



Financial Analysis of Coconut Sugar Production: A Case Study in Mempawah Regency, Indonesia

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Abstract

Coconut is one of the key plantation commodities in the Mempawah Regency that needs to be developed. This is necessary in order to increase the income of coconut sugar craftsmen and also allow them gain knowledge of the industrial scale through feasibility studies on the agro-industry. Therefore, this study aims to analyze the structure of production cost and operating income as well as the feasibility of the coconut sugar agro-industry. This analysis is important for craftsmen in the regency that engage in the continuous production of coconut sugar. Furthermore, this study was conducted in Mempawah Regency with 34 coconut farmers. The analysis of the R/C ratio and Break-Even Point (BEP) was used to determine the indicator of financial feasibility. The result revealed that the average production cost needed by the agro-industry was 7,659,868 IDR month⁻¹ and the generated income was 3,483,132 IDR month⁻¹. Additionally, the coconut sugar agro-industry was financially feasible as the obtained R/C ratio was 1.45. The BEP of production volume and Cost of Good Solds (COGS) was 346 kg and 9,814.92 IDR which is less than the actual production volume and price. It was suggested that craftsmen of coconut sugar produce more than 346 kg of sugar per month with a selling price above 9,814.92 IDR kg⁻¹ in order to obtain profit.

Keywords: agro-industry; coconut palm; feasibility; food prices; tropical agriculture

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INTRODUCTION

Coconut (*Cocos nucifera* L.) is one of the key plantation commodities in West Kalimantan after palm oil and rubber that has been widely cultivated. From 2017 to 2019, the development of coconut trees increased from 106,767 ha to 106,826 ha and this led to increased production from 83,214 tons to 83,826 tons (BPS-Statistics of Kalimantan Barat Province, 2019). Furthermore, about 7,683 households in West Kalimantan depended on coconut plantations as a source of living (BPS - Statistics Indonesia, 2020). Despite the increased production, there has been no improvement in the welfare of farmers'.

The low selling price of this fruit and its processed products (Jumarniati et al., 2020) which are nonoptimal and not proportional has also resulted in the unimproved farmers' income (Widodo et al., 2010).

Presently, the coconut agro-industry has grown rapidly in West Kalimantan and almost all of the plant parts have been processed. This has resulted in products with high economic value such as nata de coco, VCO, processed coconut fiber, shells and sugar. Furthermore, this plant is a healthy source of sugar than other sources (Gunnar, 2018; Asghar et al., 2020). According to Saepulah et al. (2017), the coconut tree could be used to fulfill the food needs of the society.

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The product quality can also be maintained through processing in order to increase its value and the income of farmers (Barlina, 2016).

The presence of coconut sugar agro-industry in the Segedong Sub-district has affected the socio-economic life of the society in terms of providing job vacancies and improving their welfare. Coconut sugar, mostly known as red sugar, was one of the various products from coconut trees that are widely produced by farmers. This is because it serves as a source of income, is easy to process, has a low cost of production as well as low technology and requires small capital due to the abundant raw materials from the farmers' plantations (Intan, 2018). This is in accordance with the study by Rahmanto et al. (2020) which states that the purpose of food diversification was to increase people's income and decreased poverty and social inequality. The development of the agro-industry improved the workforces' participation (Zahri and Febriansyah, 2014). Furthermore, good economic performance was also indicated by the diversification of coconut-based products which showed a positive correlation with the index of agricultural sustainability (Rodrigues et al., 2018). This was followed by the modernization of the agro-industry which encouraged the improvement of productivity and competitiveness, especially in the Philippines (Javier, 2015). Despite the improved agricultural production that was in line with the increased demand, further development is needed in maintaining the environment, economy and socio-culture for the current and future generations (Erbaugh et al., 2019).

Generally, the coconut sugar agro-industry is a small-scale home industry and inheritance of some generations. The industry has become the main source of income for most coconut farmers since the selling price of the fruit dropped from 2,300 IDR in 2016 to 1,400 IDR at the beginning of 2018 and reached the lowest price of 800 IDR in 2019 (Rokib, 2019). This had a big impact on farmers' which made most of them focus more on this industry in order to increase their income.

The agro-industry faces various ecological, economic and social problems, such as firewoods for fuel and using simple tools which can influence its sustainability and quality of produced coconut sugar (Rianse et al., 2016), simple processing technology (Tarmizi, 2017); craftsmen's poor knowledge and awareness of

cleanness and product safety related to the use of food additives (Ekawati and Rizieq, 2021). Further examples also include capital, human resources and less supportive marketing system (Suliyanto et al., 2013), the weak bargaining position of the coconut sugar craftsmen for their products (Supomo, 2007), the price made by brokers (Maharani et al., 2011), shortage of tappers and fuels and old trees (Mugiono et al., 2014). These factors have negatively affected the income of farmers, the feasibility of the agro-industry and have also led to less optimal production of sugar by the home industry.

