AGROMIX
pISSN (Print): 2085-241X; eISSN (Online): 2599-3003
Website: https://jurnal.yudharta.ac.id/v2/index.php/agromix

Location selection, added value analysis, and financial feasibility of developing a non-smoking tobacco agroindustry in Jember District

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Original article

Article history
Received : February 22, 2025
Accepted : September 17, 2025
Published : September 30, 2025

Keyword
Tobacco;
Added value;
Expensive method;
Hayami method;
Financial feasibility analysis.

ABSTRACT

Introduction: Jember Regency is the largest tobacco producer in East Java, reaching 37,821 tons in 2022. Tobacco offers strong development potential and provides significant income for farmers, yet the industry faces challenges due to the health impacts of smoking. Developing non-cigarette tobacco agro-industries is a promising alternative, especially since tobacco waste remains underutilized. Therefore, this study aims to identify potential areas for the development of non-cigarette tobacco agro-industries in Jember Regency and evaluate products with the highest added value and feasibility. **Methods:** The Exponential Comparison Method (MPE) was used to determine the most suitable districts for agro-industrial development, while the Hayami Method assessed the added value of various tobacco-based products. Financial feasibility was analyzed using Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit-Cost Ratio, and sensitivity tests on changes in raw material prices and product selling prices. **Results:** Wuluhan District was identified as the most promising area. Added value analysis showed that biopellets generated the highest added value, with a profit percentage of 46.94% and IDR 28,750 added value. Financial analysis confirmed feasibility, yielding an NPV of IDR 9,728,771,339, an IRR of 68.75%, and a Net B/C ratio of 1.39 at a 6% interest rate. The break-even point was 45,720 units per year, with a payback period of 2.24 years. Sensitivity analysis showed feasibility even with raw material price increases up to 30%, while selling price decreases of up to 20% remained feasible; a 30% decrease made the project unfeasible. **Conclusion:** Wuluhan District is the most suitable area for developing non-cigarette tobacco agro-industries. Biopellets offer the highest added value and strong financial feasibility, providing economic and environmental benefits.

Cite this article:
Wardana, D. I., Aulia, A. N., Mananda, A. B., Setiawan, A. P., & Lestari, S. A. (2025). Location selection, added value analysis, and financial feasibility of developing a non-smoking tobacco agroindustry in Jember District. *Agromix, 16*(2), 205–215. https://doi.org/10.35891/agx.v16i2.6074

INTRODUCTION

Indonesia acts as one of the producers and exporters of tobacco products on the world market, as well as the world's main consumer country because Indonesia is the country with the third largest number of smokers in the world. The agricultural sector in Indonesia contributes greatly to the regional and national economy, including absorbing labor, providing food, providing raw materials for industrial factories and increasing income for local communities. East Java Province is the largest tobacco producer in Indonesia with a planting area of 123,107 ha. Production was 136,069 tons, and productivity was 1,105 kg/ha in 2020, and contributed to state excise revenue of 59.83% or 101.09 trillion of total state excise revenue (Kementerian Kesehatan RI, 2023).

According to Wijaya *et al.* 2023, the development of smallholder plantations dominates the total area of Indonesian tobacco in 2022. Of the total area of Indonesian tobacco of 204,509 hectares, 196,403.8 tons or 99.96% are Smallholder Plantations (PR) and the remaining 84 hectares with a production of 78.2 tons or 0.04 percent are State Large Plantations (PBN). The large dominance of smallholder plantations greatly influences the fluctuation of the area of Indonesian tobacco.

Jember Regency is recognized as the foremost producer of tobacco contributing area in East Java in 2023. According to data from Badan Pusat Statistik Provinsi Jawa Timur (2024), tobacco production in East Java Province is around 135,927 tons in 2023. According to the region, this makes Jember Regency the largest tobacco producer in East Java, reaching 37,821 thousand tons throughout 2022. Tobacco has excellent development potential and has a fairly high price, thus providing significant income for farmers. However, during its development it faced the issue of the impact of smoking on health. This could have a big impact on tobacco farmers, there are apprehensions that this may lead to a decrease in family income and contribute to social instability in regions reliant on tobacco production. It is also hoped that the development of the non-cigarette tobacco agro-industry can overcome the problem of tobacco waste which is still rarely used by farmers. Tobacco waste has the potential to be developed into products other than cigarettes, so that tobacco waste has a selling price that can increase income from tobacco farming (Witman *et al.*, 2023).

