasing by 50.6% and 99.9% respectively for raw sugar and 78.3% and 15.5% for refined sugar respectively from 2011 to 2013.High importations however were observed in year 2010 when the two country's sugar production was low. Refined sugar importations were on a declining trend.

B. VALUE CHAIN ANALYSIS: PRELIMINARY FINDINGS

BATANGAS PROVINCE

Sampling Procedure. In CY 2016-17, there are 9,440 sugarcane farms in Batangas with a total area of 28,323.34 has. There are only two mills that serve the whole area. About 60% (5,652) of the farms are in the municipalities within the vicinity of Don Pedro Mill District, namely: Nasugbu, Tuy, Lian, and Calatagan. The remaining 40% (3,788) of the farms are located in Balayan Mill District. Although there is greater number of farms in Don Pedro, the total sugarcane area in Balayan is larger (16,219 has) than Don Pedro (12,104.2 has) as the farm sizes in Balayan (Eastern side) are larger. While nearly 55% of the total sugarcane area in Balayan is accounted for by medium and large farms, in Don Pedro medium and large farms only account for about 22% of the total sugarcane area. The average farm size in Don Pedro and Balayan are 2.1 has and 4.3 hectares, respectively.

For the farm survey, ***stratified random sampling*** was adopted. All the four municipalities in Don Pedro were included, while in Balayan only the top five municipalities in terms of total sugarcane farm area were selected, namely: Balayan (4,447.3 hectares), Calaca (1,756.3 hectares), Ibaan (1,409 hectares), Tanauan (1,301.7 hectares), and Alitagtag (1,146.6 hectares). The farms in the selected municipalities were classified by size (Table 1). The industry classification by size was adopted, i.e. small (≤ 10 has), medium (10.1 – 50 has) and large (> 50 has). A minor modification in the classification was done by subdividing the small farms into Small-A (≤ 2.5 has) and Small-B (2.6 – 10 has). This was done since it is deemed that 2.6 to 10 has of farm size is not ordinarily small by Philippine standard as the average farm size in the Philippines as of 2012 was 1.29 hectare. Moreover, a planter with more than two hectares can already be considered as relatively progressive planter.

Socio-Economic Characteristics of the Sample Planters. Planters holding larger farms were generally younger and more educated, but with fewer number of years of experience in sugarcane farming planters with smaller land holding. Most of them are part-owners of the land they till with one or more parcels of land.

Characteristics of the Sample Farms. Sample farms belonging to Small-A and Small-B subgroups have average farm areas of 1 hectare and 5 hectares, respectively, while those belonging to medium and large groups have average farm areas of 23 hectares and 97 hectares, respectively. Majority of the sample farms under different size groups has the ideal flat topography and clay loam to sandy loam soils. Small-A farms mostly plant Phil 7544 sugarcane variety while larger farms mostly planted VMC 84524. Very few sample farms in Batangas mill districts adopted newly introduced varieties, e.g. 1999 and 2000 series.

Farm Production and Land Productivity. Average total cane production of sample farms were 75 tons among Small-A, 302 tons among Small B farms, 1,408 tons among medium farms, and 6,990 tons among large farms. In terms of land productivity or yield per hectare, the overall average for all samples was 58 tons of cane. Larger farms generally obtained greater yields than small ones—Small-A and Small-B have an average of 56 tons and 57 tons per hectare, respectively, while the medium-and large-sized farms obtained an average of 60 tons and 70 tons per hectare, respectively.

Constraints on Sugarcane Production and Land Productivity. The first and most commonly cited constraints on sugarcane production and land productivity across different farm sizes was the prevalence of pests, e.g. white grubs, termites, beetles, rats, locusts, tungro, and army worms. More than half (52%) of sugarcane planter-respondents have experienced the prevalence of one or more of these pests. The second most commonly cited constraint is the lack or high cost of labor (38%) especially during harvesting. Some planters rely on migrant labors from Negros who usually migrate to Batangas after the harvesting in Negros. Hence, sometimes these planters experience delay in harvesting because they have to wait until harvesting in Negros is finished. Other common constraints cited by planters were high cost of inputs (17%), lack of capital (13%), low price of sugar (10%), and weeds (12%). There is a myriad of other constraints which were cited by planters, e.g. soil type, low sugar yield, absence of irrigation, drought, fertilizer usage, lack of equipment and machinery, climate, trucking, unavailability of cane points, same variety all throughout, wilting of sugarcane crop, low soil fertility, and a host of other minor factors.

Reasons for Not Expanding Sugarcane Farm Areas. Sugarcane planter-respondents mentioned lack of capital (49%), unavailability of land (25%), cannot manage larger farm (14%), lack/shortage of labor (6%), and a host of other minor factors.

Access to New Technology and Adoption. Majority (87%) of the sample planters, especially those with small- to medium-sized farms, were not aware of new sugarcane production technologies, or have not kept abreast with technological development. Nonetheless, majority (78%) of the large planters were aware of, and even claimed they have adopted, new technologies.

As far as access to extension services is concerned, majority of the sample planters has not accessed extension services provided by government institutions (83%) and non-government institutions (99%).

Credit Access. Majority of the sugarcane planter-respondents are not aware of the existence of banks (66%) and non-banks (57%) financial institutions in the area. In terms of borrowing incidence, majority (58%) of them are borrowers while the rest are not. Sugarcane planters belonging to the Small-A and Small-B groups has an average credit amount of around PhP36,000.00 and PhP 91,000.00, respectively. While, the medium and large planters has an average credit amount of PhP266,000.00 and PhP46,000.00, respectively. Out of the 83% who availed credit, majority (51%) of them did not encounter any problem. On the other hand, 41% of them encountered problems which include inadequate amount of loan, high interest, timeliness, schedule of payments, expenses for guarantors, payments of loans are being deducted right after milling, schedule of release of loan is not known, limited sources of credit.

Moreover, 42% of them have a credit-market tie up arrangement. In this type of arrangement, planters are oblige to sell their output to their respective creditors. Some of the sampled respondents claimed this arrangement has advantages including immediate source of credit, assurance of market/buyer, quick transactions, and less cost of access.

Membership in Organizations. Fifty one percent of the samples-respondents are members of the organizations such as Batangas Sugar Planters Cooperative Marketing Association, Inc. (BSPCMA), Batangas Integrated Sugar Planters Multi-Purpose Cooperative, Inc. (BISPMPC) Saprocom Multipurpose Cooperative (SAPROCOM-MPC) and *Kapisanan ng mga Magsasaka ng* Hacienda Roxas Inc. (KAMAHARI). According to them, there is an advantage of being a member of an organization when it comes to marketing, credit availment and provision of inputs and machineries. These organizations are the member associations of the LUZONFED, Inc.

Marketing. The study is now on its stage of completing the first level of the market chain. So far, a total of eight traders were already traced from the 37 sugarcane planter respondents. The other marketing participants identified were the assembler-wholesalers, agents and brokers. Noted is the change of ownership of the quedan

as it moves along the chain. The usual practice of the sugarcane planters is to bring their harvest to the millers (Central Azucarera Don Pedro, Inc. and URC-SURE Balayan Corporation) wherein the miller will issue them a warehouse receipt indicating the volume and the date of withdrawal of quedans. At the time the quedans are released, this is also the time where sugarcane planters and traders meet for transactions. Only the registered traders are allowed to withdraw these quedans from the mill.

Marketing Problems. Majority (65%) of the sugarcane planter-respondents did not encounter problems in marketing their quedans. On the otherhand, 51% of them experienced marketing problems such as: low price of sugar (67%), low bargaining power (11%) and limited market options (5%). Other problems include poor farm-to-mill roads (3%), low PSTC (3%), limited number of millers (2%), competition with HFCS (2%), smuggling (2%), wrong information (2%), delayed payment (2%), and priority of traders are large planters (2%).

Distribution and Marketing of Sugar Quedan. Sugar millers and planters' associations do not market or sell physical sugar collectively. They only trade their sugar *quedan,* a proof of ownership of sugar as deposited in registered warehouses of the mill. The quedan system secures credit, simplifies trading, and monitors the withdrawal of raw sugar from the warehouses. As soon as the sugar is processed, the planter is being issued a *quedan* or warehouse receipt by the mill representing his share of the sugar and stating its classification or market destinations depending on the SRA policies. The sugar *quedan* then becomes a negotiable instrument and the sugar can now be easily bought and sold without physical movement prior to delivery.

Annexes A and B show the flow of sugar *quedan* in the two mill districts in Batangas province, wherein a total of 13 market intermediaries were traced from the 50 sugarcane planter-respondents. A total of 8,022 Lkg and 40, 680 Lkg of raw sugar were sold from Don Pedro Mill district and Balayan mill district, respectively. In Don Pedro MD, the commission agents has the majority of raw sugar bought about 3, 573 Lkg, while in Balayan MD, the assembler wholesalers got the bulk of the sugar from the planters with a total of 20, 617 Lkg. These assembler wholesalers are actually the associations and cooperatives in the province. Most of the planter-respondents from Balayan MD are members of the associations/ cooperatives who consolidate their output, initially buy their sugar *quedan* and eventually sell to the big trader. In CY 2016-2017, the sugarcane planters sold their sugar at an average price of PhP1,300 per bag. On the other hand, majority of their sugar *quedan* buyer has a mark-up price that ranged from PhP5.00 to PhP10.00 per bag, while some cooperatives, has a mark-up price of PhP2.00 per bag of sugar.

Planters Associations/Cooperatives. There are a number of associations and cooperatives who provide services to the sugarcane planters in Batangas. Such services include production/ crop loans, fertilizer trading, distribution of planting materials, pre and post harvest facilities rental and marketing of sugar *quedan*. Among the large planters associations/cooperatives are Batangas Integrated Sugar Planters Multipurpose cooperative (BISPMPC) located in Lipa City and Batangas Sugar Planters Cooperative Marketing Association (BSPCMA) in Balayan, Batangas.

Input Suppliers. There were 11 input suppliers interviewed in Batangas who provide access to inputs such as planting materials, machineries and equipment, herbicides and fertilizers. The input supplier-respondents include 9 multi-purpose cooperatives (MPCs) and 2 market outlets. The MPCs commonly provide access to fertilizers which they sell to their members and sometimes offers it as credit in a form of cash or in kind. Their mark-up price for fertilizer irrespective of grades usually ranges from PhP5.00 to PhP10.00 per bag. In the case of herbicides, they just put a mark-up price of PhP5.00 on the average. Meanwhile, the mark-up price of the other input suppliers in the area is relatively higher that ranges from PhP10.00 to PhP15.00. Most of the costumers of the available stores in the area are small sugarcane planters who cannot afford to order in bulk in some associations. Other planters are unaffiliated.

Financial Service Providers. Access to credit institutions is one of the main concerns of the sugarcane planters given the capital intensiveness of the industry. There are formal banking and non-bank institutions that serve the sugarcane planters in Batangas. Landbank and Philippine National Bank (PNB) are the banks which the planters can access credit, while other planters can
directly access their credit to their respective associations/cooperatives. There were 3 associations/ cooperatives which provide financing services to the sugarcane planters exclusive for their members in Batangas. These associations/ cooperatives usually offer credit in a form of cash or in kind. The type of loans which planters could get are agricultural/ production/crop loans, chattel mortgage, fertilizer loan, real estate and educational

loans. The interest rates ranges from 11 to 24 percent per annum. Their planter-members could pay their loans during harvest season, wherein others have an option to pay them in cash. Other associations/ cooperatives automatically deducts their loans from their sugar *quedan* proceedings. Meanwhile, aside from the bank and non-bank institutions, some of the sugarcane planter-respondents avail credit directly from their sugar *quedan* buyers, known as agents and brokers. Usually, they can have cash advances from these *quedan* buyers and just pay during the milling season. These planter-borrowers chose to get credit from them due to accessibility and less hassle of availment. They have basically a credit-market tie up arrangement with the agents and brokers.

Research Development & Extension Service Providers. In Batangas, there is an assigned mill district officer in each mill district. These MDOs usually conduct farm visits and attend to the sugarcane farming concerns of the planters. Each mill district has also Mill District Development Council. Like in Don Pedro MD, it has Mill District Development Foundation Inc. (MDDFI), which acts as a focal point of the development in the district. MDDFI helps in the implementation of plans and programs to help the sugarcane planters, like farm mechanization and variety improvement program. Other projects like mudpress utilization; road rehabilitation and extension, education and training were also being undertaken by the MDDFI for assistance to the planter clientele. Don Pedro MDDFI has a representative from the seven planters association in Batangas, Sugar Regulatory Administration (SRA) and Philsurin.

