

## Economic Value of Palm Sugars Production with Technology of Double Tapping

Aliudin<sup>1</sup>, Fitry Riany Eris<sup>2</sup>, Setiawan Sariyoga<sup>1</sup>, Septian Tirta Cahyadi<sup>2</sup><sup>1</sup>Dosen Agribisnis Fakultas Pertanian Universitas Sultan Ageng Tirtayasa<sup>2</sup>Dosen Agroekoteknologi Fakultas Pertanian Universitas Sultan Ageng Tirtayasa**\*Corresponding author:**

Aliudin

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**Abstract:** The palm sugar industry is one type of small industry that grows in rural areas. The palm sugar industry has been driving rural economy from subsistence to semi-commercial patterns. The palm sugar industry uses raw materials from palm sugar. Palm juice is produced from palm trees. There are 2 techniques in tapping palm sap, namely single tapping and double tapping. This study focuses on the palm sugar industry that uses multiple tapping technology. The sampling technique used is simple random sampling with a population of 31 people. The results showed that the palm sugar industry with double tapping technology is profitable with an income ratio and costs more than one. This shows that double tapping by utilizing stamens and pistil interest in tapping the sap can increase the crafter's income.

**Keywords:** Palm sugars, economic value, double tapping.

### INTRODUCTION

Small industries that develop in developing countries have the same characteristics, namely low control over the use of inputs (production factors). The use of balanced inputs is difficult to achieve, the impact of optimum production is difficult to achieve. In micro terms this will cause the difference between production costs and sales results to be negative, this makes it difficult for farmers to compete prices because farmers produce goods at a cost that exceeds the normal price. Macro if in a closed economic condition, this results in a decrease in the purchasing power of both farmers as producers and consumers. Based on the results of the study carried out the rank number of the production function of more than one. This shows production in an irrational position. This factor that triggers farmers increases yields for small-scale agricultural industries to develop.

One of the cases presented with the problem of using unbalanced inputs occurred in the small sugar palm industry. This industry is cultivated individually by farmers ranging from tapping to marketing of results. Industrial growth is very slow, the impact on the welfare of the crafters is very low, and the link between the culture and future linkages to economic growth is very small. The attention of industry players is only to

the achievement of high profits, regardless of the combination level of optimal input use.

Industri gula aren merupakan salah satu agroindustri yang sangat penting untuk menguatkan perekonomian di pedesaan. Industri gula aren mempunyai permasalahan ketersediaan bahan baku yang sangat terbatas. Faktor pembatasnya, perajin hanya menyadap satu sumber bahan baku yaitu tangkai bunga jantan. Terdapat peluang untuk menambah jumlah bahan baku yaitu dengan menyadap tangkai bunga betina. Penelitian ini bertujuan untuk melihat jumlah produksi gula aren dan pendapatan perajin dengan menyadap dua sumber bahan baku. Jumlah bahan baku di hitung selama 30 hari penyadapan, sedangkan pendapatan dihitung berdasarkan jumlah produksi gula aren dengan harga jual di tingkat perajin.

The palm sugar industry is one of the agroindustry which is very important to strengthen the economy in the countryside. The palm sugar industry has very limited problems with the availability of raw materials. The limiting factor, craftsmen only tap one source of raw material, namely male flower stalks. There is an opportunity to increase the amount of raw material by tapping the female flower stalks. This study aims to look at the amount of palm sugar production and the income of artisans by tapping two sources of

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raw materials. The amount of raw material is calculated for 30 days of tapping, while the revenue is calculated based on the amount of palm sugar production with the selling price at the level of the craftsman.

## METHODS

The method used in this research is survey and observation methods. Research done in Haryang Village, Cijaku Sub-district Location selection was intentionally determined. The basis for selecting these locations: (1) The location is the location of industrial centers that produce palm sugar with individual management characteristics, (2) craftsmen have problems in combining the use of production inputs.

