



Performance of Aren Sugar Processors in Wolo District, Kolaka Regency, Southeast Sulawesi

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Abstract

This study aims to analyze the performance of palm sugar processors in Wolo District, Kolaka Regency, Southeast Sulawesi. A sample of 60 palm sugar processors was selected using simple random sampling technique from the population in Tolowe Ponrewaru Village and Langgomali Village. Performance data were collected through questionnaires measuring the main activities of sap tapping, sugar processing, and product marketing. Descriptive analysis was used to describe the performance level of processors. The results showed that the performance of processors was in the medium category, with balanced contributions at each stage of the production process. The main constraints found include limited processing technology and access to marketing. These findings provide important implications for increasing productivity and developing the local palm sugar agro-industry.

Keyword: Aren Sugar Performance, Local Product Marketing, Small-Scale Sugar Makers Southeast Sulawesi Agroindustry

INTRODUCTION

Palm sugar is a traditional agro-industrial product that has an important role as a source of natural sweetener and raw material in various food and beverage products in Indonesia (Soekarto et al., 2010). Palm sugar as a type of palm sugar offers an environmentally friendly alternative and has a better health value added in the midst of the dominance of sugar from sugar cane whose national production is not sufficient to meet the needs (Kusumanto, 2010).

302

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The potential of aren palm plants as a source of sap is quite large, especially in the Southeast Sulawesi region, especially Kolaka Regency which has a significant area of aren palm land (BPS Southeast Sulawesi, 2024).

This potential has not been matched by optimal development in the aspects of production and marketing. The palm sugar processing business in Kolaka Regency is still dominated by micro-scale household businesses with traditional technology. This causes the productivity and quality of palm sugar to be generally low and unable to compete in the wider market (Sunanto, 1993). The performance of palm sugar processors is a key aspect to bridge the gap between the potential of natural resources and the needs of the palm sugar commodity market.

Various studies show that the performance of agro-industrial microenterprises is influenced by the technical capabilities of processors, the resources they have, and the support of the business environment (Sumantri et al., 2013; Andriansari, 2010). International studies reinforce these findings, for example Jiang et al. (2021) state that technical skills and appropriate technology significantly affect the performance of small agro-industries in rural China. In addition, policy support and market access are important factors in maintaining and improving the competitiveness of small and medium enterprises (SMEs) in developing countries (Smith & McBride, 2019).

Based on the results of the initial survey, the center of palm sugar production in Kolaka Regency is Wolo Sub-district, precisely in Tolowe Ponre Waru Village and Langgomali Village. There has been a decline in the number of palm sugar processors in both villages. Constraints faced by palm sugar processors include limited access to technology, lack of modern processing knowledge, fluctuations in palm sap raw materials, and limited marketing networks. Therefore, an in-depth study is needed to understand the performance level of palm sugar processors as a basis for developing strategies to increase production and marketing capacity.

This study aims to provide a comprehensive picture of the performance of palm sugar processors in Wolo Sub-district, Kolaka Regency, so that it can be a reference in the preparation of a sustainable palm sugar agro-industry development program.

METHOD

Research Location

This research was located in Tolowe Ponrewaru Village and Langgomali Village, Wolo Sub-district, Kolaka Regency. The determination of the research location was carried out purposively, with the consideration that the research location is an area with the largest

potential production of palm sugar business in Kolaka Regency, but the number of brown sugar processors has decreased by > 50%.

Population and Sample

The study population was palm farmers who also acted as brown sugar processors in Tolowe Ponrewaru Village and Langgomali Village, Wolo District, Kolaka Regency. The population of this study amounted to 149 processors (50 processors in Tolowe Ponrewaru Village and 99 processors in Langgomali Village). Sampling of brown sugar processors using simple random sampling method. The Slovin formula was used to calculate the number of samples with an error rate of 10% ($\alpha = 10\%$). So that the sample of this study amounted to 60 people.

Data Analysis

The performance of palm sugar processors was analyzed using descriptive analysis. The analysis process is to first determine the width of the score interval by calculating the lowest and highest scores of the question items. The range of values of each item for each level category is obtained by means of the highest score minus the lowest score then divided by the expected number of interval classes. The formula for calculating the class interval is as follows (Sudjana, 2005):

$$I = \frac{J}{K}$$

Where:

I = Class interval

J = Spread distance (highest score – lowest score)

K = number of class

Research Variable

Table 1. Research Variable

Variable	Indicators	Parameter	Scoring (a, b, c)	Categori
Tapping Performance	Length of tapping time per tree (minutes)	a. < 5 minutes b. 5 – 10 minutes c. > 10 minutes	a = 3, b = 2, c = 1	High = 3 Medium = 2 Low = 1
	Number of bunches tapped per tree	a. 1 bunch b. 2 – 3 bunch c. > 3 bunch	a = 1, b = 2, c = 3	