Sugar Mills. There are two sugar mills in Batangas, namely, Central Azucarera Don Pedro Inc. (CADPI) and the URC-SURE Balayan. The former is the largest milling and the second largest refining operations in the country with a capacity of 12,000 TC per day and 18,000 bags of refined sugar per day. URC-Sure has a daily milling capacity of 4,500 TC.

For crop year 2016-17, about 71% of canes in Batangas were milled in CADPI while the remaining 29% where brought to URC Balayan. Both mills also provide trucking services with corresponding rates depending on the distance. URC Balayan offers trucking rates ranging from PhP100 to PhP200 per ton, while in Don Pedro they offer free hauling within the 50 km radius and about PhP40 to PhP200 per ton for the Eastern part of Batangas. Aside from trucking services, millers also give incentives such as volume, fresh cane and early milling incentives. Incentives usually range from PhP10 to PhP50 per ton. The planters share in CADP is 67% which is relatively higher than URC Balayan with 65%.

NEGROS OCCIDENTAL PROVINCE

Sampling Procedure. In CY 2016-17, there are 10, 093 sugarcane farms in Negros Occidental with a total area of 230, 789 has. There are 9 milling companies that serve the whole area, namely La Carlota, Victorias, Lopez, URC-SONEDCO, BISCOM, Hawaiian-Philippines, First Farmers, Sagay and OPTIONS.

For the farm survey, ***stratified random sampling*** was adopted. All the three municipalities in La Carlota Mill districts were included , while in Victorias only the top three municipalities in terms of total sugarcane farm area were selected, namely: Cadiz City (58,297 has), Victorias City (28,029 has), and Manapla (6,304 has). The farms in the selected municipalities were classified by size. The industry classification by size was adopted, i.e. small (≤ 10 has), medium (10.1 – 50 has) and large (> 50 has). A minor modification in the classification was done by subdividing the small farms into Small-A (≤ 2.5 has) and Small-B (2.6 – 10 has). This was done since it is deemed that 2.6 to 10 has of farm size is not ordinarily small by Philippine standard as the average farm size in the Philippines as of 2012 was 1.29 hectares. Moreover, a planter with more than two hectares can already be considered a relatively progressive planter.

It was initially targeted to cover in the survey a total of 156 sample farms (i.e, small-A (37), small-B (39), medium and large (40 each)). Nonetheless, the actual number of small planters interviewed exceeded the planned number while the number of medium and large planters actually interviewed somewhat fell short of the target numbers for some reasons. Some of the large planters identified in the sampling frame were found not actually medium/ large while others were simply hesitant to be interviewed.

Socio-Economic Characteristics of the Sample Planters. Planters who have different farm sizes generally have almost the same age and are male dominated. Planters holding larger farms are generally more educated and more experienced, with large farm holders being the most experienced. Large farm holders also started farming

at an early age, averaging to 28 years old, relative to the others. Generally, the planters' household size are almost the same ranging from four to five members per household. As the farm size increases, their total yearly household income together with the household income from sugarcane also increases. This can be supported by the gathered data on planters' primary occupation; 95% of them has farming as their primary occupation. Even as secondary occupation, almost half of them do farming. Most of the planters are owner operator of the land they till with one to five parcels of land.

Characteristics of the Sample Farms. Sample farms belonging to Small-A and Small-B subgroups have average farm areas of 1 hectare and 5 hectares, respectively, while those belonging to medium and large groups have farm areas of 28 hectares and 126 hectares, respectively. Majority of the sample farms of each size group has the ideal flat topography, except for farms belonging to large group with majority of them being flat-slightly rolling. Furthermore, mostly have clay loam soil. Majority of the farms from different size groups are rainfed, with 98% and 91% rainfed farms in Small-A and Small-B subgroups, respectively. The new plant variety that is being used by majority of planters from different farm sizes is the VMC 84-524 sugarcane variety. Likewise, majority of the farms from different size groups have ratoon with VMC 84-524 sugarcane variety.

Farm Production and Land Productivity. The average ton cane production of sample farms were 84 tons among Small-A farms, 286 tons among Small-B farms, 2000 tons among medium farms, and 10,257 tons among Large farms. In terms of land productivity or yield per hectare, the overall average for all samples was 66 tons of cane. Larger farms generally obtained greater yields than small ones—Small-A and Small-B have an average production of 63 and 62 tons per hectare, respectively, while medium and large-sized farms obtained an average of 66 and 76 tons per hectare, respectively.

Farm Area, Farm Production, and Land Productivity with New Plant. Larger farms generally cover more area with new plant and has greater average total cane production compared to small ones. Small-A, Small-B, Medium, and Large farms produced 54 tons, 576 tons, 1,053 tons, and 6,422 tons, respectively. Moreover, larger farms generally obtained greater new plant yields than small ones. The average new plant yield is 62 tons per ha among Small-A farms, 63 tons per ha among Small-B farms, 72 tons per ha among Medium farms, and 80 tons per ha among Large farms.

Farm Area, Farm Production, and Land Productivity with Ratoon. Larger farms generally cover more area with ratoon and had greater average total cane production compared to small ones—Small-A, Small-B, Medium, and Large farms produced 79 tons, 209 tons, 1,113 tons, and 4,012 tons, respectively. Moreover, larger farms generally obtained greater ratoon yields than small ones. The average new plant yield is 63 tons per hectare among Small-A farms, 60 tons per hectare among Small-B farms, 62 tons per hectare among Medium farms, and 73 tons per hectare among large farms.

Constraints on Sugarcane Production and Land Productivity. The most commonly cited constraint on sugarcane production and land productivity across different farm sizes is the lack or high cost of labor especially during harvesting season while some of the large planter-respondents are also having manpower shortage during weeding season. Due to high cost and shortage of labor, they have the tendency to experience delayed harvesting operations and therefore might lose the chance to have their output sold at a high price.

The second most commonly cited constraint is the changing weather patterns (42%). For instance, their application of fertilizer tend to be delayed and too much heat might cause the sugarcane to wilt while excessive rainfall could reduce its sugar content.

Prevalence of pests (29%) is also a problem and just like in Batangas province, pests such as white grubs and termites and are also found in Negros Occidental.

Other common constraints cited by the planter-respondents were lack of capital (23%), high cost of inputs (16%), lack/ high cost of machineries and equipment (16%), and soil type/ topography (12%). There were also numerous other constraints but were cited sparingly, e.g. low sugar yield, absence of new technologies/ varieties, drought, fertilizer usage, lack of equipment and machinery, inefficient farming systems, management capability, number of ratoons, cane quality, weeds, rice volatility, weeds, CARP, and taxes.

Reasons for Non-Expansion. Majority (82%) of the sugarcane planter-respondents did not expand for the last five years mainly due to the unavailability of land (53%). Some of the areas are now being converted to residential and recreational purposes. The next most commonly cited reason was the lack/ no capital (35%) while some of them are being constrained by the lack/ expensive labor (23%). Other commonly cited constraints were low/ fluctuating sugar prices (12%) and having fixed land area (10%).

Input Sourcing/Procurement. Majority (52%) of the sugarcane planter-respondents did not encounter problems in acquiring inputs. However, 48% of them had a problem in terms of availability (24%), accessibility (23%), and lack of capital (20%). Most of them complained about having shortage of cheaper and high quality fertilizer. Hence, they tend to buy what is readily available in the market. Other commonly encountered problems include high cost of procurement/transportation (14%), price fluctuations (11%), high costs (9%) and delayed delivery (7%). Majority (81%) of them picked-up the inputs they purchase, while the rest (19%) preferred their inputs to be delivered and pay on a per sack basis, e.g. PhP 10/sack (See Tables 32 & 33).

Awareness of the Presence of Banks and Non-Banks Financial Institutions. Majority (65%) of the planter-respondents are aware of the existence of banks in their areas which offers financial services for sugarcane planters, like Landbank, Marayo Bank, UCPB, etc. On the other hand, 63% of them are also aware of the existence of non-bank financial institutions like Neptune, Boston, MACARBEN, etc.

Credit information. Majority (68%) of the sugarcane planter-respondents did not borrow capital for the last five years while the rest (32%) availed credit mostly from their respective associations, mills and traders (50%), relatives (43%) and cooperatives (33%) while only few of them availed credit from the bank (22%). Most of them availed cash (72%) and a few of them had an in kind credit (9%) while some of them availed both cash and in kind (20%). Usually cooperatives and associations provide credit in kind, i.e., a farmer can avail 10 sacks of fertilizer and their payment will be automatically deducted from their output during harvest season. On the average, the sugarcane planter-respondents had a total loan amount of PhP68,864 (Small-A), PhP100,000 (Small-B), PhP152,000 (Medium) and PhP232,857 (Large). Results showed that most of the planter-respondents acquired credit in order to pay for their farm laborers (78%) and to purchase fertilizers (67%). It can also be inferred that part of their credit acquisition are being devoted for household expenditure (37%), purchase/ payment for machineries/ equipment (30%), purchase of material inputs (20%) and purchase of herbicides and other chemicals (9%). Among the 46 sugarcane planter-borrowers, 87% of them encountered problems such as high interest rates (61%), inadequacy of loan amount (57%) and untimely release (13%). In addition, the respondents were also asked regarding the organization that can best facilitate credit services and results showed that most of them still preferred banks (37%).

Access to Extension Supports. Out of the 145 sample sugarcane planter-respondents, only 20% of them were able to have access to extension support from the government while 24% of them had an access to non-government extension supports for the last five years. Some of the private institutions like, Philsurin and Alter Trade Philippines, provide the sugarcane planters access to material inputs (e.g., provision of new HYVs), machineries/ equipment (e.g, ram pump irrigation facilities) and soil analysis. However only 34% of the sugarcane planter-respondents are aware of the existence of the private technology providers, nonetheless majority (68%) of them are still willing to pay for additional services in order to improve sugarcane farming/ production. Based 13% of them adopted new technologies.

There are seminars and trainings being organized by the different government institutions including Department of Agriculture and Sugar Regulatory Administration for the past five years, however, only few (27%) of them were able to participate for some reasons. Some of them could
not afford going to the seminar sites while some are not just interested. According to them, the concerned institutions should hold seminars and trainings not just on the technical aspect of production but also into management (farm record keeping), financial literacy and marketing.

Planters Associations & Cooperatives. In Negros Occidental, sugarcane planters are required to become a member of an association/cooperative in order for them to bring their canes to the respective millers and to be able to market their sugar. Each of the association maintains a workforce in the sugar mill premises that monitors data and equipment to protect the integrity of the cane weights and analysis of cane deliveries. Normally, they have personnel in the scale house and core sampling laboratory. Also, they have personnel who monitor periodically the calibration of the weighing equipment in the factory, compute the balance of stocks in the

warehouses and molasses volume in the tanks. The associations also offer services related to Social Amelioration Program (SAP) like maternity and death benefits of sugarcane farm workers of planter-members through the Department of Labor and Employment (DOLE). Other services being offered by the associations also include mudpress and mill ash withdrawal, trip tickets to the mills, road repair and crop inspection, soil analysis, double-coring/LkgTC and trash appraisal monitoring.

In La Carlota MD, there are two planters' associations that serve the entire mill district. Apart from negotiation and monitoring, the association also provides scholarship programs through Sugar Industry Foundation, Inc. (SIFI), offers patronage refund of around PhP10 per Lkg and sells fertilizer to their planter members.

In the case of Victorias MD, there are 5 district and 12 non-district or extended associations. District associations are from the areas such as Victorias City, Cadiz and Manapla, while outside these areas are considered to be non-district who deliver canes to VMC. On the average, cooperatives charge between PhP5.00 to PhP10.00 per Lkg as service fee. Aside from negotiation, monitoring and marketing, the associations/ cooperatives also provide services including input supplies, financing, transloading and access to machineries and equipment.