The sampling technique in this study was carried out using proportional stratified random sampling. The basis of stratification is the ownership of productive palm trees (in the year of research palm trees are ready to be tapped). The population surveyed is palm trees which are owned by productive craftsmen and have male and female flowers that are ready to be tapped (craftsmen who use multiple tapping techniques). The number of productive palm sugar samples is determined intentionally. The total sample in total number of productive palm trees 31 productive palm trees. Observations were made with the shortest age of the sap flow in the study location, namely 30 days of taking nira in one tapping round. Furthermore, for the selection of productive palm trees for tapping sap with a dual system is determined intentionally with the following criteria: (1) Age of palm trees between 17 years to 20 years. (2) Palm trees are the maximum productive trees already tapped twice tapping cycles.

## RESULTS OF ANALYSIS AND DISCUSSION

Palm trees in the haryang village are scattered throughout the Haryang Village area, covering an area of 1,783 ha. An ecosystem where the growth of palm trees is in the form of hills and valleys. The distribution is in the valley and mountain of Bongkok, Gunung Hariang, Gunung Manik, Mount Handeleum, Gunung Ngalasaung.

Topographic conditions vary, namely alluvial, latosol and red yellow podzolic. The percentage of distribution of these types of land includes alluvial soil approximately 7.40 percent, latosol approximately 40.26 percent, red yellow podzolic approximately 45.20 percent, regosol area of 3.13 percent, rezina and litosol area of approximately 4.01 percent (Monographs of Hariang Village, 2013). The pH of the soil in Desa Hariang is 5.5 to 6.7.

Road infrastructure leads to asphalt research sites, with winding trajectories and up and down hills. The village structure is clustered in a circle pattern, while the craftsman factory is separated from the village and spread between the hills and around the palm trees tapped. Means of transportation used by the community

of mini buses and two-wheeled vehicles. The route is from the provincial capital to the research location (Desa Hariang), including the terminals of the Kadubanen terminal in Pandeglang Regency up to Mandala Terminal Lebak-Haryang Regency. Total travel time of 6 hours. Palm trees in the Haryang Village grow wild among mixed forests. Mixed plants include forest plants and plantation crops.

The process of producing palm sugar in the village of Hariang is taking place in the forest where it is located in the factory (saung / hut), using a burning stove, which is made by digging a hole about 1.5 m deep, besides firewood as an ignition process material, steel pan as a place for juice in the process of cooking, stirring (quiz) as a stirrer in the cooking process and printing sugar as the print.

### Palm Sugar Processing Process

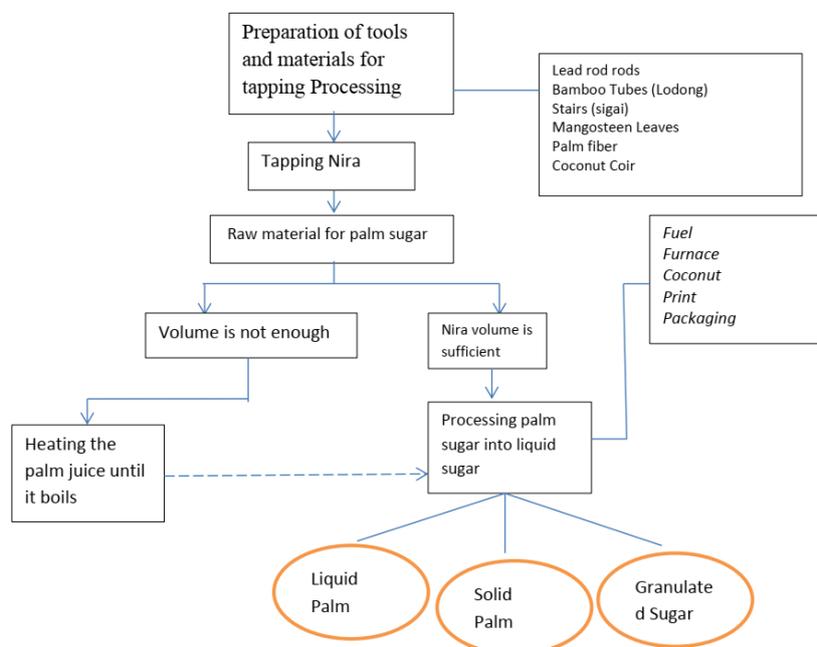
The process of processing palm sugar into sugar is divided into several stages. The first stage is the preparation of processing equipment, which is done by artisans in the preparation of processing equipment, namely cleaning the furnace from ash and from the rest of the combustion, washing kenceng, stirrers and molds with clean water, which is available around the plant. Whereas the bride and groom are sufficiently prepared not to go through the washing process. The second stage is boiling palm sugar juice there are two boiling techniques, namely the boiling technique of palm sugar into liquid sugar and the technique of boiling palm sugar directly into palm sugar.

