Feasibility analysis of sugar palm (*Arenga pinnata* Merr) by the people around Batang Gadis National Park area

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Abstract. Sugar palm (*Arenga pinnata* Merr) is a commodity that produces high economic value products and all of its parts can be processed into various food and non-food products. The purpose of this study was to determine and analyse the feasibility of sugar palm businesses in the vicinity of Batang Gadis National Park, in Pastap Julu Village. Analysis of the data in this study is a feasibility of palm sugar business with the indicators of total cost, total revenue and income as well as revenue cost ratio (R/C). The results obtained from this study indicate that the total fixed costs amounted to 4,750,000 IDR and the total variable costs amounted to 740,000 IDR so that the total costs amounted to 5,490,000 IDR. The revenue is 3,120,000 IDR in a month which calculated from the total production of 240 kg palm sugar per month and the price of 13,000 IDR/kg, so that the revenue in the year is 15,600,000 IDR. Then it was concluded that the income received was 10,110,000 IDR and the palm sugar business in Pastap Julu Village was feasible to be developed because the R/C value was 2.84 (more than 1).

1. Introduction
Sugar palm is a potential commodity to be developed and has economic value because all its parts can be processed into various food and non-food products. Sugar palm produces sap juice that can be processed into sugar, drinks (palm wine) and bio-ethanol. Sugar palm also produces fruit which is commonly called *kolang kaling* – a candy fruit, the stems produce flour if the sap is not tapped and the flour can be processed into vermicelli, *hunkwe* flour and can be used as raw material for making edible films [1].

Sugar palm trees belong to the palmae family which has a variety of functions including conservation and production as well as important economic value because almost all parts ranging from roots, stems, leaves, fruits can be used for various human needs. Propagation and spread of sugar palm occur through seeds or spread through animals (weasels), after knowing the benefits of sugar palm then cultivation began to be developed through silvicultural techniques [2].

Feasibility analysis can be said as financial analysis which means looking at it from the perspective of the entrepreneur as the owner. Feasibility analysis to see the level of profit of a product. The financial/feasibility analysis that is concerned is in terms of cash flow, which is the comparison between the results of gross sales or receipts (gross sales) with the total costs (total cost) stated in present value to determine the eligibility criteria or benefits of a project [3].

According to [4] business feasibility analysis can be seen and calculated from various aspects that influence it, namely business revenue and revenue cost ratio (R/C). Operating income is the profit
obtained determined at the price offered and the Revenue cost ratio (R/C) can be said to be the ratio of the ratio of revenue received to costs incurred in the business. If the ratio shows zero result it can be said that the business does not provide financial benefits. Likewise, if the ratio shows a number less than 1, the effort made does not benefit from the activities carried out.

This research is expected to be able to provide information on the financial feasibility of palm sugar business in the vicinity of Batang Gadis National Park.

2. Methods
This research was conducted in the vicinity of the Batang Gadis National Park SPTN II Resort 3 precisely in the Village of Pastap Julu, Tambangan District, Mandailing Natal Regency, North Sumatra Province. This research took place in March 2019. The research location can be seen in Figure 1. The data used in this study, namely primary data and secondary data. Primary data obtained through the results of field observations, questionnaires, and interviews with people directly involved in the management of sugar palm. Secondary data collected included general site conditions or general data available at government agencies.

![Figure 1. Research location](image)

2.1 Sampling
The sampling method is done by purposive sampling. Purposive sampling is the selection of a group of subjects based on certain characteristics or characteristics that are considered to have a close relationship with the characteristics or characteristics of the population that have been known beforehand. This method is adapted to the needs of research objectives [5]. The number of respondents sampled is as follows:

1). If the total population is 100 households, then all respondents are taken.
2). If the number of respondents more than 100 households, then 10-15% of the total number of households is taken [6].

2.2 Data analysis
Simple business feasibility analysis using the formula Total Cost (TC), Total Revenue (TR) and Income (I). To find out the total costs (overall costs incurred) [7], mathematically can be written as follows.

\[ TC = TFC + TVC \] (1)

Descriptions:
TC : Total Cost ( IDR)
TFC : Total Fixed Cost ( IDR)
TVC : Total Variable Cost ( IDR)

Mathematically, the formula for calculating the number of receipts is as follows.
\[ TR = PxQ \]  \hspace{1cm} (2)

Descriptions:
\( TR \): Total Revenue (IDR)
\( Q \): Quantity (kg)
\( P \): Price (IDR)

Income from a business can be calculated using the concept of income by reducing total revenues by total costs.

\[ I = TR - TC \]  \hspace{1cm} (3)

Descriptions:
\( I \): Income (IDR)
\( TR \): Total Revenue (IDR)
\( TC \): Total Cost (IDR)

Next, look for revenue cost ratio (R/C) or as a difference between revenue and costs. R/C is useful to find out whether the sugar palm business produces profits or not from the costs incurred [8]. Can be formulated as follows:

\[ R/C = TR/TC \]  \hspace{1cm} (4)

Descriptions:
\( R/C \): Revenue cost ratio
\( TR \): Total Revenue (IDR)
\( TC \): Total Cost (IDR)

R/C evaluation criteria
\( R/C < 1 \) = business suffered a loss
\( R/C > 1 \) = the business makes a profit
\( R/C = 1 \) = attempt to break even

3. Result and discussion
Feasibility/financial analysis means looking at it from the perspective of the entrepreneur as the owner. The feasibility/financial analysis concerned in terms of cash flow, which is a comparison between the results of gross sales or receipts (gross sales) with the total costs stated in present value to determine the eligibility criteria or benefits of a project [3]. Financial analysis aims to see whether a business is feasible or not to run. Financial analysis includes costs, revenues, income and revenue cost ratio.