Input Suppliers. There are numerous input suppliers in Negros Occidental, hence planters have options on where to purchase. A total of 10 input supplier-respondents were interviewed in the study, 7 of which are the regular stores and dealers found in the area while 3 of them are planters' association/cooperatives. The dealer's mark-up price for fertilizer ranges from PhP10.00 to PhP30.00, while associations/cooperatives put a mark-up price between PhP10.00 to PhP20.00 per bag. Some associations (e.g. VICMICO) assist the planters in purchasing tractors, trucks, tires, diesel fuel and cane knives.

Financing Service Providers. Aside from the formal banking institutions like Landbank, PNB and DBP, other prominent banks that provide access to financing for sugarcane planters in Negros Occidental also include Marayo Bank and Dungganon Bank Inc. The type of loans vary from agricultural/ production/crop loans, truck loans, educational and real estate loans. Normally, aside from the usual paper requirements, these banks also require the submission of the previous three consecutive volume of production of the planter borrower. The interest rates range from 11 to 22 percent per annum.

The small planters usually access credit from their respective associations/ cooperatives. They can actually avail loans and services like molasses advances, fertilizer loans, and *quedan* financing. *Quedan* financing allows the planter members to continue operations by having their quedans financed by banking institutions (e.g., LBP, Bank of Commerce, BDO) and not sold at cheaper prices. With this kind of financing, the planter member can avail funds from the banks to help them in their cash flow. Loans from associations/cooperatives are being paid during milling season and automatically deducted from the planter's *quedan* proceedings.

Sugar Mills. There are 9 operating sugar mills in Negros Occidental. The study covered only two mill districts, which are La Carlota and Victorias. However, some of the planter-respondents also happened to bring their canes to the remaining seven mills including BISCOM, Lopez, URC-SONEDCO, Hawaiian Phil, First Farmers, OPTION and Sagay Central. The planters-millers sharing scheme is based on the capacity of mills and it usually ranges to 30-35 percent (millers' share) and 65-70 percent (planters' share). However, the net planter's share may vary depending on their respective association charges. Victorias Milling Company (VMC) and Central Azucarera de la Carlota Inc. (CACI) are the two largest mills in the area with milling capacity of 16,000 TC per day. Since there is a stiff competition among the mills, they have different styles and services. Milling companies have transloading stations to aid the hauling of canes. Also, trucking subsidies are being offered which vary depending on the distance, usually it ranges from PhP30.00 to PhP280 per ton. There also incentives in volume and fresh canes.

Research Development & Extension Service Providers. Just like in Batangas, there are MDOs and MDDCs in every mill district. MDDC in La Carlota provides assistance/ services such as custom plowing (PhP9500/ha), canepoints dispersal (PhP2700/lacsa), soil analysis, and mudpress loading (PhP400/ truck load). Currently, the institution is launching the use of VMC 84-524, Phil 86-550, PSR 07-195, PSR 07-66, Phil 07-45, Phil 02-272, Phil 03-171, Phil 06-2289, and Phil 00-0791. MDDC serves a total of 60 municipalities, including La Carlota, La Castellana and Pontevedra.

Interfirm Relationships. Inter-firm relationships refer to the type of coordination or cooperation in the value chain. Strong coordination between and among players through horizontal (e.g. farmer to farmer or farmers' coop to other farmers' coop) or vertical integration (e.g., farmer to mill or farmer to traders) is important to take advantage of market opportunities. Support services enable the different functions or vertical linkages in a value chain (e.g., financing, RDE, technology, logistics, advisory services, product design, and other services). For horizontal relationship analysis, six parameters were used which include, price and technological information sharing, input bulk buying, collaboration in marketing, trust and their competition level. Results revealed that, there is a strong relationship among the farmers in terms of price information sharing. Majority of them are members of the cooperatives/ associations. Pricing and marketing of their output are not a major concern as majority of them rely on their cooperatives/associations in determining the prices and in seeking buyers. On the other hand, there is a weak relationship among them in terms of technological information sharing. They do not often discuss and exchange information about the newly available technologies. Majority of them still rely on their traditional way of farm practices. In terms of buying farm inputs, there is a weak relationship among them, since majority of them prefer to buy on their own. Although, it will be cheaper for them to buy in bulk, the availability of their capital for inputs are not always readily available. Meanwhile, their degree of trust to each other is strong in general, thereby making their competition level, weak in general.

On the other hand, for vertical relationship analysis, parameters such as supply contract, price and technological information sharing, value added services, quality control and trust were used.

Farmer to Input suppliers. In terms of procurement/ supply contract, farmers and input suppliers have a strong relationship. Some of them can actually avail credit in kind and pay in cash within a month or in *quedan* form during harvesting season. Also, there is a strong relationship that exists between them in sharing price information. Farmers are always being updated to the existing prices as well as price changes. However, results showed that there is a weak relationship in general between them in terms of technological information. There are few who were offered new brands of fertilizers and herbicides by their suppliers. Most of the planter-respondents do not also often check the quality of inputs they buy, hence they have a weak relationship in terms of quality control. They often buy what is readily available at a cheaper price. This also implies their strong trust to their suppliers.

Farmer to Miller. Out of the 9 milling companies that serve the area, 7 of them were identified by the sample planter-respondents to whom they brought their cane for milling for the crop year 2016-17. Results showed that Victorias (40%). La Carlota (29%) and Lopez (16%) were the top milling destinations. There is a strong relationship between planters and the miller in general. Factors such as its proximity, sharing arrangement, subsidy, benefits, incentives and price offered are being considered by the planters in choosing where to mill. In terms of price and technological information, value added services and trust there is a weak relationship in general between them. Planter-respondents demand for transparency in each aspect. On the other hand, in terms of quality control, strong relationship exists. Mills offer incentives to green canes and penalties to burnt canes. They also have standard trash deductions schedules, which serve as their guide in measuring the percentage of purity and sugar that can be obtain from the cane.

Farmer to Traders. Their sugar quedan is being bought by their respective associations/ cooperatives. Their associations/ cooperatives are the ones who take charge in marketing their output. Their associations/ cooperatives will just deduct marketing fees, e.g, PhP2/ LkG. Some of the associations/ cooperatives also function as domestic/ international traders as well as the milling companies. In general, results showed that there is a weak relationship between planters and sugar traders. Basically, planters do not know specifically to whom their sugar is being sold.

NEGROS ORIENTAL PROVINCE

Sampling procedure. In CY 2016-2017, a total of 275,055 hectares are planted with sugarcane in Visayas, wherein, Negros Oriental has approximately 35% or about 94,882 hectares of total area planted with sugarcane. There are three milling companies which are located and serve the province of Negros Oriental, namely, Central Azucarera de Bais (CAB), Bais-URSUMCO and URC Tolong. There are about two mill districts in the province which includes, Tolong (11,549 hectare) and Bais (28,596 hectare). The former covers the municipalities of Siaton to Basay City, while the latter covers the town of La Libertad down to Zamboangita area. ***Stratified random***

sampling was employed in the selection of the planter-respondents. The top municipalities covered were chosen in terms of farm area and number of planters. The municipalities included from Bais MD are Bais City, Pamplona, Tanjay City, while Bayawan City, Sta. Catalina and Siaton represented the Tolong MD. A total of 122 planter-respondents from Bais MD and Tolong MD were interviewed and were classified as small (subdivided into three groups; 3 hectares and below, 5 hectares and below and 10 hectares and below), medium (10.01 to 50 hectares) and large (above 50 hectares).

Socio-economic Characteristics of the Planter-Respondents. Planters having different farm sizes generally have almost the same age and are male dominated. Planters holding larger farms are generally more educated and more experienced, with large farm holders being the most experienced. Large farm holders also started farming at an early age, averaging to 30 years old, relative to the others. Generally, the average planters' household size are almost the same ranging from four to five members per household. As the farm size increases, their total yearly household income together with the household income from sugarcane also increases. This can be supported by the gathered data on planters' primary occupation; 95% of them have farming as their primary occupation. Even as secondary occupation, almost half of them do farming. Most of the planters are owner operator of the land they till with one to seven parcels of land.

Characteristics of the Sample Farms. Sample farms belonging to small group have an average farm area of 3.53 hectare, while those belonging to medium and large groups have farm areas of 22.41 hectares and 136.28 hectares, respectively. Majority of the sample farms of each size group has a slightly rolling topography, that is why some of the farms could not fully mechanized their farm operations. Furthermore, mostly have clay loam and sandy loam soil, which are considered to be good quality of soil for sugarcane. Majority of the farms from different size groups are rain-fed (71%), while 29% of them have irrigation system. Majority of the irrigated farms are owned by the large planter-respondents, thus, they use different irrigation system like, overhead sprinkler, drip and water pump irrigation system. Apparently, only one planter-respondent belonging to medium-sized group has only irrigated farm, mainly because some of them complained about the water source, hence they do not invest to irrigation facilities.

In terms of cane planted, only 9% of them has a new plant, while most of them (48%) are planted with ratoon and about 43% of them have both new plant and ratoon planted. The average number of ratoons noted was about 4 to 5. With regards to the sugarcane varieties planted, still VMC 84-524 dominates, while only some, especially the medium and large planters were able to access to new varieties like 2000 series launched by Philsurin. Meanwhile, among the sugarcane varieties, Phil 99-1793, has a positive feedback from the planter-respondents. This variety, according to them has a yield potential of up to 170 TC/hectare and approximately 2.1 LkG/TC. Also, aside from its good tonnage and LkG/TC characteristics, agronomic traits include self detrashing, drought tolerance, good germinator and fast grower.

Farm Production and Land Productivity. The average ton cane production of sample farms were 109 tons among Small (3 hectare and below) farms, 150 tons among Small (5 hectare and below), 203 tons among Small (10 hectare and below) farms, 1,255 tons among Medium farms and 9,783 tons among Large farms. On the average, Negros Oriental has an average production of 2,660 tons. In terms of land productivity or yield per hectare, the overall average for all samples was 57.6 tons of cane which is lower compared to Negros Occidental with 66 tons per hectare. Larger farms generally obtained greater yields than small ones. Small farms had an average of 56 tons per hectare, while large-sized farms obtained an average of 65 tons per hectare. Noticeably, yield per hectare of the medium-sized farm seemed to be lower than the small-sized farms. Medium-sized farms had an average yield of 54 tons per hectare. This might be due to the farm protocols of the planter-respondents interviewed. In terms of the number of bags of sugar produced for the crop year 2016-17, sampled respondents in Negros Oriental has an average of 100 Lkg per hectare. Small farms had an average of 91 Lkg per hectare, while the medium-sized and large-sized farms obtained an average of 97 and 127 Lkg per ha respectively. Meanwhile, their average sugar factor or LKG/TC received ranges from 0.6 to 4.2.

Reasons for Non-expansion. Out of the 122 planter-respondents, 78% of them did not expand their area devoted to sugarcane farming for the last five years. Among the top reasons for non-expansion were lack/ no capital (41%), lack/ no available land (39%), lack/ expensive labor (37%) and inconsistencies of LKG/TC (17%). Other commonly cited reasons were low/ fluctuating prices (12%), some couldn't manage activities (6%), low sugarcane yield (4%), crop diversification (3%), and CARP (3%).

On the other hand, 22% of them expanded their farm area for some reasons like source of additional income, while some of the large farms has a capital for expansion.

Constraints on Sugarcane Production and Land Productivity. The most commonly cited constraint on sugarcane production and land productivity across different farm sizes was still the lack or high cost of labor especially during harvesting season while some of the large planter-respondents are also having manpower shortage during weeding season. Due to high cost and shortage of labor, they have the tendency to experience delayed harvesting operations and therefore might lose the chance to have their output sold at a high price. Also, other planters were not able to deliver their canes right before the mills within their reach close their milling schedules.

The second most commonly cited constraint is the changing weather patterns (34%). For instance, their application of fertilizer tends to be delayed and too much heat might cause the sugarcane to wilt, while excessive rainfall could reduce its sugar content. Prevalence of pests (33%) is also a problem and just like in Batangas and Negros Occidental provinces, pests such as white grubs and termites and can also be found in Negros Oriental.

Furthermore, millers/ milling inefficiencies is also seen as a constraint by the planter-respondents. They complain about the LKG/TC results which seems to be inconsistent. Other common constraints cited by the planter-respondents were: high cost of inputs (26%), price volatility (23%) and CARP (12%). There were also numerous other constraints but were cited sparingly, e.g. low sugar yield, absence of new technologies/ varieties, drought, fertilizer usage, lack of equipment and machinery, inefficient farming systems, management capability, number of ratoons, cane quality, weeds, price volatility, weeds, high cost of hauling, lack/no irrigation facilities, poor farm to mill roads and taxes.