The first technique is done if the juice produced is considered insufficient to be processed into palm sugar, the second technique is done if the amount of juice produced is considered sufficient to be processed into palm sugar. The first technique is done by heating the sugar to a temperature of 100<sup>0</sup>C (boiling) after which it is left to wait for the next additional juice to suffice. While the second technique is done by heating palm sugar with a temperature of more than 150<sup>0</sup>C. After the sap thickens added *pemepe* (honey bee nest). This *pemepe* material is useful to facilitate the sugar release process from printing. If the craftsman wants liquid palm sugar as the final product, then if the sugar has thickened it is turned until it reaches room temperature, and afterwards is packaged in plastic or bottle packaging.

If the craftsman wants the final product of sugar, the processing is continued until the sugar is fully cooked. Furthermore, to determine the level of sugar maturity, craftsmen test by dripping sugar that is still hot and liquid which is being cooked into cold water, if the juice hardens it means that the sugar is cooked, if the sap entered into the water has not hardened means the juice is immature (not ready for printing).

The next step is the printing process. In this process the sap that has been cooked is poured into the print one by one and then left to harden in a vulnerable print for approximately 2 minutes. After the sugar hardens the sugar is released from the print. The next stage is the packaging stage in this stage the sugar that

has been released from the print is wrapped using dried banana leaves. The way to package it is by wrapping it, in one package there are two sugar sticks, the craftsman calls it one upstream of palm sugar, if the amount reaches five upstream sugar palm craftsmen call it 1,25 kg.



If the palm sugar is processed further by reducing the water content, it will form granular palm sugar called the local community as grainular palm sugar. Palm sugar is packaged not with salak leaves but packed with plastic.

fee is not used up in one production process. The structure of the variable cost in this study is defined in the type of costs in the short term directly affecting the production of palm sugar, this cost runs out in one production process.

**Production Cost Structure**

The structure of production costs is seen from the structure of fixed costs and variable costs. The fixed cost structure in this study is a type of cost in the short term indirectly influencing the yield of palm sugar. This

**Fixed Cost Structure**

Fixed costs in the process of producing palm sugar are costs incurred by craftsmen to procure production facilities. The cost structure can be seen in Table-1.

**Table-1: Fixed Cost Structure of Palm Sugar Production**

Number	Cost Type	Costs in one month (IDR)	Average Total Cost Per Crafters in One Month Tapping (IDR)	Percentage (percent)
1	Workshop	596.388,33	19.238,33	<b>26.95</b>
2	Brown sugar Stove	66.577,28	2.295,77	<b>3.01</b>
3	Mold	109.207,58	3.522,83	<b>4.93</b>
4	Steel pan	300.833,24	9.704,30	<b>13.58</b>
5	Bamboo tube (lodong)	665.000,00	21.451,61	<b>30.02</b>
6	Stirrer	103.333,23	3.333,33	<b>4.66</b>
7	Stairs	24.374,95	1.218,75	<b>1.10</b>
8	Machete	243.333,20	7.849,46	<b>10.98</b>
9	Trimmer cleaver	36.458,10	1.215,27	<b>1.51</b>
10	Pemalung	36.318,66	1.345,14	<b>1.64</b>

Based on the fixed cost structure, the biggest cost required for bamboo tube (*lodong*), for these equipment is almost 30.02 percent of the total cost. While the costs incurred for the stairs are only a small part, which is 1.10 percent of the total. The overall cost percentage can be seen in Figure-1.