There have been several studies on the feasibility of coconut sugar agro-industry in some areas in Indonesia, such as Tumpeng Village, Candipuro, Lumajang (Mustaqim, 2019) and financial analysis of coconut sugar processing industry in Penago II Village, Ilir Talo (Triasmadita, 2016). There are also studies on the analysis of the added value of coconut sap and palm sugar agro-industry in Karangrejo Village, Garum, Blitar (Prasetiyo et al., 2018) and Rambah Samo, Rokan Hulu (Tarmizi, 2017). However, none has been carried out in West Kalimantan. The feasibilities of the agro-industry were different as they depended on the studied areas. This is led by the different cost structures and the availability of raw materials. Therefore, this study aims to analyze the structure of production cost and operating income as well as the feasibility of coconut sugar agro-industry. This was carried out in order to provide knowledge of the needed industrial scale to the coconut sugar craftsmen and also for them to obtain profit from their business. Furthermore, this study is different from the previous ones which only analyzed the processing techniques (Agato and Batu, 2019; Andriyani et al., 2019), development strategy (Suryansyah et al., 2019) and society empowerment (Kusrini et al., 2017; Ekawati and Rizieq, 2021).

MATERIALS AND METHOD

The study was conducted from February to April 2020 in Segedong Sub-district, Mempawah Regency, West Kalimantan Province of Indonesia. This region was chosen purposively because it is known as one of the most qualified centers for producing brownish yellow and durable uncovered coconut sugars.

The population includes 174 farmers that are managing a small-scale home industry of coconut sugar. According to Arikunto (2011), in case the subject number is less than 100, it is advisable to use the entire sample. However, when the number increases, it can be taken around 10 to 15%, 20 to 25%, or more. The sampling of this study was 20% of the population and the number of samples was 34 coconut farmers. They were selected from the 174 farmers in Parit Bugis Village that were selected purposively considering their continuous coconut sugar production. The village was selected because it has more coconut sugar craftsmen than other villages in Segedong Sub-district.

The primary data was obtained through interviews using questionnaires, while the secondary data were from statistics, Indonesia and other relevant government agencies. The secondary data involved the general condition of the studied selected location, number of farmers managing coconut sugar industry in Segedong Sub-district and other relevant data. This was analyzed with production cost structure, revenue and business feasibility analysis. Furthermore, analysis of financial feasibility which is an important factor for making decisions in companies was analyzed using financial statement report (Qehaja and Ismajli, 2018; Barreto Granda, 2020).

The total costs of coconut sugar agro-industry were analyzed by calculating the total costs for the production process in a month. It is the total of fixed costs and variable costs as systematically presented in equation I.

$$TC = FC + VC \quad (I)$$

Where; TC = Total costs of coconut sugar production (IDR); FC = Total fixed costs of coconut sugar production (IDR); VC = Total variable costs of coconut sugar production (IDR).

Fixed costs were calculated from the depreciation of each equipment used in the production process. The depreciation was calculated using the formula equation II.

$$\text{Depreciation} = \frac{\text{Equipment prices}}{\text{Economic life}} \quad (II)$$

The revenue of coconut sugar agro-industry was obtained from the difference of total revenue

and total costs of the agro-industry (Suratiah, 2020). The formula used equations III and IV.

$$I = TR - TC \quad (III)$$

$$TR = Y \times P_y \quad (IV)$$

Where; I = Farmers's income (IDR); TR = Total revenue (IDR); TC = Total costs (IDR); Y = Number of production (kg); P_y = Product price (IDR).

The feasibility of the agro-industry was calculated using the formula of BEP (Break-Even Point), COGS (Cost of Good Solds) and R/C ratios. BEP means that the total revenue is equal to the total cost. The BEP was exceeded when the value of each variable was higher than the resulting BEP (Sunarjono, 2000). Furthermore, when the selling prices were lower than COGS it indicated a loss occurred (Elpawati et al., 2018). BEP and COGS were formulated as follows (Macpal et al., 2014; Suratiah, 2020) equations V, VI and VII.

$$\text{BEP of production volume (kg)} = \frac{FC}{P_y - AVC} \quad (V)$$

$$\text{BEP in IDR} = \frac{FC}{\left(1 - \frac{AVC}{P_y}\right)} \quad (VI)$$

$$\text{COGS (IDR kg}^{-1}\text{)} = \frac{TC}{Y} + \text{expected profit} \quad (VII)$$

Where; FC = Fixed Costs (IDR); P_y = Product price (IDR); AVC = Average Variable Cost (IDR); TC = Total Costs (IDR); Y = Number of production (kg).