Farm Production and Land Productivity Planted with New Plant. Large-sized farms cover more farm areas planted with new plant compared to the small ones. Some planters were hesitant to buy cane points for planting which are relatively costly. On the average, cane points cost about PhP2000 per lacsa, while the 2000 series varieties costs up to PhP2700 on per lacsa basis. Moreover, as the farm size increases yield per hectare also increases. On the average, yield per hectare with new plant is 58 TC for large-sized farms, while 46 TC, 48 TC and 53 TC, for small farms with 3 ha and below, 5 ha and below and 10 ha and below, respectively. Medium-sized farms have an average yield of 55 TC.

Farm Production and Land Productivity planted with Ratoon. Most of the planters-respondents have their farm planted with ratoon. Majority of them (51%) belong to the small-sized farms.

Meanwhile, most of these large farms planted first up to second ratoon only, because they believe that more than two ratoons will yield to lower output. Moreover, large-sized farms still had the highest yield, with 63 TC, among the farm sizes. Noticeably, the yield per hectare of medium-sized farm (52 TC) is relatively lower compared to the 59 TC yield of the small-sized farms.

Constraints to Inputs Sourcing. Forty eight percent of the planter-respondents encountered problems in acquiring inputs. Majority of them are actually the planter-respondents belonging to the small-sized farms. Among the top cited problems were price (52%), availability (42%), accessibility (42%) and shortage (22%). Large planters do not have problems when it comes to inputs access in general, since they have their own procurement system, wherein they usually have an advance or pre-order of inputs they need (material inputs, fertilizers and other machineries and equipment). In Negros Oriental, access to material inputs is not a major problem, however prices of new high yielding varieties are relatively higher (e.g, PhP2700/ lacsa), hence most of the planter-respondents, especially the small ones are hesitant of purchasing these varieties. When it comes to fertilizers, Viking Ship, Amigo Planters and Harvesters are the most patronize brands when it comes to quality. However, these brands are costly, depending on grades.

Credit Information. In Negros Oriental, there is a relatively fewer credit institutions compared to Negros Occidental. Out of the 122 planter-respondents, only 35% of them availed credit for the past five years mainly for capitalization, purchase of inputs and payment for laborers. Most of them availed credit from the non-bank institutions such as associations and cooperatives. Their payment will be automatically deducted from their sugar proceedings. However, some problems were cited by the planter-respondents in credit availment including, inadequacy (84%), high interest rates offered (67%) and tedious requirements (7%). On the average,

planter-borrowers belonging to the large-sized farms had an average loan amount of PhP4,991,818 which is higher compared to the average loan amount of the small ones.

Extension support services received by the Planter-respondents. Only few of the planter-respondents received extension support from both government and non-government agencies. Forty percent of them received assistance from the government and most of them are from Bayawan City covered by Tolong mill district. Its local government has an active involvement to the sugarcane industry in their area. Part of their program is the provision of free plowing and harrowing services and dissemination of maximum of four bags of Diammonium phosphate (18-46-0) fertilizer per hectare. The planter-beneficiary is allowed up to a maximum of 4 hectares only to be assisted by the program.

On the other hand, majority of the planter-respondents are not aware of the availability of newly developed technologies, hence majority of them did not also adopt any of the technologies. Newly launched technologies like high yielding varieties and high-end equipment like cane loaders and mechanical harvesters can only be accessed by the large planters themselves.

TARLAC PROVINCE

Sampling Procedure. Seven municipalities in the province of Tarlac were initially selected for research. These are Bamban, Capas, Concepcion, Gerona, Paniqui, Tarlac City, and Victoria. ***Stratified random sampling*** was used, resulting to different number of target planters to be interviewed from each municipality. Planters-respondents were classified according to the size of their farms. There are planters which are also interviewed from other municipalities like Pura, Ramos, and San Manuel. Total respondents are 130 from farms which are classified as small (10 hectares and below), medium (10.01 to 50 hectares) and large (above 50 hectares).

One-third of small planters came from the municipality of Victoria. This is followed by Gerona and Paniqui. In the case of medium-sized farms, most of them came from Capas, while large planters also came from Capas and Concepcion (18%). Farms were classified in order to know if there are significant differences among farms on production, marketing, and other factors involved in the industry.

Socio-Economic Characteristics of the Sample Planters. In general, most planters are middle-aged, with an average year of 55 years. These planters are relatively younger with an average of 50 years old. For gender, more than 80% of planters are male, uniform to all farm size.

Educational attainment are classified as elementary graduate (EU), elementary graduate (EG), high school undergraduate (HU), high school graduate (HG), college undergraduate (CU), college undergraduate (CG), and post-graduate (PG). Most planters from all farm sizes, have graduated college and obtained a degree, with the large planters having the highest percentage of 62%. This ratio is twice of that of small planters which is just 30% and very close to the number of high school graduates.

The family size of the planter-respondents range from four to six members. Percentages vary among size brackets, next to family of five, small planters usually live with two or less family member, while medium planters live with more than five.

The main occupation or source of income of the planter-respondents are categorized into farmer (F), government employee (GE), private employee (PE), laborer (L), and self-employed (SE). More than 90% of planters (small and medium) received their income from farming (sugarcane or rice), and a little less of this percentage for large planters which is 88%. Among the government employees or laborers interviewed considered their job only as secondary occupation, since they are more involved in sugarcane farming and treat as their main source of income. There were also a few respondents who are working in private institutions or have their own business and treat sugarcane farming as secondary source of income.

Based from the primary occupation and other sources of income of the household of the planter-respondents, the figure above shows their annual household income. The income was computed annually since there is only one cropping season for sugarcane. The average annual income of planters is roughly half a million pesos, which is just one-third of the income of medium planters. Large planters owning a farm of more than 100 hectares,

have an average annual income of more than PhP 10 million. Seventy-five percent of the household income came from sugarcane farming.

For small planters, 59% of them own the land they till, and 16% are either owned or leased. This is very low compared to medium and large planters since who almost 50% of them are owner-operators and lessee at the same time. Fifteen respondents received certification of land ownership award (CLOA) and were granted a parcel of land from the Department of Agrarian Reform (DAR).

In summary, sugarcane planters in Tarlac are male, middle-aged, has college degrees, belong to a family of five, do farming from their own land as their main source of income, and earns PhP 2 million per year.

Characteristics of the Sample Farms. The characteristics of farms are described based on the total area, number of parcels of land, irrigation, land features like topography, soil type, furrow distance, area planted with new plant and ratoon.

Out of 130 planters, 64 or 49% of them have farms with an area of 10 hectares and below, which is twice the number of respondents-large planters (50 hectares and above). On the other hand, forty planters have medium-sized farms (10.1 to 50 hectares). Small and medium planters have one parcel of land, while 35% of large planters have one. The remaining 75% of them owns more than one up to five parcels of land. This is because most of them owns and lease from other areas or outside their barangay or municipality.

Irrigation or water supply is very important in farming. It is an established fact that crops need water in order to grow. Around 70% of sugarcane farms in Tarlac are irrigated, the remaining 30% are depending their water supply from rainfall. Majority of the planters also use deep well irrigation in their farms.

More than 80% of the farm have flat topography, with sandy loam type of soil, and with a furrow distance of 1.5 meters since most of them practice mechanized farming.

It was also found out that most of planters-respondents did not plant in the last crop year and harvested from ratoon plants instead. Forty-four percent of the planters only devoted a quarter or half of their total farm area for new plant.

There are different varieties used or planted in Tarlac mill district. The usual or main variety used by Tarlac planters is 99 series, although many large planters also use VMC 84-524.

Planters commonly use urea, ammonium sulfate, ammonium phosphate, complete, and potash as their fertilizers. The most common brand of fertilizer is Swire. For herbicides, only 44% of them uses chemical, which is 2-4D, while the rest of the respondents do manual weeding.

Farm Production and Land Productivity. Twenty-five percent of sugarcane farms harvested in Tarlac yield within the range of 51-60 ton canes per hectare. The total average yield for the province is 60.4 tc/hectare. This finding follows the trend of the average sugarcane yield in the Philippines which is around 60.4 tc/ha in 2010-2014, and is also 4.5% higher than the average yield in Batangas (58 tc/ha). Among the farm classifications, small planters have higher yield of 63 tc/ha and medium and large planters have not reached 60 tc/ha. It can also be observed that only small and medium planters have yields higher than 90tc/ha.

Based from these yields, the average bags of sugar produced from the mill district is 85 Lkg and using the conversion formula, this results to a PSTc value of 1.10. Large planters have the highest average number of bags of sugar with a value of 88 Lkg/ha. Further analysis will be employed in order to know the cause of the difference in yield and PSTC values among planters.

Planter-respondents were also asked directly regarding the constraints of their farms' productivity. Multiple answers were recorded, and the data shows that most of them have problems in accessing or paying for labor. Medium and large planters experience this more, due to the higher number of laborers they need. Other problems mentioned by planters are sugarcane burning, unavailability of machineries, lack of government support, quality of soil, and unawareness with new technologies.

It can also be seen that large planters do not have a problem when it comes to capital, this can be attributed to their higher income. On the other hand, almost 15% of small planters are facing this problem and more than 25% of them lack inputs or cannot procure due to lack of supply or high costs.
In general, only 22% of the planters expanded their farms. The rest of them did not expand, and even converted their lands for other crops due to the problems mentioned above, and also due to the low price of sugar, resulting to lower income.

Facility Machine Availability. Almost all planters in Tarlac practice mechanization, especially medium and large planters. Table 7 shows the availability and access for the different facility or machine that planters use in sugarcane farming. Looking on the data, all planters believe that tractor is available in their area, and 45% of them have their own tractors (light and/or heavy). In terms of trucking, only two planters cited that trucking service is unavailable in their area. These planters are from Victoria and Paniqui. Twenty-five out of 26 (96%) planters have their own trucks while 63% of small planters rent from the mill or from medium and/or large planters. The last machine evaluated was harvester, and only 27% of the planters did not use or rent the machine, most of them came from the small planters group since medium and large planters are prioritized when renting. Only four out of 130 planters own harvester, since the machine is very expensive. These are large planters with more than 100 hectares, two of them personally own their farms, while the other two are corporations.

Research, Development, and Extension (RDE) Services. RDE services refer to any kind of support received by the planters, given by government and/or private institutions. These services can be in the form of farm visits, provision of technical advice and materials, farmer field school, study tour, school on the air, seminar or trainings, soil analysis and fertilizer recommendation, and post-harvest or processing technology.

Overall, only 30% of the all planters received extension service from the government institutions, while half of them received the services from private institutions like the miller. Extension services like farm visits and seminars/trainings from the government mostly came from SRA. Forty percent of the sampled planter population were able to attend seminars which are mostly about improving production, farm operations, mechanization, and introduction of new varieties.

When asked if they are willing to pay for technical services, 41% of the planters answered yes as long as it will help their production. Forty-two percent of the planters are also aware of new technologies developed like new varieties and fertilizers, new implements, and the mechanical planter, but only 31% of them adopted it. These new technologies were provided by CAT and SRA.

Credit Support Services. Forty-seven out of 130 planter-respondents are familiar or aware of banks that provide loans for sugarcane farming. These are FICO bank, Landbank, Rural Bank of Angeles, Security Bank, Signa Bank, and United Coconut Planters Bank. On the other hand, there are also non-bank institutions providing loans, wherein most planters are more aware of. These are Agrikulto Inc., ASKI (Alalay Sa Kaunlaran Inc.), ASUCAL, CAT, CATPA, Mabilog Cooperative, NCPAT, PhilSuCor, Tinang SN MPC, and informal like Benito Chan, Dra. Lourdes Plaminiano, and Baby Garvez. Eighty-five or 65% of the planters have availed loan either from bank or non-bank institutions in the last five years.

It can be observed that small and medium planters borrow less amount than large planters, which is logical given their farm size needs and income. The average amount borrowed by planters within the last five years was PhP 342,000 was given in cash. The interest rate varies among the institutions providing the loan and it ranges from 0.8% to 31% per annum. Planters pay the loan through installment, quedan, or by selling their molasses to the lender.