3.1 Cost, revenue and income of sugar palm business
Production costs incurred in producing palm sugar are divided into 2, namely fixed costs and variable costs. Fixed costs are costs that amount to a certain level of activity is relatively fixed and is not affected by changes in the volume of activities. Variable costs are costs that vary in proportion to changes in the volume of activities, but the costs per unit are fixed.

Based on Table 1, it can be seen that the total cost of palm sugar business in a year is 5,490,000 IDR. Fixed costs are costs that include employee wages and rent. Variable costs are the cost of raw materials and the cost of conventional bamboo equipment to process palm juice into palm sugar products such as cauldron, spoon, basin, ladder (sigai), net basket and palm sugar moulds and other supports such as fuel. For fixed costs, producers expense a land rental fee of 1,000,000 IDR a year and employee wages of 3,750,000 IDR a year (only one employee). As for variable costs, since the bamboo equipment are made
by themselves so that the community does not incur any costs. So that producers only expense costs to buy pans, spoons and basins of 240,000 IDR and fuel costs of 500,000 IDR in a year.

### Table 1. Total costs of the palm sugar business in Pastap Julu Village

| No | Cost type   | Value/year (IDR) |
|----|-------------|------------------|
| 1  | Fixed cost  | 0,4,750,000      |
| 2  | Variable cost | 1,740,000        |
| 3  | Total       | 5,490,000        |

The total revenue is obtained by multiplying the amount of palm sugar production and the selling price of sugar palm. Here is a Table of total receipts.

### Table 2. Total revenues from palm sugar business in Pastap Julu Village

| No | Information                          | Value  |
|----|--------------------------------------|--------|
| 1  | Total production (kg)                | 000240 |
| 2  | Price (IDR)                          | 13,000 |
| 3  | Total monthly revenue (IDR)          | 3,120,000 |
| 4  | Total annual revenue (IDR)           | 15,600,000 |

From Table 2 it can be seen that the amount of production in a month reaches 240 kg produced from the tapping of 6 palm trees. In a day, tapping is usually done twice, producing 35 litres of sap in the morning and 25 litres of sap in the afternoon. For the selling price of palm sugar per kg of 13,000 IDR which is determined through market prices. Usually the price will increase when approaching the month of Ramadan to Eid.

Total revenue per month amounted to IDR 3,120,000 and the results obtained from total revenues in a year were 15,600,000 IDR. The annual results in sugar palm business is expected runs for only 5 months considering the sugar palm tree productivity in a year to produces sap juice. This is consistent with the statement of [9] which states that in a year it can be tapped up to 4 bunches of flowers per tree, and each bunch of flowers can be tapped for 3-5 months.

Income can be identified through total costs and total revenues by determine the difference between total revenue and total costs in making a product. The following is a Table of palm sugar business revenue.

### Table 3. Palm sugar business income in Pastap Julu Village

| No | Description         | Value/year (IDR) |
|----|---------------------|------------------|
| 1  | Total cost          | 15,490,000       |
| 2  | Total revenue       | 15,600,000       |
|    | Income (revenue - cost) | 10,110,000     |

The total costs obtained are the results of costs incurred during the production process in the form of fixed costs and variable costs. Revenue is income derived from the sale of palm sugar for 1 year which lasts for 5 months. Through calculation of total costs and the total revenues, the annual farmers income can be determined.

Table 3 shows the total cost in a year is 5,490,000 IDR and total revenues in the year of 15,600,000 IDR. Income is obtained by reducing total revenue with total costs. So, the result of income received in a year is 10,110,000 IDR.
3.2 Revenue cost ratio
Revenue cost ratio can be said as the ratio of revenue to costs incurred in the business. If the ratio shows zero result it can be said that the business does not provide financial benefits. Likewise, if the ratio shows a number less than 1, the effort made does not benefit from the activities carried out.

R/C ratio value is used to determine the feasibility of a business as seen from the comparison between total revenue and total production costs in the palm sugar business. The R/C ratio value in the palm sugar business can be shown as follows.

| No | Description | Value/year |
|----|-------------|------------|
| 1  | Revenue (IDR) | 15,600,000 |
| 2  | Total cost (IDR) | 15,490,000 |
| 3  | R/C (revenue/cost) | 2.84 |

Table 4 presents the R/C value resulted from the comparison of total revenues of 15,600,000 IDR with a total cost of 5,490,000 IDR is 2.84. This shows that the palm sugar business in Pastap Julu village is profitable and feasible to run. This value can be seen from the R/C ratio criteria where if the R/C ratio <1 then the business suffers a loss, if the R/C ratio > 1 then the business experiences profits and if the R/C ratio = 1 then the business reaches a breakeven point. This is in accordance with the statement of [10] which states the value of R/C> 1, so the business is feasible.

4. Conclusion
The total cost spent in a year is 5,490,000 IDR and the total revenue in a year is 15,600,000 IDR, so the palm sugar business in Pastap Julu Village is feasible to be developed because the R/C ratio is 2.84 (more than 1).

5. Suggestion
It is expected that the local government should pay more attention to small businesses and be able to provide capital assistance and provide guidance and training to sugar palm farmers so that the products more varied, good quality and quantity.

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