Variable	Indicators	Parameter	Scoring (a, b, c)	Categori
	Number of trees tapped per day (morning and afternoon)	a. 1 trees b. 2 – 3 trees c. > 3 trees	a = 1, b = 2, c = 3	
	Number of sap tapped per day (liters)	a. 10 liters b. 11 – 30 liters c. > 30 liters	a = 1, b = 2, c = 3	
	Number of sap tapping workers	a. 1 workers b. 2 – 3 workers c. > 3 workers	a = 1, b = 2, c = 3	
Processing Performance	Amount of sap processed (liters)	a. 10 liters b. 11 – 30 liters c. > 30 liters	a = 1, b = 2, c = 3	High = 3 Medium = 2 Low = 1
	Amount of palm sugar produced (kg)	a. 3 kg b. 4 – 10 kg c. > 10 kg	a = 1, b = 2, c = 3	
	Length of time to process (cook) <i>Aren</i> sap	a. < 3 hours b. 3 – 5 hours c. > 5 hours	a = 3, b = 2, c = 1	
	Number of workers processing palm sugar	a. 1 workers b. 2 – 3 workers c. > 3 workers	a = 1, b = 2, c = 3	
Marketing Performance	Timing of palm sugar sales	a. Every day b. Every week c. Every 2 – 4 weeks	a = 3, b = 2, c = 1	High = 3 Medium = 2 Low = 1
	Quantity of palm sugar damaged in storage (kg)	a. Nothing b. < 5 kg c. > 5 kg	a = 3, b = 2, c = 1	
	Quantity of unsold palm sugar (kg)	a. Nothing b. < 5 kg c. > 5 kg	a = 3, b = 2, c = 1	
	Quantity of palm sugar for household consumption per period (kg)	a. Nothing b. < 5 kg c. > 5 kg	a = 3, b = 2, c = 1	
	Quantity of packed palm sugar per day (kg)	a. Nothing b. 3 – 10 kg c. > 10 kg	a = 1, b = 2, c = 3	
	How to market <i>aren</i>	a. Waiting in the garden	a = 1, b = 2,	

Variable	Indicators	Parameter	Scoring (a, b, c)	Categori
	sugar	b. Waiting at home c. Taken by themselves to the trader/market	c = 3	

RESULTS AND DISCUSSION

Overview of the Aren Sugar Processing Business

Palm sugar processing is an important source of livelihood for the people of Southeast Sulawesi, especially in Kolaka district. The business is still small-scale, carried out individually, and uses very simple technology. Palm trees can be tapped at the age of 8-10 years and can be tapped for 7-12 years. Each palm tree has 2-4 male flower clusters that are ready to be tapped, while female flower clusters are not recommended to be tapped because they can reduce sap production. The process of processing palm sugar includes several stages, namely cleaning the palm tree, cutting the mayang or flower bunches, tapping the sap twice a day (morning and evening), cooking the sap into palm sugar, molding, and packaging (Figure 1).

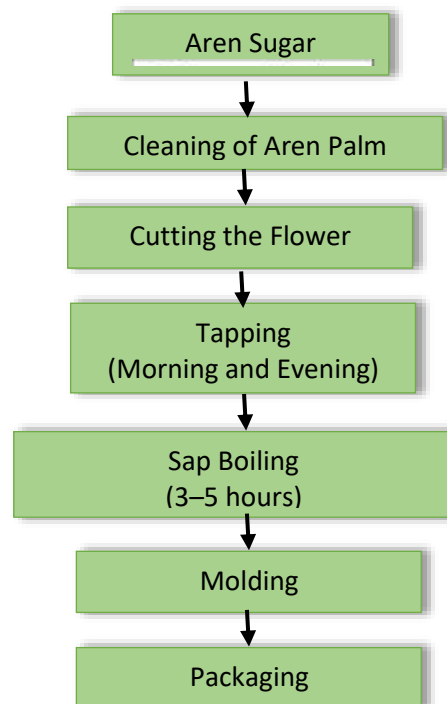


Figure 1. Process of Aren Sugar Production



Processors should clean the trunk of the tree from dirt and fibers and open the fronds to ensure optimal quality and quantity of sap. The flower bunches are prepared by shaking and beating them carefully to open the pores so that the sap can flow out smoothly. The tapping process is done without hired labor, usually by the processors themselves. Sap from the afternoon tapping is immediately boiled over low heat until the next morning and mixed with the morning sap to prevent souring. A mixture of lime water and jackfruit peel is also used to maintain the quality of the sap during the tapping process. Next, the sap is cooked over high heat until it thickens into palm sugar, which is then molded with molds from coconut shells or wooden cups.