Marketing. All of the planters in Tarlac mill their harvest in CAT, since it is the only miller in the province, but 61% of them have no idea regarding the sharing arrangement among the producer, miller and association. In ASUCAL and CATPA the sharing arrangement is 0.66-0.33-0.01, in NCPAT, 0.62-0.37-0.01, for producer, miller, and association respectively.

The average trucking subsidy given to the planters is PhP 31/ton. Small and medium planters sell their harvest through their associations while large planters while 54% of large planters sell directly to traders. Planters do

not have problem regarding the logistics of marketing, but rather on the fluctuating and low price of sugar, thirty-six percent of the planters identified this as their major marketing problem.

Membership in Organizations. As mentioned in the last report, there are cooperatives and associations present in Tarlac province. These are Mabilog Cooperative, Sapang Multi-purpose Cooperative, Tinang SN Multi-purpose Cooperative, Association of Sugar Planters of Central Luzon (ASUCAL), Central Asucarera de Tarlac Planters' Association, and North Cluster Planters' Association of Tarlac (NCPAT). These groups usually market planters' produce from the miller.

Forty-four percent of Tarlac planters are members of ASUCAL, majority of the members are small planters. Thirty-three percent are CATPA members while only 10% belong to NCPAT, this is because the organization is just mainly composed of planters from the northern municipalities in the province like Paniqui and Gerona. When asked if they experience any organization-related problem, only seven planters responded and mentioned issues in price differential, transparency, and same set of board of directors, but the 95% of them are generally satisfied with their organization.

DON PEDRO MILL DISTRICT

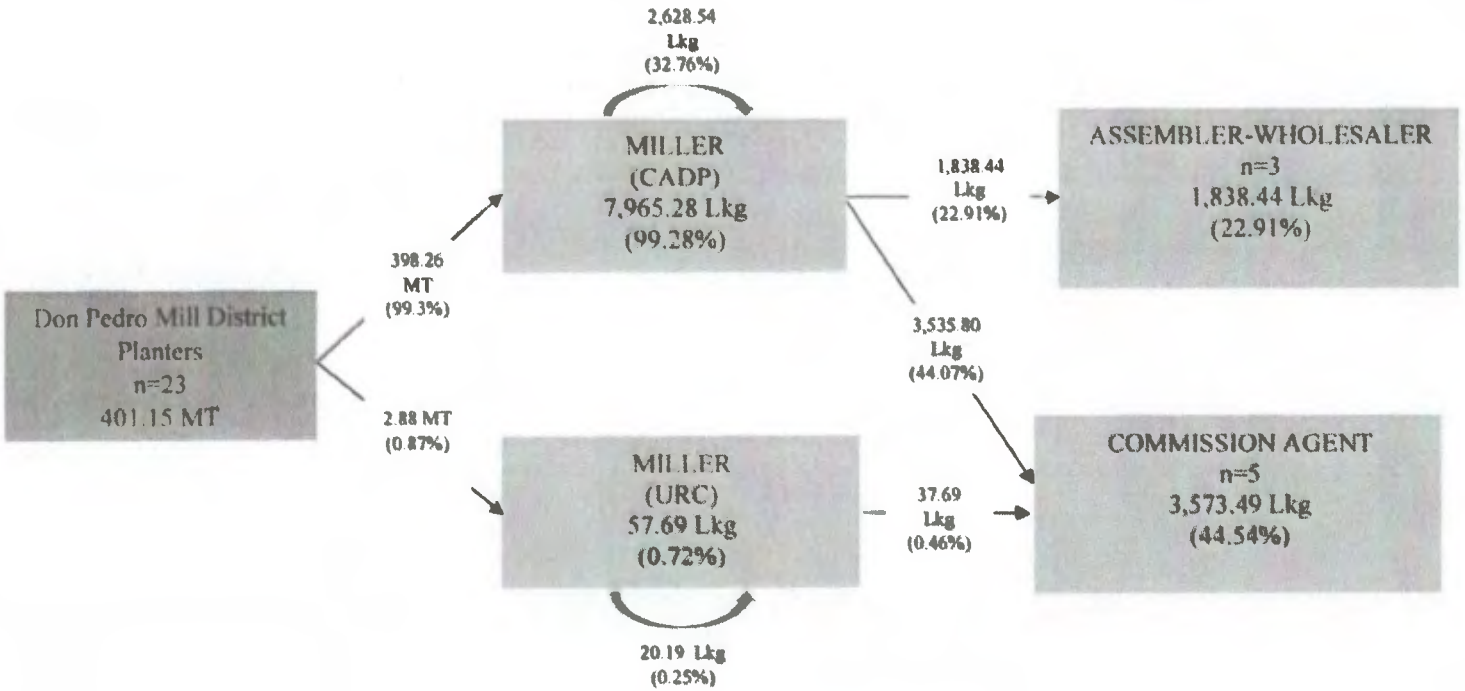

Figure 1. Flow of sugar *quedan* in Don Pedro Mill District, CY 2016-2017

BALAYAN MILL DISTRICT

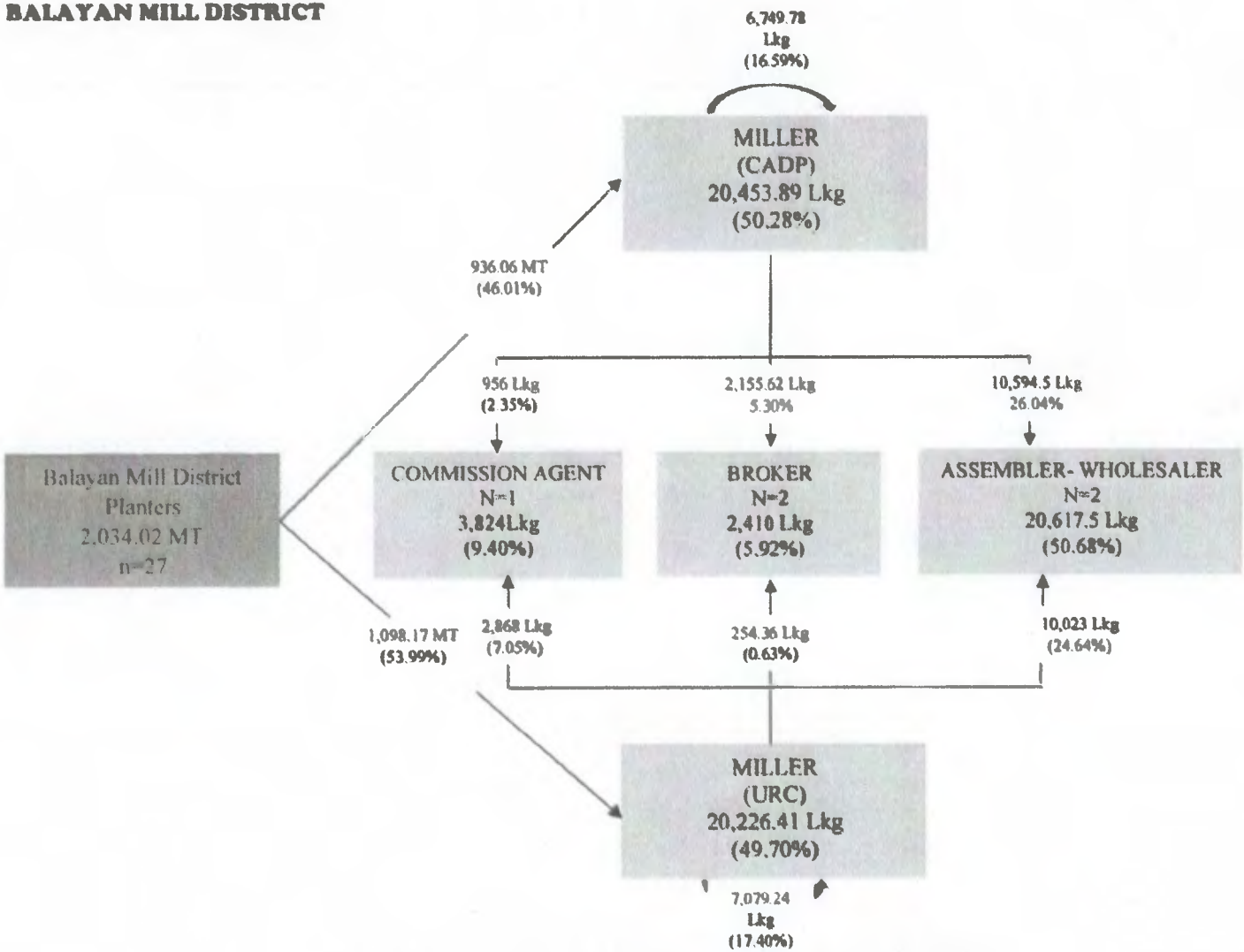

Figure 2. Flow of sugar *quedan* in Balayan Mill District, CY 2016-2017

OBJECTIVE	ANALYSIS OF SUGARCANE SUPPLY/VALUE CHAIN IN SOME MAJOR SUGARCANE-PRODUCING PROVINCES IN THE PHILIPPINES Sugarcane Farmers' Questionnaire	CONFIDENTIALITY
The major goal of the project is to come up with upgrading strategies to make the sugar industry efficient and competitive, thereby increase the income of the people in the industry.		The researchers take responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data will be used for academic/research purposes only.

Record No. _____ Date: _____ Interviewer: _____

Name of Respondent: _____ Address: _____

Contact Number:_____

I. SOCIO-ECONOMIC PROFILE

Age	Sex [a]	Educ'l Attainment[b]	Years in Sugarcane Farming	Tenurial Status[c]	Occupation[d]		Household Size	Monthly Household Income (PhP)	
					Primary	Secondary		Primary	Secondary

[a] M – male, F – female

[b] E – Elementary, HS – High School, C – College, PG – Post Graduate

[c] OO – Owner-operator, PO – Part-owner, L – Lessee, ST – Share tenant, O – Others

[d] F – Farmer (specify crop and cropping pattern), GE – Government Employee, PE – Private Employee, L – Laborer
BO – Business Owner, U – Unemployed, O – Others (specify)

II. FARM CHARACTERISTICS

Parcel/Location	Topo-graphy[a]	Soil Type[b]	Farm Area (ha)		Variety	Yield (TC/ha)
			Total	NP/RT[c]		
1.						
2.						
3.						
4.						

[a] F – Flat, SR – Slightly rolling, R – Rolling

[b] C – Clayey, CL – Clay loam, SL – Sandy loam, S – Sandy

[c] 1 – First, 2 – Second, 3 – Third, 4 – Fourth, 5 – Fifth, 6 – Sixth

III. CROP YIELDS AND PRODUCTIVITY CONSTRAINTS

1. Did you expand your cultivated area devoted to sugarcane for the past 5 years? [ ] Yes [ ] No
2. What are the major reasons for expanding/not expanding? List in the order of importance or rank.
   1. _____ 3. _____
   2. _____ 4. _____

3. What are the constraints to sugarcane productivity in your farm? List in the order of importance or rank.

1. _____ 4. _____
2. _____ 5. _____
3. _____ 6. _____

IV. MATERIAL INPUT SOURCES AND AVAILABILITY

Name of Input	Brand	Mode of Purchase [a]	Mode of Payment [b]	Name of Supplier	Address	Distance (km)	Contact Number
Planting materials							
Fertilizers							
Lime							
Insecticides							
Herbicides							
Rodenticides							

[a] CS – Cash, CR – Credit
[b] CS – Cash, IK – In kind

1. Do you frequently encounter problems in sourcing or procuring material inputs? [ ] Yes [ ] No
2. If yes, cite the top input procurement/sourcing problems.
   1. _____
   2. _____
   3. _____
3. Are material input prices seen to be high and a significant constraint? [ ] Yes [ ] No
4. How do they compare to the neighboring areas? _____
5. Is access to material inputs a major problem in your locality? [ ] Yes [ ] No
6. If yes for both, how do they affect your material input usage? _____
   _____
7. What are your sources of farm labor? [ ] Family [ ] Hired labor within [ ] Hired labor outside
8. Is access to labor a major problem in your locality? [ ] Yes [ ] No
9. If yes, how does it affect your farm operations?
   _____
10. Are labor wage rates seen to be high and a significant constraint? [ ] Yes [ ] No

V. AVAILABILITY OF, AND ACCESS TO, INFRASTRUCTURE, FACILITIES, AND MACHINERY SERVICES

	Available [a]	Providers	Availed[a]	Benefits	Constraint to Access
Irrigation	[ ]		[ ]		
Hot water treatment	[ ]		[ ]		
Tractor	[ ]		[ ]		
Trucking	[ ]		[ ]		
Solid waste Disposal	[ ]		[ ]		
	[ ]		[ ]		
	[ ]		[ ]		

[a] Just please check those that are available in the area.