The economic feasibility of coconut sugar agro-industry was analyzed using R/C (Faizah et al., 2020; Wibowo et al., 2020) and the equation (VIII).

$$R/C = \frac{TR}{TC} \quad (VIII)$$

Criterion Remarks: R/C > 1 = feasible; R/C = 1; R/C < 1 = unfeasible.

RESULTS AND DISCUSSION

Total production costs of the coconut sugar agro-industry

The costs of operating a coconut sugar agro-industry involve fixed and variable costs.

The fixed costs which are covered by the farmers managing the industry include the expenses for depreciation of equipment commonly used for producing coconut sugars such as building, furnace, large pot, jerrycan, sieve, stirrer, basket, tapper knife and sap collecting bottle. Whereas,

the variable costs include both cashed and uncashed expenses. The cashed expenses involve those for purchasing lime betel, firewood, plastic bag, plastic mold, while the uncashed involve wages for manpower in the family. Table 1 shows the details of the costs.

Table 1. Average of monthly production costs, revenue and income of coconut farmers managing coconut sugar agro-industry

Components	Fixed costs (IDR)	Variable costs (IDR)	Total costs (IDR)
Depreciation	306,868	-	306,868
Rental cost	1,500,000	-	1,500,000
Cashed expenses			2,353,000
Lime betel	-	405,000	
Firewood	-	1,600,000	
Plastic bag	-	324,000	
Plastic mould	-	24,000	
Uncashed expenses			3,500,000
Wage	-	3,500,000	
Total costs	1,806,868	5,853,000	7,659,868

Based on the table above, the one with the highest value for one production period (a month) is the variable cost, reaching 76.4% of the total costs. These include cashed (30.7%) and uncashed variable costs (45.7%). Furthermore, this is in accordance with one of the studies which had the biggest variable (Mugiono et al., 2014; Indra et al., 2018). The biggest monthly cashed expense was from buying firewoods (1,600,000 IDR) which was one-fifth of the total cost of production. Four to five hours is required to cook 150 to 200 liters of sap for coconut sugars and much fuel is needed as the process still involves using simple stoves. The use of conventional stoves wasted a lot of fuel, too much time and produced pollution (Tarmizi, 2017; Wardono et al., 2018). However, in order to reduce the cost of firewoods, the farmers used coconut fibers as fuel. Other expenses were from buying lime betels, plastic molds and bags for packaging.

The wage and uncashed expense were the biggest components of the cost of production. It reached 45.69% of the total costs. It was found that most of the farmers' family members can do the works including sap tapping, filtering, boiling, stirring and even molding together. This was due to the poor technology and crowded manpower in the home industry. The condition was led by the 'labor intensive' agricultural sectors in Indonesia (Akbar, 2017; Kusumaningrum, 2019).

The tapping relatively takes a short time, but is very tedious particularly during rainy season. This was carried out by male workers (husbands) while filtering, boiling, stirring and molding were performed by either male or female workers. Furthermore, the light works such as preparing the mold and keeping the furnace was conducted by their children. According to Aliudin et al. (2016), the shortage of manpower and wood fuel threatens the sustainability of coconut sugar agro-industry.

Revenue and income of the coconut sugar agro-industry

The revenue of a business is obtained from multiplying the production quantity and the applied prices. The average production of coconut sugar in Segedong was 1,013 kg. This is the average of one production period (one month). The applied price at that time was 11,000 IDR kg⁻¹ and this provided revenue as much as 11,143,000 IDR month⁻¹ to the farmers (Table 2).

Tabel 2. Average of monthly revenue of coconut farmers managing coconut sugar agro-industry

Components	Unit	Total
Production	kg	1,013
Price	IDR	11,000
Revenue	IDR	11,143,000

The revenue of coconut sugar craftsmen depends on the production volume and selling prices. Therefore, in order to increase the income of farmers' the cost of production for the sap as the main raw material was added (Saleh, 2014). This was because the price was one of the variables that positively influence their income (Yanutya, 2013; Ardi et al., 2017).

Factors that influence the selling price of coconut sugars include sugar quality and marketing channels. According to Apriyanto and Yulianti (2020), the quality of coconut sugars was determined by their hardness levels and bright or yellowish-brown color. The high-quality sugars have high selling prices. Meanwhile, the mushy ones have low selling prices and are frequently rejected by brokers. The coconut farmers need to be empowered in order to implement efficient and effective technology for the improvement of sugar quality (Matondang et al., 2017). In addition, marketing channels can also be used to market the products.