### Variable Cost Structure

Variable costs in the process of producing palm sugar are costs incurred by craftsmen to procure materials and production facilities needed for the

production of palm sugar. The material is divided into two, namely raw materials and supporting materials, the raw material in question is palm sap, the supporting material is honeycomb (*pemepe*) and mangosteen leaf (*sterilizer*) based on the two types of materials the variable cost structure is divided into costs for raw materials, costs for honeycomb (*pemepe*) and fees for mangosteen leaves (*sterilizer*). All of these costs are spent in the process of producing palm sugar. For more details can be seen in the table as follows:

**Table-2: Variable Cost Structure**

Number	Types of expenditure	Total costs in one tapping period	Average total cost	Percentage
1	Raw material for sap	44,534,000	1,436,581	54.35
2	Labor Wages	25,049,000	808,032	30.58
3	Honeycomb	89,068	2,873	0.11
4	Sterilization material	445,340	14,365.81	0.54
5	Firewood	11,133,500	359,145	13.58
6	Packaging	685,635	22,117	0.84
	Total	81,936,543	2,643,114.29	100

Look at the structure of the most variable costs incurred by artisans is the cost of raw materials with a percentage of 54.35%, while the costs that are close to expenditure for raw material costs are costs for labor with a percentage of 30.58%. The lowest variable cost is the cost incurred for the cost of honeycomb with a percentage of 0.11%, in a single production process the total variable cost within 30 days of tapping is required to cost IDR 81,936,543. Whereas on average each craftsman for 30 days tapping costs a fixed IDR 2,643,114.2.

Based on the fixed cost structure the largest distribution of costs incurred for lodgings is 30.02% of the total fixed costs incurred while for factories the costs incurred are below the cost for bamboo tube which is 26.92%. The smallest cost structure is the cost incurred for the stirrer 1.10% and machete 1.51%. Based on the fixed cost structure for thirty days of

tapping, the total cost of IDR 2,215,171.59 or can be averaged over a fixed cost structure for 30 days of tapping, it costs IDR 71,556.61. The biggest cost requirement was issued to pay IDR 665,000.00 and the smallest costs incurred for stirring costs IDR 24,374.95 for 30 days tapping. On average, every craftsman within 30 days of tapping requires a fixed fee of IDR 71,556.61, the highest cost was incurred for the cost of *lodong* IDR 21,451.61, and the smallest for the cost of stirrer IDR 1,218.75. If the average cost within 30 days of tapping is calculated per crafter then each crafter pays a daily fee of IDR 2,385.22.

### Income

The income from the craftsmen is the income obtained from processing sugar products from tapping to form sugar products. Revenue is calculated in a period of stem tapping.

**Table of Revenue for Double Sugar Tapping Crafters**

Number	Descriptions	Value per tapping period (IDR)	Average per craftsmen per tapping period
1	Revenue	101,395,000	3,270,806.45
2	Total Cost	84,151,714.59	271,571.44
3	Revenue Cost Ratio	1.2	1.2
4	Income	17,243,285.41	556,235.01

Based on the revenue structure for 30 days, the income earned by the craftsmen was IDR 17,243,285.41. The production cost structure incurred to produce palm sugar looks great, and the level of profit obtained by craftsmen is very small, but because craftsmen directly handle the craft's activities, craftsmen in addition to receiving benefits also receive remuneration in the form of labor wages. The advantages of palm sugar craft compared to other businesses pursued by craftsmen are palm sugar crafts

that can contribute to income every day, while plantation and farming businesses contribute to income at certain times (after harvesting and harvesting). In other words, to obtain results from the plantation and farming business, it takes a longer waiting time compared to waiting time in the palm sugar business.

If the average daily income is calculated, each craftsman is IDR 18,541.17 per day when compared and assumed craftsmen try in other fields around the

research location such as farm laborers get a daily salary of IDR 50,000.00 workers' wages are far greater than the palm sugar craft business. In addition to earning crafters also get a salary from palm sugar craftsmen on average craftsmen get a salary one month (30 days) tapping that is equal to IDR 808,032. If the wage is calculated per day then the craftsman receives IDR 26,934.40. So the money received by craftsmen from the income and wages of IDR 45,475,57.