1. What other infrastructure, facilities, and machinery services do you need but not available in the area? _____

_____

VI. AVAILABILITY OF, AND ACCESS TO, AGRICULTURAL SUPPORT SERVICES AND TECHNOLOGY

A. Research and Development Services

1. Are you aware of the new technologies that had been recently developed? What are they? Do you adopt them? How would you rate them?

Technology	Adopted[a]	Accessibility[b]	Usefulness[c]	Compatibility[d]	Ease of Adoption[e]	Affordability[f]
1-	[ ]					
2-	[ ]					
3-	[ ]					
4-	[ ]					

[a] Just check if being adopted.
[b] 1 – Not accessible, 2 – Somewhat accessible, 3 – Accessible, 4 – Highly accessible, 5 – Very highly accessible
[c] 1 – Not relevant, 2 – Somewhat relevant, 3 – Relevant, 4 – Highly relevant, 5 – Very highly relevant
[d] 1 – Not compatible, 2 – Somewhat compatible, 3 – Compatible, 4 – Highly compatible, 5 – Very highly compatible
[e] 1 – Difficult, 2 – Somewhat difficult, 3 – Moderate, 4 – Easy, 5 – Very easy
[f] 1 – Not compatible, 2 – Somewhat compatible, 3 – Compatible, 4 – Highly compatible, 5 – Very highly compatible

2. Who are the technology providers in your area? _____

_____

3. Given the productivity-related problems that you previously mentioned, what type of production technologies would you wish to be developed to address them? _____
4. Are there problems in accessing production/post-harvest/processing technologies? [ ] Yes [ ] No
5. What are they? _____

_____

_____

B. Extension Support Services

1. Have you received extension support services from government extension workers for the past five years?
   [ ] Yes [ ] No

2. If yes, what government agencies/institutions provided extension support services in your community?

   1. _____ 3. _____

   2. _____ 4. _____

3. What are the types of extension services being provided?
   [ ] Technical advice [ ] Conduct of trainings
   [ ] Distribution of technical materials [ ] Soil analysis and fertilizer recommendation
   [ ] Conduct of demo farms [ ] Production/postharvest/processing technologies
   [ ] Farm visits of extension workers [ ] Other _____

4. If through farm visits, how often have you been visited by government extension agents? _____

5. What technical advice did you receive from government extension agents? _____

   _____

6. Was the technical advice useful in solving your farm-related problems? [ ] Yes [ ] No

7. How would you rate the quality of the technical advice?

   [ ] 1 – Very poor [ ] 2 – Somewhat poor [ ] 3 – Fair [ ] 4 – Somewhat good [ ] 5 – Very good

8. What problems did you encounter in technical services from government agencies?

   _____

   _____

9. Have you and other farmers in your community received extension support services or accessed technologies from non-government sources? [ ] Yes [ ] No

10. If yes, what is the nature of the extension service provided by non-government sources?
    [ ] technical advice [ ] farm visits of extension workers
    [ ] distribution of technical materials [ ] conduct of trainings
    [ ] conduct of demo farms [ ] _____

11. What technical advice did you receive from non- government extension sources? _____

    _____

12. Was the technical advice useful in solving your farm-related problems? [ ] Yes [ ] No

13. How would you rate the quality of the technical advice?

    [ ] 1 – Very poor [ ] 2 – Somewhat poor [ ] 3 – Fair [ ] 4 – Somewhat good [ ] 5 – Very good

14. If non-government sources charge a fee for providing technical services, would you be willing to pay some fee for technical services from non-government or private sources? [ ] Yes [ ] No

15. Which organization can best facilitate delivery of extension support services to your community? Why?

    _____

16. What are the trainings and seminars that you received for the past 5 years?

Type of Trainings/ Seminars Attended[a]	Title	Organizer	Year	Number of days

[a] **Examples**: Land preparation, varietal selection, planting material treatment, soil/fertilizer management, pest management, cultivation, harvesting, postharvest management, farm business management

17. What are the crucial training gaps or the more appropriate trainings to conduct to increase productivity?

a. _____ d. _____

b. _____ e. _____

c. _____ f. _____

C. Credit Support Services and Credit-Related Problems

1. Are there banking/financial institutions that extend agricultural loans in your municipality? Specify the name(s) of the banking/financial institutions.

_____ _____

_____ _____

2. Are there NGOs that extend agricultural loans in your community? [ ] Yes [ ] No
3. If yes, specify the name of the NGOs.

_____ _____

_____ _____

4. Did you borrow any capital for the last 5 years? [ ] Yes [ ] No If yes, fill up the table below:

Source [a]	Date Borrowed	Amount Borrowed	Interest rate/ year	Collateral/ Other Requirements	Maturity Date	Credit Status[b]	Mode of Payment [c]

[a] B – Bank C – Cooperative R – Relative F – Friend MI – Microfinance Institutions O – Others
[b] P – paid UP – unpaid
[c] SP – Single Payment INS - Installment

5. For what purpose(s) did you utilize the loan that you availed? _____
6. Were the loans delivered on time when needed? [ ] Yes [ ] No
7. Was the amount of loan adequate? [ ] Yes [ ] No
8. Do you consider the interest rate reasonable/low or is it exorbitant? [ ] Low [ ] Exorbitant _____% Interest rate
9. What problems did you encounter in availing of credit assistance? Cite the top three credit-related problems.

_____ _____

_____ _____

10. Do you and/or other sugarcane farmers in your community have credit-marketing tie-up/arrangement with input suppliers, traders or processors? [ ] Yes [ ] No

11. Describe the arrangement. _____

_____

12. What are the advantages/disadvantages of such arrangement? _____

_____

13. Which organization can best facilitate delivery of credit support services to your community? Why?

_____

14. Overall, can you say you are getting enough credit support?

_____

D. MARKET SUPPORT SERVICES AND MARKETING PROBLEMS

1. Where did you mill your sugarcane output last season? [ ] CADP [ ] URC
2. How much was your milling fee? Sugar share of mill: CADP _____% URC _____%
3. **Ouput Disposal Information**

Product/Quantity	Name of Buyer[a]	Place of Sale by Farmer	Type of Buyer [b]	Mode of Sale [c]	Mode of Payment [d]	Selling Price (PhP/L-kg)
Total						
	1-					
	2-					
	3-					
Molasses						

[a] Please provide address and contact number of buyers. 1- _____

2- _____

3- _____

[b] F – Farmer B – Broker AW – Assembler-wholesaler W – Wholesaler WR – Wholesaler-Retailer E - Exporter
[c] CS – Cash LD – Loan Deduction

5. **Marketing Cost**

Transportation cost PhP _____

Storage cost PhP _____ Maximum holding time _____

Total cost PhP _____

6. Who sets price of the sugar? _____
7. How much were the prices that you received for your product last milling season? (Date of sale: _____)

A = P _____/L-kg B = P _____/L-kg C = P _____/L-kg D = P _____/L-kg Molasses = P _____/L-kg

_____% _____% _____% _____% _____%

8. Are the prices in your area similar to nearby areas? [ ] Yes [ ] No
9. If no, what are the reasons for deviations? _____
10. What factors influence prices of your produce? _____
11. What is your basis in selecting your market outlet? [ ] Prices offered [ ] Terms of Payment [ ] Others _____
12. What market information do you get and where do you get those information?

Information received	Source of Information [a]
[ ] Prices	
[ ] Demand	
[ ] Supply	
[ ] Market outlet	
[ ]	

[a] LGU – Local Government Units NGO – Non-Government Organizations CF – Co-Farmers COA – Cooperatives/Associations O – Others_____

13. Cite the top marketing problems.

_____ _____

_____ _____

14. Have you received marketing assistance from government agencies? [ ] Yes [ ] No
15. If yes, specify the form and the government agencies. _____
16. Did you benefit from the marketing assistance from the government agencies? [ ] Yes [ ] No
17. Have you received marketing assistance from private sources? [ ] Yes [ ] No
18. If yes, specify the form and the private source. _____
19. Did you benefit from the marketing assistance from the private sources? [ ] Yes [ ] No
20. Which organization can best facilitate delivery of market support services to your community? Why? _____

_____

21. What can you say about the market support that you are getting? Are there other marketing supports do you need?

_____

VII. GROUP PARTICIPATION

Name of Organization	Type of Organization	Date of Membership	Position	Status[a]	Benefits

[a] A – Active I – Inactive

Enumerate organization-related problems: _____

_____

VIII. INTER-FIRM RELATIONSHIP

1. Horizontal Relationship

Parameter	Farmer to Farmer[b]	Farmers' Cooperative/ Association to other Farmers' Cooperative/Association[b]
Information sharing[a]		
Input bulk buying		
Collaboration in marketing		
Trust		
Competition level		
Benefits from collective initiative		

[a] Specify the type of information shared;
[b] Identify if the relationship is *WEAK, MODERATE, or STRONG* and indicate why the said relationship is established among key players.
Note: (*Weak*: if seldom or minimally practiced; *Moderate*: if practiced frequently but not by all players; *Strong*: if commonly practiced)

2. Vertical Relationship

Parameter	Farmer to Miller	Farmer to Broker/Trader
Procurement or supply contract (*suki*)		
Information sharing on technology/prices		
Presence of value-added services		
Quality control		

[a] Specify the type of information shared
[b] Identify if the relationship is *WEAK, MODERATE, or STRONG* and indicate why the said relationship is established among key players.
Note: (*Weak*: if seldom or minimally practiced; *Moderate*: if practiced frequently but not by all players; *Strong*: if commonly practiced)

X. Business Enabling Environment (Check those that exist.)

[ ] 1. Good economic environment _____
[ ] 2. Peace and order _____
[ ] 3. Product quality and safety standards _____
[ ] 4. Business permit _____
[ ] 5. Municipal ordinance _____
[ ] 6. Provincial ordinance _____
[ ] 7. Trade policy _____
[ ] 8. Exchange policy _____
[ ] 9. Presence of research and academic institutions that provide technology and skilled manpower requirement for the industry _____
[ ] 10. _____
[ ] 11. _____
[ ] 12. _____

XIII. Strengths and Weaknesses of the Farm Production System

	STRENGTHS/ADVANTAGES	WEAKNESSES/DISADVANTAGES
Land	[ ]	[ ]
Material input	[ ]	[ ]
Labor	[ ]	[ ]
Technological	[ ]	[ ]
Information	[ ]	[ ]
Market	[ ]	[ ]
Management	[ ]	[ ]
	[ ]	[ ]
	[ ]	[ ]
	[ ]	[ ]
	[ ]	[ ]

XIV. Constraints and Opportunities

SEGMENTS	CONSTRAINTS	OPPORTUNITIES
Input provision	[ ]	[ ]
Production	[ ]	[ ]
Milling	[ ]	[ ]
Marketing/Trade	[ ]	[ ]
R&D	[ ]	[ ]
Extension	[ ]	[ ]
Credit	[ ]	[ ]
	[ ]	[ ]

XV. Policy Reforms and Upgrading Strategies

SEGMENTS	POLICY REFORMS	UPGRADING STRATEGIES
Input provision		
Production		
Milling		
Marketing/Trade		
R&D		
Extension		
Credit		

XVI. FARM OPERATIONS AND LABOR USE (per hectare/ per farm if less than one ha)

Farm Operations	Unit	Number of Units				Cost/unit	Total Cost
		Per Hectare		Per Farm			
		New Plant	Ratoon	New Plant	Ratoon		
1. Land Clearing	MD						
2. Land Preparation							
a. Plowing	MAD/MMH						
b. Harrowing	MAD/MMH						
c. Furrowing	MAD/MMH						
3. Hauling of canepoints	MD						
4. Treatment of canepoints	MD						
5. Planting	MD						
6. Replanting	MD						
7. Fertilizer application							
a. Inorganic	MD						
b. Organic	MD						
8. Irrigation	MD						
9. Cultivation							
a. Middle-busting (*saka*)	MAD/MMH						
b. Off-barring (*tastas*)	MAD/MMH						
c. Hilling-up (*sampay*)	MAD/MMH						
10. Weeding							
a. 1st weeding	MD						
b. 2nd weeding	MD						
11. Insect control	MD						
12. Rat control	MD						
13. Detrashing	MD						
14. Harvesting (cutting, loading, & unloading)	MD						
15. Hauling/Trucking	MD						
16. Trash clearing	MD						
17. Trash mulching	MD						
18. Stubble shaving	MD						
D19. Soil analysis	MD						
20. Liming	MD						
21.	MD						
22.	MD						