All activities in the palm sugar processing business are still very simple and have a high dependence on nature. About 80% of the fixed and variable inputs used are obtained without incurring nominal costs.

The profile of palm sugar processors in Wolo sub-district shows that most processors are of productive age, between 15-54 years old, with an average age of 46 years. This reflects the large physical labor required in running this business, considering that tapping must be done twice a day and the sap cooking process takes up to 8 hours. Most processors' education is only at the primary and junior high school level, with around 15% not even attending school. This low level of education contributes to the lack of knowledge and application of business management, making it difficult for the scale of the business to grow. In addition, the family dependents of the processors also varied, with the majority having 0-3 dependents, which became an economic burden and influenced risk preferences in running the business.

The business experience of palm sugar processors is quite diverse, with an average length of business of around 18 years. Most processors rely on wild palm trees growing in their own gardens or around their homes with an average number of around 7 trees per processor. Although the availability of raw materials is abundant, processors tend to rely on trees that grow naturally without special planting.

Overall, palm sugar processing in Southeast Sulawesi still relies on traditional methods and small-scale independent labor. The low education level of processors is one of the barriers to better business development. Nevertheless, this business remains an important source of income for the community, especially those of productive age and with large family burdens, so they try to maintain this business as a daily livelihood.

Performance of Aren Sugar Processors in Wolo District, Kolaka Regency

This study examines the performance of palm sugar processors from three main aspects, namely sap tapping, palm sugar processing, and product marketing. Performance is a measure



of the work ability of palm sugar processors. The analysis of the performance of palm sugar processors can then be used as a basis for future palm sugar business development. This performance analysis is based on the respondents' ability to carry out the production and distribution stages, which are important foundations for the development of a more optimized and competitive palm sugar business. The level of performance varies among palm sugar processing respondents. This can be seen in Table 2.

Table 2. Performance of Aren Sugar Processors in the Aren Sugar Processing Business in Wolo District, Kolaka Regency, Southeast Sulawesi

Category	Performance	
	Number (workers)	Percents (%)
Low	17	28.33
Medium	41	68.33
High	2	3.33

Table 2 shows that most of the palm sugar processing respondents have a performance level in the medium category (68.33%). This means that the performance of respondents in the palm sugar processing business has not been maximized, both in terms of tapping, sap boiling, and marketing. Thus, there is still great potential to improve the performance of palm sugar processing.

The minority of palm sugar processing respondents who have high performance can be caused by their lack of focus in pursuing the palm sugar processing business. They prioritize their plantation businesses (cocoa, cashew, clove, pepper). They see greater profits (nominal) in the plantation business than in the palm sugar processing business.

The total performance of the palm sugar processing respondents in Table 2 is further detailed into the performance of tapping, processing, and marketing palm sugar. This can be seen in Table 3, Table 4, and Table 5.

Tapping Performance

Respondents' performance in tapping palm sap is indicated by the length of time tapping takes, the number of bunches, the number of trees, and the amount of sap that can be tapped in one day, as well as the amount of labor used. The level of performance in tapping palm sugar varies among the respondents. This can be seen in Table 3.

Table 3. Tapping Performance of Aren Sugar Processors in Aren Sugar Processing Businesses in Wolo District, Kolaka Regency, Southeast Sulawesi

Category	Tapping Performance	
	Number (workers)	Percents (%)
Low	13	21.67
Medium	47	78.33
High	0	0.00

Table 3 shows that the tapping performance of palm sugar processing respondents was predominantly in the medium category (78.33%), and none of the respondents had high tapping performance. This means that none of the respondents tapped > 3 bunches in one tree and none of the respondents used labor > 3 people, as well as only a small proportion of respondents who could tap > 30 liters of sap and or tap > 3 trees in one day.

Based on the interview results, it is known that there are as many as 50% of palm sugar processing respondents who are only able to tap 2 - 3 palm trees every day. This is due to the limited energy owned by the respondents. Respondents only tapped the trees by themselves. The palm trees tapped by palm sugar processors are palm trees that grow wild around the residence or around the respondent's plantation area. There are no palm sugar processors who cultivate palm trees. Thus, the height of the palm trees is not uniform. The tapped palm trees tend to have a height of more than 10 meters due to the high growth density. This is an obstacle for respondent processors to shorten their tapping time. The high caution of respondents in tapping to avoid the risk of falling from the tree and the risk of less sap obtained also affected the length of time they tapped. Only 27% of respondents were able to tap less than five minutes for one tree.