Palm sugar crafts when viewed based on the conditions in the field can be classified as a business that fully utilizes natural resources that are neglected (not processed or not utilized). This can be seen from the procurement of some production facilities and materials needed for palm sugar business. Bamboo tube, *pamalung*, stairs, are made by craftsmen and obtained without having to incur real costs. Likewise with materials to make palm sugar, which is raw material for sap, sterilizing ingredients or ingredients to maintain pH (mangosteen leaves), honey nests as lubricants even sometimes firewood is obtained without having to incur real costs. So if the craftsman is assumed without having to pay real costs for a fixed fee, then the money earned by the craftsman is IDR 627,791.62. This figure is obtained from the income earned by artisans during the 30-day production process, which is IDR 556,235.01 plus a fixed fee in one production process per crafter IDR 71,556.61 in one production process. This value is a fundamental reason the craftsmen survive to pursue palm sugar craftsmanship, even though the real profits received by artisans are relatively small but the money received by craftsmen as wages and the utilization of locally respected resources is relatively large. The value of the rupiah is greater than that of local farm laborers.

Based on the Revenue Cost Ratio the value obtained is 1.20. This value gives an understanding that every 1 IDR issued by craftsmen is able to provide a profit of IDR 0.20. Based on the value of Revenue Cost Ratio, it means the palm sugar craft using beneficial double tapping technology.

The development of agro-industry in the countryside has an impact on the development of the rural economy in the countryside, providing business opportunities for the community, developing the potential of regional capital and building rural economic turnover. This effort can also reduce pressure on labor and urbanization problems. The agro-industry business that is developed must be able to provide comparative advantages, and this will be realized if the effort is carried out efficiently [1]. Palm sugar craft is an industrial style that can provide solutions to these problems, this industry style is able to contribute relatively high to family income in a sustainable manner [2]. One of the obstacles and the problem is the problem of raw materials, raw materials produced from trees

owned by farmers are still not enough to support the needs of raw materials for perira palm juice [3].

The research of Aliudin and Sariyoga [4] on palm sugar agro-industry at Pandeglang shows that the added value and contribution to the crafter's profits is smaller than the benefits of labor obtained, however, it shows that the palm sugar agro-industry business is still a livelihood of craftsmen and can survive even though economic crisis.

BEP sales at an average production of IDR 1,146. BEP production volume at an average production of 0.21 kg. BEP sales at the lowest average production of IDR 1,965. BEP production volume at the lowest production time is 1.15, BEP sales at the highest production is Rp 1,100, BEP production volume at the highest production is 0.2 kg [5].

The advantage in the one-time production process obtained from palm tree-based handicrafts is from the highest farther, vinegar sour from sap, palm sugar and the lowest is broom stick. However, even though the benefits of processing kolang kaling are the highest but require a longer time. The highest R / C ratio of sugar palm sugar-based handicrafts is vinegar, palm sugar, palm and broom sticks. The added value obtained successively from the highest is vinegar, kolang kaling, palm sugar and broom sticks. The strategy that can be taken for the development of palm tree-based product diversification is hold and maintenance, this strategy focuses on improving and maintaining product quality through labeling, registering, lifetime information and group-based management [6].

Research Aliudin *et al.*, [7], shows that the use of production factors (palm juice, work and fuel) in the palm sugar agro-industry business has not been efficient. This can mean that there are still opportunities to increase the volume of use of production factors, in this case an increase in the volume of palm sugar, labor and fuel used in the manufacture of palm sugar. The added value of the processing of sap into palm sugar can still be increased through group efforts to make substitution between production factors, which ultimately can increase profits and added value. This research provides a different solution to increase income not only done in groups but also by using double tapping technology.

The previous research above is a study with a single tapping technique, while the difference with the research that will be done is to examine the additional juice and production of palm sugar with a double tapping technique. Alternative double tapping has been shown to provide additional palm juice and palm juice from dual tapping technology which can have a direct impact on increasing sugar production and crafting income. This evidence shows that the technology of

double tapping technology can increase the production of palm sugar, so that the assembly of the technology can be used as a dissemination material to increase the production of palm sugar.