XVII. MATERIAL USAGE (per hectare basis/per farm if farm is less than one hectare)

Farm Operations	Unit	No. of Units			Price (PhP/unit)
		New Plant	Ratoon		
1. Canepoints – planting	lacsa				
2. Canepoints - replanting	lacsa				
3. Chemical – canepoint treatment					
4. Fertilizers					
a. Complete (14-14-14)	bag				
b. Urea (46-0-0)	bag				
c. 21-0-0	bag				
d. 18-46-0	bag				
e. 16-20-0	bag				
f.					
g.					
5. Organic fertilizer	bag/li				
6. Herbicide	kg/mg/li/ml				
7. Fuel	li				
8. Oil	li				
9. Insecticide	kg/mg/li/ml				
10. Rodenticide	kg/mg/li/ml				
11. Nematicide	kg/mg/li/ml				
12. Lime	bag				
13. Food					
17.					
TOTAL					

XVIII. FARM INVENTORY

Items	Number	Year Acquired	Years to Last	Acquisition Cost/Unit
Land Farm Structure				
1. Land (if owned)				
2. Farm house				
3. Workers' quarters				
4. Tractor shed				
5. Fertilizer bodega				
6.				
7.				
Farm Machinery/vehicle				
1.Heavy tractor				
2.Light tractor				
3. Trucks				
4. Trailers				
5. Farm service vehicle				
6.				
7.				
Tools and Equipment				
1. Bull Cart				
2. Plow				
3. Disc plow				
4. Moldboard Plow				
5. Disc harrow				
6. Furrower				
7. Sprayer				
9.				
10.				
Irrigation facilities				
1. Irrigation pumps				
2.				
Working Animals				
1. Carabao				
2.				

OBJECTIVE	ANALYSIS OF SUGARCANE SUPPLY VALUE CHAIN IN MAJOR SUGARCANE-PRODUCING PROVINCES IN THE PHILIPPINES (funded by SIDA)	CONFIDENTIALITY
The major goal of the project is to come up with upgrading strategies to make the sugar industry efficient and competitive, thereby increase the income of the people in the industry.	**Sugar Millers' Questionnaire**	The researchers take responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data will be used for academic/research purposes only.

Record No. _____ Date: _____

Interviewer: _____ Time started: _____ Time ended: _____

Name of Respondent: _____ Position: _____

Age: _____ Sex: [ ] Male [ ] Female Contact Number: _____

I. MILL PROFILE

1. Name _____
2. Address: _____
3. Legal organization: [ ] Sole proprietorship [ ] Partnership [ ] Corporation [ ] Cooperative [ ] GO [ ] NGO
4. Number of years: in sugar milling _____ in refinery _____
5. Rated capacity:

   [ ] Mill _____ tons//day [ ] Refinery _____ tons/day [ ] Others (specify) _____ tons/day
6. Average capacity utilization for the past five years:

   Mill _____ % Refinery _____ % Others (specify) _____%
7. Average number of weeks of mill operation: for the last mill season _____ for the past five mill seasons _____
8. Have you expanded your operation for the past five years? [ ] Yes [ ] No
9. Top reasons for expanding/not expanding:

   a) _____

   b) _____

   c) _____
10. Total output for the past five years

CROP YEAR	Raw Sugar (L-kg)	Refined Sugar (L-kg)	Molasses (kg)	Bagasse/Power (ton/kwh)	Filter Cake/Power (ton/kwh)
2012/13					
2013/14					
2014/15					
2015/16					
2016/17					

11. What are the assistance/support your company received?

Name of Institution	Type of Support
1.	
2.	
3.	
4.	

12. What other supports/assistance you think are necessary for your business and why?

Type of Support	From Whom	For what purpose
1.		
2.		
3.		

II. RAW MATERIAL PROCUREMENT AND LABOR HIRING

12. Cane (2016/17)

Type of Supplier	Location (Mun/Prov)	Volume (ton)	Frequency of Delivery	Trancking Cost/Subsidy*	Sharing Arrangement
1. Free Planters					
2. Cooperatives					
3. Others					
Total					

* PhP/ton/km _____

13. Cane quality requirements: _____

_____

14. Incentives to cane suppliers _____

_____

15. Penalty to cane suppliers _____

_____

16. Other inputs

Input	Name of Supplier	Address and Contact Number	Type of Supplier [a]	Volume (kg)	Price (PhP/kg)
1. Industrial lime					
2.					
3.					
4.					
5.					

[a] Type of Supplier: M – manufacturer D – dealer

15. Other inputs...Continued

Input	Frequency of Procurement	Mode of Delivery [b]	Delivery Cost (PhP)	Mode of Payment [c]
1. Industrial lime				
2.				
3.				
4.				
5.				

[b] Mode of Delivery: P – picked-up D – delivered

[c] Mode of Payment: CS - cash CR – credit CA – cash advance

16. Manpower Complement

Number of direct laborer in the Mill Refinery:

Contractual _____ _____

Regular _____ _____

Indirect Labor

Administrative _____

Budget and Accounting _____

Human Resource _____

Security _____

Other _____

III. MILLING/REFINING

17. Average cost (PhP/L-kg) or per week/monthly operation

	Raw Sugar	Refined Sugar	Washed Sugar	
Raw materials				
Cane				
Industrial lime				
Labor				
Indirect materials				
Bags				
Indirect labor				
Depreciation				
Others				
Total				

IV. SELLING OPERATION (2016/17)

17. Who are your buyers of sugarcane products?

Type of Product/ Name, Address, Contact Number/ Type of Buyer [a]	Point of Sale (Mun/Prov)	Volume Sold (L-kg) (% by Type of Buyer)	Price/unit (PhP/L-kg)	Purchase Arrangement [b]	Mode of Payment [c]	Terms of Payment [d]	Mode of Delivery [e]	Transfer Cost	Storage Cost
Raw Sugar									
Refined Sugar									
Washed Sugar									

[a] **Type of Buyer**: AW – assembler-wholesaler W – Wholesaler WR – Wholesaler-retailer IB – institutional buyers O – others _____

[b] **Purchase Arrangement**: RB – regular buyer SB – spot buyer O – others (specify) _____

[c] **Mode of Payment**: CS – cash CR – credit CA – cash advance O – others (specify) _____

[d] **Terms of Payment**: 07 – net 7 days 15 – net 15 days 30 – net 30 days O – others (specify) _____

[e] **Mode of Delivery**: P – picked up D – delivered

18. Where do you get market information?

Price ____

Supply ____

Demand ____

Competitors ____

19. How price is determined? If not market determined, who determines price?

A ______________________________ ____________________

B ______________________________ ____________________

C

D ______________________________ ____________________

E ______________________________ ____________________

20. Capital Investment

Item	Quantity	Year Acquired	Useful Life	Price (PhP/unit)

V. RESEARCH AND DEVELOPMENT THRUSTS

21. Does your company undertake research and development? [ ] Yes [ ] No

Research Area	Describe	Partner Agency	Cost (PhP)

VI. THREATS AND OPPORTUNITIES IN THE INDUSTRY

OPPORTUNITIES	THREATS

VII. STRENGTHS AND WEAKNESSES OF THE COMPANY

STRENGTHS	WEAKNESSES

VIII. PROBLEMS

PROBLEM	DESCRIBE/EXPLAIN	RECOMMENDATION
Raw materials	[ ]	
Cane	[ ]	
Lime	[ ]	
	[ ]	
Labor	[ ]	
	[ ]	
Power	[ ]	
	[ ]	
Equipment	[ ]	
Marketing	[ ]	
Market outlets	[ ]	
Price	[ ]	
Transportation	[ ]	
Competition	[ ]	
Government policies	[ ]	
Licensing requirement	[ ]	
Taxes/Tariff	[ ]	
	[ ]	
Others (Specify)	[ ]	
	[ ]	
	[ ]	
	[ ]	
	[ ]	
	[ ]	
	[ ]	

THANK YOU VERY MUCH!!!

OBJECTIVE	ANALYSIS OF SUGARCANE SUPPLY/ VALUE CHAIN IN MAJOR SUGARCANE-PRODUCING PROVINCES	CONFIDENTIALITY
The major goal of the project is to come up with upgrading strategies to make the sugar industry efficient and competitive, thereby increase the income of the people in the industry.	**Sugar Trader's Questionnaire**	*The researchers take responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data will be used for academic/research purposes only.*

Respondent Number: _____ Interviewer and date: _____

Respondent Name: _____ Address: _____

Contact Number: _____

Areas of Operation: _____

I. SOCIO-ECONOMIC PROFILE

Age	Sex [a]	Educ'l Attainment[b]	Household Size	Monthly Household Income (PhP)	Source of Household Income[c]	Type of Trader[d]	Business Classification/ Legal Organization[e]	Years in Sugar Trading

[a] **M**-male F- female [b] **E**-Elementary **HS**-High School **C**-College **PG**-Post Graduate [d] **ST**-Sugar trading **O**-Others, specify _____

[c] **A**-Assembler **AW**-Assembler **W**-Wholesaler **B**-Broker **A**-Agent **E**-Exporter **R**-Retailer

[e] Single Proprietorship **P**-Partnership **CR**- Corporation **CO**-Cooperative **O**-Others, _____

II. GROUP PARTICIPATION

Name of Organization	Type of Organization	Date of Membership	Position	Status[a]	Benefits

[a] **A**= Active **NA**= Not Active

Problems Encountered: _____

III. SOURCES OF CAPITAL

[ ] Personal [ ] Company's [ ] Credit

Did you borrow any capital for CY 2016-17? Yes [ ] No [ ] For what purpose? _____

Source [a]	Date borrowed	Amount borrowed	Interest Rate/Yr	Collateral/other requirements	Maturity	Payment schedule [b]	Payment mode [c]

a: **B**=Bank **C**=Cooperative **R**=Relatives **F**=Friends **M**=Microfinance **O**=Others (specify)

b: **W**=Weekly **M**=Monthly **Q**=Quarterly **Y**=Yearly **O**=Others (specify)

c: **CS**=Cash **IK**=In kind **LD**=Loan Deduction **CK**=Check

Problems Encountered: _____

IV. VOLUME OF SUGAR PURCHASED AND SOLD

1. Volume of sugar purchased by source

SOURCE (Farmer/ Trader)[a] Name/Date	Location of Source	Classification/ Product form (A, B, D,.. molasses)	Volume Purchased (Lkg)	Buying Price (PhP/Lkg)	Who Determines the Price? [b]	Mode of Buying[c]	Mode of Payment[d]
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15							
Total							

2. Volume of sugar traded by outlet or destination

OUTLET OR BUYER (Trader/End User)[a]	Location of Outlet	Classification/ Product form	Volume Sold by Outlet	Selling Price (PhP)	Who Determines the Price? [b]	Mode of Selling[c]	Mode of Payment[d]
1.							
2.							
3.							
4.							
5.							
6.							
7.							
8.							
9.							
10.							
11.							
12.							
13.							
14.							
15.							
Total							

[a] **FP** = Free Planter **T** = Trader (classification) **O/C** = Organization/Coop **SM** = Sugar mill **O** = Others **Note**: Specify full names.

[b] **S** = Seller **B** = Buyer **MC** = Market Condition

[c] **PU** = Picked up **D** = Delivered **WR** = Warehouse receipts (Note: If the trader-respondent bought/sold on both picked up and delivered basis from the same seller/buyer, make two entries.)