The use of marketing channels has influenced the success of agricultural product marketing and there are two methods that can be used by coconut farmers to market their products (Ambarwati et al., 2017). The first is a farmer–retailer–consumer, while the second is a farmer–broker–consumer. In the first channel, the farmers will receive higher prices than in the second one,

namely 12,000 IDR to 13,000 IDR kg^{-1} . When taking the second channel, they would get 11,000 IDR to 11,500 IDR kg^{-1} . Nevertheless, more farmers prefer the second channel because 1) they can get loans easily when they experience a lack of capital or have urgent family needs and 2) they can market their product easily and can send the sugars to brokers living in the village thereby saving cost. Despite the selected channel by the farmers, the important thing is how the coconut sugars are sold out so that they in order for them to receive cash and fulfill their family needs.

The farmers' income was obtained from the difference of revenue and the entire spent costs. The average revenue, cost and income of the farmers were 11,143,000 IDR, 7,658,868 IDR and 3,483,132 IDR month^{-1} (Table 3). The income was higher than the provincial minimum wage of West Kalimantan and the regional minimum wage of Mempawah in 2020, namely 2,399,699 IDR and 2,422,594 IDR. This is in accordance with Khotimah et al. (2014) and Indra et al. (2018), proposing that coconut sugars contributed > 50% to the family income of the sugar craftsmen. Furthermore, this is what makes the agro-industry of coconut sugar the mainstay of the farmers' family income in Segedong. The received income is used for the capital of the following sugar production and fulfillment of family needs.

Table 3. Average of monthly income of coconut farmers managing coconut sugar agro-industry

Components	Unit	Total
Production cost	IDR	7,659,868
Revenue	IDR	11,143,000
Income	IDR	3,483,132
R/C ratio		1.45
Break Even Point (BEP)		
BEP of production volume	kg	346
BEP in IDR	IDR	3,806,036
COGS	IDR kg^{-1}	9,814.92

Feasibility of the coconut sugar agro-industry

BEP, COGS and R/C ratio

The determination of BEP was essential for business as its value showed the minimum production required for meeting both fixed costs and variable costs (Florin-Constantin, 2016; Kampf et al., 2016). The expected profit was 29.8% (Hardiyanto, 2020) and based on Table 3, the BEP of production volume per month is 346 kg, while in IDR and COGS was 806,036 IDR

and 9,814.92 IDR kg^{-1} . Meanwhile, the produced sugars were 1,013 kg month^{-1} , along with a revenue of 11,143,000 IDR and a selling price of 11,000 IDR kg^{-1} . Therefore, the operated coconut sugar agro-business by the farmers in Segedong, Mempawah is higher than the BEP of production volume and price. In order to generate profit, the production of coconut sugar had to exceed 346 kg month^{-1} and the revenue had to be more than 3,806,036 IDR.

One of the factors influencing the big production volume was the number of coconut trees that can produce sap water. Segedong Sub-district has 4,351.38 ha of coconut plantation with 120 to 150 trees hectare⁻¹ and this ensures the availability of sap sufficiently. The agro-industry of molded coconut sugars is highly dependent on the availability of fresh sap (Aliudin et al., 2016). Meanwhile, the proper selling price motivates the coconut farmers to enhance their production in order to increase their family income. The proper price is led by demand for food and seasoning manufacture. Furthermore, the coconut sugar agro-industry is quite promising as the demand for sugar for various industries such as soy sauce, herbal medicine and food industry as well as household needs is relatively high (Sukardi, 2010).

The feasibility of the coconut sugar agro-industry was determined using the R/C ratio, comparing the revenue and the total costs of production and when the R/C ratio is > 1 it shows there was profit. This is in line with the other studies in Indragiri Hilir and Banyumas Regency (Faizah et al., 2020; Wibowo et al., 2020). Table 3 shows the obtained R/C ratio was 1.45 and this indicates that the business is feasible to develop. Furthermore, it provides profit in which for each spent cost of 1,000 IDR there is an equal result of 1,450 IDR in revenue.

CONCLUSIONS

The coconut agro-industry is economically feasible to run (R/C value of $1.45 > 1$). The BEP of production volume is 346 kg, less than the actual production volume (1,013 kg). The BEP in IDR and COGS was 806,036 IDR and 9,814.92 IDR kg⁻¹ which is less than the actual production price of 11,000 IDR kg⁻¹. This study recommended that the craftsmen of coconut sugar produce was more than 346 kg of sugar per month, had a revenue that was more than 3,806,036 IDR and the product was sold with the price above 9,814.92 IDR kg⁻¹ to obtain profit. In order to get a good selling price, the farmers have to know the market price when bargaining with brokers. Subsequently, based on the results, all of the coconut farmers are expected to produce coconut sugar continuously.

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