### Palm Sugar of Productivity

Palm sugar craft is a business that utilizes local resources. The main resources used are palm trees. Palm trees that grow in the research location can be categorized as forest resources. Palm that grows is not cultivated but grows wild. Crafters are not familiar with good palm sugar cultivation, craftsmen are only limited to spacing, it is also done not based on planning. Aren in the research location is mostly used by craftsmen as raw material for palm sugar (palm juice). Palm juice obtained is taken and obtained through the tapping process. The decision of the craftsman to do tapping basically can be said as a decision taken to take risks. If the craftsman decides to do the tapping, the craftsman is also faced with the risk of not getting results from the collision. If the craftsman succeeds in tapping, it means that the opportunity to get income from sugar palm fruits is lost, and the opportunity of farmers from palm trees is replaced by tapping palm sugar, but if the craftsman fails to do the tapping process, the craftsman loses two opportunities to earn good income from the results. both palm and palm sugar. Craftsmen experience can minimize this risk, more experienced farmers can estimate the type of tree that can be tapped and produce palm juice or tree species that do not produce sap at all if tapping. The experience of this farmer is a reference for doing or not tapping on palm flowers that will be tapped. If the craftsman estimates the palm flower will not release the sap when tapping, the craftsman will allow the flower to become fruit and take the result in the form of sugar palm fruits. If the flower is a male flower (local craftsmen call it a workshop) the craftsman will cut the male flower and use it for goat feed.

Actually there are many factors that cause high and low volume of sap produced by tapping palm sugar. This factor has not been known until now, but it can be expected that the factors that influence the volume of juice is the nutrient content in the soil, the environmental conditions around the plants where the palm trees grow, and the climate or weather. Based on the observation, the volume of sap produced by tapping is not always directly proportional, meaning that not all the juice produced is comparable to sugar. Sometimes the volume of juice produced is inversely proportional, meaning that in certain conditions the amount of juice produced is a little sugar, in certain conditions the amount of juice produced is small but the yield of sugar is greater in units of kilograms of sugar per liter of palm sugar. The ability of palm sugar in liters to produce palm sugar is called yield or productivity.

Based on the observation that the lowest yield was 0.17, the number showed that every single liter of

palm sugar produced 0.17 kg of palm sugar. The highest yield is 0.28 that number shows that everyone liter of palm juice can produce 0.28 kg of sugar. During the 30 days of tapping, the yield was 0.22. This figure shows that every 1 liter of palm juice produces palm sugar of 0.22 kg. The yield was obtained from the results between the amount of palm sugar divided by the amount of palm juice for 30 days of tapping.

Another factor that affects the tapping age is the type of flower bunches that will be tapped. There are 3 types of flower bunches that will be tapped in one palm tree, namely female flower bunches (*langgari /caruluk*), male flower bunches (workshops) and female flower bunches that grow between male flower bunches and female flower bunches, the local people call it rangda flower bunches. The longest tapped age of tapping is a female flower bunch, the tapping age of female flowers can reach 6 months. While the tapping age of male flowers is a maximum of 3 months tapping.

For tapping male flowers, craftsmen are not faced with business risks, because male flowers cannot bear fruit into sugar palm fruits so that craftsmen are free to make decisions on tapping palm sugar. The situation is different if the craftsman is faced with the decision to intercept the palm sap that intercepts palm sugar from female flowers. If the craftsman will do wiretapping on the flower, the female craftsman is faced with business risk, because if the wiretapping is done on the flower, the female craftsman loses the opportunity to earn income from the collapsing, it will likely increase the risk if the interest bunch (female interest) to be tapped will experience a tapping failure (does not issue palm juice), means that the craftsmen (palm sugar farmers) bear the risk of double business in addition to losing the opportunity to earn income from the collapsing and also lose the opportunity for income from palm sugar.

### CONCLUSION

Based on the results and discussion it can be concluded that palm sugar business with double tube has economic value that benefits the revenue ratio at a cost greater than one. Craftsman income is above average total income.

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