[d] **CS** = Cash **CA/LD** = Cash Advanced/Loan Deduction **CR** = Credit/ terms of payment. _____ # of weeks/month; [ ] installment, spec. _____

Seasonality of Buying: Specify: Peak months _____ Average volume _____ Average price _____

Specify: Lean months _____ Average volume _____ Average price _____

Seasonality of Selling: Specify: Peak months _____ Average volume _____ Average price _____

Specify: Lean months _____ Average volume _____ Average price _____

V. CAPITAL INVESTMENT

Item	No. of Units	Specification	Acquisition Cost (PhP/Unit)	Year Acquired	Lifespan	Salvage Value	% Devoted to Sugar Trading
Warehouse							
Vehicle							
Weighing scale							
Others (specify)							

VI. COSTS INCURRED BY TRADER, CY 2016-17

Activity	Total Cost Incurred	Cost/Lkg
Transportation		
Fuel		
Driver's fee		
Toll fees		
Rental /Fare		
Food and drinks		
Agent's fee		
Taxes		
Shipping		
Permit		

Storage fee		
Packaging materials		
Direct Labor		
Administrative/Overhead costs		
Administrative staff		
Security guard		
Electricity		

VII. INTERFIRM RELATIONSHIP

Vertical Relationship

Parameters	Trader & Farmer	Trader & Miller	Trader & wholesaler/retailers	Trader & End-users
Procurement or supply contract				
Information sharing on technology*				
Information sharing on prices*				
Value adding services				
Quality assurance				

Horizontal Relationships

Parameters	Trader to Trader	Trader Cooperative/Association to other Trader Association
Information sharing*		
Trust		
Collaboration in marketing		
Competition		
Presence/absence of collective initiative		

*Specify the type of information shared

Describe whether the relationship is ***WEAK, MODERATE, or STRONG;*** indicate why such relationship is established among key players. (Note: *weak* if seldom or minimally practiced; *moderate* if practiced frequently but not all by the players; and *strong* if commonly practiced)

VIII. SOURCES OF INFORMATION

Information	Sources of Information
Price information	
Supply information	
Demand situation	
Market outlets/buyers/location	
Other information, specify	

IX. PRICE STRUCTURE BY PRODUCT FORM

Product Form	Wholesale (PhP/Lkg)	Retail (PhP/Lkg)	Export Price (PhP/Lkg)
Raw sugar			
A			
B			
C			
D			
E			
Refined Sugar			
Primera			
Segunda			
Brown Sugar			
Muscovado			
Molasses			

X. SUPPORT SERVICES PROVIDED TO SUGAR TRADERS (specify and identify support service providers)

Name of Service Providers	Support Services Provided	Description of Support Services

XI. Business enabling environment

1. How do you find the business environment in the area(s) where you operate?
   [ ] Encouraging to sugar trading [ ] Not encouraging to sugar trading

a. Regulations	Description	Assessment
Business permit (DTI)	_____	_____
Mayor's permit	_____	_____
Trader's registration (SRA)	_____	_____
Taxation (BIR)	_____	_____

Quedan System _____ _____

Sugar Allocation System _____ _____

Bidding procedures _____ _____

Export quota allocation _____ _____

Sugarcane product standards _____ _____

Municipal/provincial ordinances _____ _____

Others _____ _____

_____ _____

b. **Programs/Incentives** _____ _____

_____ _____

XIII. Strengths, Weaknesses, Opportunities, Threats

What do you consider are the strengths of your firms?

_____

_____

_____

What do you consider are the weaknesses of your firms?

_____

_____

_____

Are there opportunities that you see for sugar trading?

_____

_____

_____

Are there threats that you see for sugar trading?

_____

_____

_____

XIV. Policy Reforms and Upgrading Strategies

Suggest possible government interventions/policy reforms to improve your trading activities:

1. _____
2. _____
3. _____
4. _____

END

OBJECTIVE	**ANALYSIS OF SUGARCANE SUPPLY VALUE CHAIN IN MAJOR SUGARCANE-PRODUCING PROVINCES** **Input Supplier's Questionnaire**	*CONFIDENTIALITY*
The major goal of the project is to come up with upgrading strategies to make the sugar industry efficient and competitive, thereby increase the income of the people in the industry.		*The researchers take responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data will be used for academic/research purposes only.*

Respondent No. _____ Date: _____ Contact No. _____

Name: _____ Address: _____

I. SOCIO-ECONOMIC PROFILE

Age	Sex [a]	Educational Attainment	HH Size	Monthly HH Income (PhP)	Sources of HH Income	Business Classification[b]	Years in the Business	Organization/ Cooperative Membership[c]

[a] **M** – Male **F** – Female

[b] **S** - Single Proprietorship **P** – Partnership **CR** – Corporation **CO** – Cooperative **O** – Others: _____

[c] Specify

II. BUSINESS PROFILE

Name of the Business and Type of Input Supplier[a]	Date Established	Types of Inputs Handled	Location(s)

[a] **W** – Wholesaler **WR** – Wholesaler-retailer **R** – Retailer

III. VOLUME REQUIREMENTS AND QUALITY STANDARDS

PRODUCT/INPUT	VOLUME REQUIREMENT Per Year	QUALITY STANDARD
1.		
2.		
3.		
4.		

IV. PROCUREMENT AND DISPOSAL (CY 2016-17)

1. Procurement

INPUT TYPE/NAME OR BRAND	SOURCE		AVERAGE VOLUME PURCHASED/MONTH (Unit)			FREQUENCY OF PURCHASE/MONTH			AVERAGE BUYING PRICE/UNIT			MODE OF PROCUREMENT[b]	MODE OF PAYMENT[c]
	Name and Location	Type[a]	Peak	Lean	Ave.	Peak	Lean	Ave.	Peak	Lean	Ave.		
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													
11.													
12.													
13.													

[a]**Type of source:** **M** – Manufacturer **D** – Dealer **W** – Wholesaler **WR** – Wholesaler-Retailer **O** - Others, specify_____

[b]**Mode of Procurement:** **PU** – Picked Up **D** – Delivered **B** – both

[c]**Mode of Payment:** **CS** - Cash **CR** – Credit (Please specify the terms and condition,including interest rate, payment period, etc. _____

B - Both

Specify seasonality of purchase: Peak months: _____; Lean months: _____

2. Disposal

TYPE/NAME OF PRODUCT	MARKET OUTLET		AVERAGE VOLUME SOLD (kg)			AVERAGE SELLING PRICE/UNIT			MODE OF SALE[b]	MODE F PAYMENT[c]
	Location	Type[a]	Peak	Lean	Ave.	Peak	Lean	Ave.		
1.										
2.										
3.										
4.										
5.										
6.										
7.										
8.										
9.										
10.										
11.										
12.										
13.										

[a]**Type : FP** – Free farmers **C** – Cooperative **FA** – Farmers' association **W** – Wholesaler **WR** – Wholesaler-retailer **R** – Retailer **O** - Others, specify_____

[b]**Mode of Disposal:** **PU** – Picked Up **D** – Delivered **B** - Both

[c]**Mode of Payment:** **CS** – Cash **CR** – Credit (Please specify the terms and conditions, including the interest rate, payment period, etc)_____
B - Both

Seasonality of Selling: Peak Months _____ Lean Months _____

V. MARKET INFORMATION

Who determines the price? [ ] **S** – Seller **B** – Buyer **M** – Market **O** – Others (Please specify) _____

Source(s) of price information [ ] **G** – Government **T** – Traders **PM** - Public Market **O** – Others (Please specify) _____

VI. SUPPORT SERVICES RECEIVED (e.g. financing, training, marketing, etc.)

SERVICES AVAILED	PROVIDER	BENEFITS

VII. BUSINESS ENABLING ENVIRONMENT

1. In general, how do you find the business environment in the area(s) where you operate?
   [ ] Conducive to sugar trading [ ] Not conducive to sugar trading
2. Why did you say so? _____

Please indicate the programs and regulations that incentivize/disincentivize the conduct of businesses in the area especially the sugar trading.

	Specify/Describe	Incentivize[a]	Disincentivize[a]
National regulations			
National programs			
Business permits			
Municipal ordinances			
Barangay ordinances			

[a] Just please check if it provides incentive or not.

VIII. STRENGTHS, WEAKNESSES, OPPORTUNITIES, THREATS

What are the elements that serve as strengths of your firm?

_____

_____

_____

_____

_____

What are the elements that serve as weaknesses of your firm?

Are there opportunities that you see for input suppliers or service providers like you in the sugar industry?

Are there threats that you see for input suppliers or service providers like you in the sugar industry?

VII. PROBLEMS ENCOUNTERED AND SUGGESTED POLICIES AND UPGRADING STRATEGIES

What are the problems that you encounter in input trading?

Can you suggest some possible government interventions/policy reforms to improve your input trading activities?

THANK YOU VERY MUCH!!!!

OBJECTIVE	ANALYSIS OF SUGARCANE SUPPLY VALUE CHAIN IN MAJOR SUGARCANE-PRODUCING PROVINCES IN THE PHILIPPINES	CONFIDENTIALITY
The major goal of the project is to come up with upgrading strategies to make the sugar industry efficient and competitive, thereby increase the income of the people in the industry.	R,D & E Questionnaire	The researchers take responsibility of guarding the sanctity and confidentiality of all the information generated through this instrument. Data will be used for academic/research purposes only.

Record No. _____ Date: _____ Interviewer: _____

Name of Respondent: _____ Institution: _____

Address: _____ Contact Number:_____

I. MANPOWER COMPLEMENT*

Name	Designation	Educational Attainment	Area(s) of Specialization	Age	Years of Experience
1.					
2.					
3.					
4.					
5.					
6.					
7.					
8.					
9.					
10.					

* Attach extra sheets if needed.

II. RESEARCHES CONDUCTED FOR THE LAST FIVE OR TEN YEARS

Research/ Program Title	Fund (PhP)	Source/s of Funds
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		
10.		

Which of the following is/are the main focus of most of the R&D projects carried out by the institution?

Segment	Remarks
Sugarcane production, farmer's efficiency and profitability	
Energy production (Bioethanol)	
Manufacturing (Sugar and muscovado processing)	
Extension services	
Health	
Policy and planning	
International trade	
Others, specify	

III. EXTENSION EFFORTS

TECHNOLOGY TRANSFER

Year	Name of the Program	Number of Participants Trained	Number of Demonstration Farms established	No. of Distributed/ Reproduced Pamphlets/ Comics	Number of Mill district seminars conducted	Source/s of Fund	Allotted budget (Php)

A. Demonstration Farms Established

Year	Subject/Highlights	Organizer/s	Location	Duration	Budget

Problems Encountered: _____

B. Information materials distributed (comics, pamphlets, brochures)

Year	Subject/Highlights	Number of Publications/ Volumes	Number of Participants	Allotted Budget

Problems Encountered: _____

C. Mill District Seminars Conducted

Year	Subject/Highlights	Location	Number of Recipients

Problems Encountered: _____

FARM SUPPORT AND ADVISORY SERVICES

[1] *1-MDDC projects 2- LGU's 3- Cooperatives 4-Planter's Association 5-Others, Specify*

Year	Number of Participants Trained	Number of Farm visits conducted	Number of Consultations/referrals attended	Recipients/ Participants [1]	Allotted Budget

A. Farm Visits

Year	Subject/Highlights	Location	Number of Recipients	Budget

Problems Encountered: _____

B. Consultations/Referrals

Year	Subject/Highlights	Location	Number of Recipients	Budget

Problems Encountered: _____

PRODUCTION AND SUPPORT SERVICES

Year	Number of Participants Trained	Number of Nursery Farms monitored	Number of canepoints distributed	Number of Soil Samples collected/analyzed	Allotted Budget (PhP)

Specify the support services provided (e.g. micropropagated plantlets, vermicompost and BMO Production, distribution of Trichograma strips)

Year	Support service provided	Subject/Highlights	Number of recipients	Allotted Budget (PhP)

Problems Encountered: _____

SPECIAL ASSIGNMENT

Year	No. of Ocular inspection conducted	Total Area Involved	Allotted Budget (PhP)

Problems encountered: _____

Enumerate other special assignments conducted:

Activity	Purpose	Budget (PhP)

ORGANIZATION-FOCUSED

Year	Number of Participants Trained	Number of Ecological Test Sites monitored	No. of trainings conducted	Allotted Budget (PhP)

Problems Encountered: _____

FINANCIAL SUPPORT

Year	Type of Financial Support	No. of Recipients	Recipients	Mode of Payment	Allotted Budget (PhP)

Problems encountered: _____

IV. STRENGHTS, WEAKNESSES, OPPORTUNITIES, THREATS

Segment	Strength	Weakness	Opportunity	Threat
R&D				
Technology transfer				
Farm support & Advisory services				
Production Support services				
Organization-focused				