According to Kusumanto (2010), the use of appropriate technology, such as mechanical tappers, can increase the efficiency and volume of sap tapped. In addition, the quality of sap is strongly influenced by tapping techniques and processing time, because sap that is processed late can undergo fermentation, which reduces the quality of the final sugar (Soekartawi et al., 1999). Therefore, improving knowledge and training on tapping techniques is crucial to improving tapping performance.

Processing Performance

Respondents' performance in processing palm sugar is indicated by the amount of sap they can process into palm sugar, the amount of palm sugar they can produce in one day, and

the amount of labor used. The level of performance in processing palm sugar varied among the respondents. This can be seen in Table 4.

Table 4. Processing Performance of Aren Sugar Processors in Aren Sugar Processing Business in Wolo Sub-district, Kolaka Regency, Southeast Sulawesi

Category	Processing Performance	
	Number (workers)	Percents (%)
Low	13	21.67
Medium	47	78.33
High	0	0.00

Table 4 shows that most of the brown sugar processing respondents had medium processing performance (78.33%). This means that no respondent was able to boil sap into palm sugar in less than three hours, and no respondent used more than two workers. It can be explained that respondents did not control the quality of the firewood they used. The firewood used is obtained from around the residence or from around the garden. This causes the heat generated to boil the palm sap is often not optimal. 55% of respondents needed more than five hours to boil the sap until it thickened and could be molded into palm sugar. Forty-five percent of other respondents took 3 to 5 hours.

According to Soekartawi (1999), the use of more efficient appropriate technology can reduce fuel consumption and improve product quality. In addition, the cleanliness of the processing environment and equipment sanitation also need to be improved to avoid microbial contamination that can reduce the quality of palm sugar (Noor, 2012).

Respondents did not have labor to process palm sugar. This is because the palm sugar processing business is still not considered an attractive livelihood in terms of profit or prestige, so there are no people who offer themselves as labor for this business. Although this traditional process requires a long time and more energy, the uniqueness of the product produced is a selling point and a characteristic that must be maintained when modernizing the production process.

Marketing Performance

Respondents' performance in marketing palm sugar is indicated by the time of selling palm sugar, the amount of palm sugar damaged in storage, the amount of unsold palm sugar, the amount of palm sugar used for own household consumption, the amount of palm sugar

packed daily, and the way respondents marketed the palm sugar. The level of performance in marketing palm sugar varied among the palm sugar processing respondents. This can be seen in Table 5.

Table 5. Marketing Performance of Aren Sugar Processors in Aren Sugar Processing Business in Wolo Sub-district, Kolaka Regency, Southeast Sulawesi

Category	Marketing Performance	
	Number (workers)	Percents (%)
Low	15	25.00
Medium	42	70.00
High	3	5.00

Table 5 shows that most of the respondents who processed palm sugar also had moderate marketing performance (70.00%). This means that none of the respondents packaged the palm sugar they produced. In addition, only a few respondents (12%) sell sugar every day. Eighty percent of respondents preferred to market their palm sugar every 3 days to once a week.

The medium criteria for marketing activities also indicated that respondents were not aggressive and creative in selling their palm sugar. Most respondents (55%) marketed their palm sugar passively. They only waited in the farm (where the palm sugar was processed) or at home until the collecting traders and or other consumers came to buy. Less aggressive marketing strategies and lack of innovation in packaging limit the attractiveness of the product, making it difficult to compete in a wider market.

Limited capital is a major constraint in marketing development. Without access to adequate financing, processors find it difficult to promote, improve packaging, or expand distribution networks (Andriansari, 2010). Therefore, community-based marketing training, institutional strengthening of processors, and utilization of digital technology and social media need to be encouraged as strategies to improve marketing (Robbins, 2006).

Various technical factors, human resources, and the market environment affect the performance of palm sugar processors. Limited processing technology and marketing infrastructure are the main constraints (Soekartawi, 1999). Gunasekaran and Ngai (2019) emphasized that the integration of appropriate technology and institutional support is crucial in improving the performance of agro-industrial microenterprises.

In addition, access to market information and innovation capabilities in product marketing significantly determine business competitiveness and profitability (Rashid et al.,



2020). Thus, strengthening human resource capacity and developing marketing networks are the main focus in developing palm sugar businesses in Wolo Sub-district.

CONCLUSION

Based on the results and previous discussion, it can be concluded as follows:

1. The performance of palm sugar processors in Wolo Sub-district, Kolaka Regency, is in the medium category with an average performance score on tapping, processing, and relatively balanced marketing activities.
2. Limited processing and marketing technology is still a major obstacle in improving performance.
3. Improving the performance of palm sugar processors needs to be done through technical development and marketing strengthening.

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