This research aims to increase the development of the non-cigarette tobacco agro-industry in Jember Regency with the hope of increasing tobacco income through non-cigarette tobacco products. The method used is the Exponential Comparison Method (MPE) to determine potential locations for the development of non-cigarette tobacco agro-industry in Jember Regency. Hayami's method is to calculate the added value of non-cigarette tobacco products so that the ratio of added value and profit level is obtained, then an analysis of the financial feasibility of the non-cigarette tobacco agro-industry is carried out so that we can find out whether the non-cigarette tobacco agro-industry is feasible or not to be developed in Jember Regency.

METHODS

The research utilizes both primary and secondary data sources. Primary data pertains to information obtained through direct observation in the field and insights gathered from experts, which may be collected via questionnaires or interviews. The experts involved in this research have expertise in the field of tobacco agro-industry development, including: Tobacco Farmers Group, Tobacco Entrepreneurs, Food Crops, Horticulture and Plantation Service, Tobacco Industry and Trade Service, Academics/Lecturers, Tobacco Library and Museum, and Jember Regency Tobacco Research Center. Secondary data was obtained through literature study to establish the theoretical basis and supporting data relevant to the research material. This data can be sourced from the Central Statistics Agency (BPS), the tobacco agro-industry in Jember Regency, various institutions, and related research reports. The collected data is then processed and classified according to needs to formulate the strategy to be implemented.

Exponential comparison method (MPE)

The Exponential Comparison Approach (MPE) is one of several modeling techniques used in decision support systems to prioritize alternative options based on various criteria (Nuraini, 2022). The objective is to identify possible sites for the establishment of a non-cigarette tobacco agro-industry through the application of the exponential comparison method. The Exponential Comparison Method (MPE) is an effective decision making approach used to determine the order of decision priorities based on the total score of alternatives, which are weighted based on certain criteria. The total score calculation results will be sorted from highest to lowest ranking by comparing one object with another. The decision maker will use the final score to choose the best alternative, namely the option with the highest total score (Juhardi *et al.*, 2019) . There is also a formula for calculating each alternative as follows:

$$Total\ Value(TNi)\ = \sum_{j=1}^{m} (\mathrm{RKij})^{\ tkkj}$$

Information:

TNi : Total alternative value to -i
RKij : Degree of relative importance of criteria to -j on decision choices i
TKKj : Degree of importance of decision criteria to j,
ke-j : TKKj > 0; integers
m : Number of decision criteria
n : Number of decision options

Hayami method added value analysis

Added value refers to the increase in value of a product before and after the production process. Added value in the downstream sector involving processing industries, this is because agricultural commodities are perishable which require proper treatment and processing so that they are ready to be consumed by consumers (Idsan et al, 2020). Calculation of the added value of tobacco products is carried out using the Hayami method. The hayami method is used to determine products with the highest added value and then analyze their financial feasibility . The Hayami method calculates added value by integrating the added value approach for processing and the added value approach for marketing (Hayami *et al*, 1987). The assessment of added value analysis is conducted utilizing the Hayami table, which incorporates three variables, namely: output, input, and price, income and profit, and compensation for owners of production factors. The following table illustrates the application of the Hayami Method for determining the added value of the non-cigarette tobacco agroindustry in Jember Regency:

Tabel 1. Hayami method

No	Variable	Nilai
	Output, Input, Price	
1	Output produced (kg/day)	A
2	Raw materials used (kg/day)	B
3	Labor (hours/day)	C
4	Conversion factor (1/2)	D=A/B
5	Labor coefficient (3/2)	E=C/D
6	Output price (Rp/kg)	F
7	Average wages of labor (Rp/work)	G
	Income/profit (Rp/kg)	
8	Price of raw materials (Rp/kg raw materials)	H
9	Contribution of other inputs (Rp/kg output)	I
10	Output value (4x6)(Rp)	J= D x F
11	a. Value-added (Rp/kg)	K= J – H– I
	b. Value added ratio (%)	L% = K/Jx 100%
12	a. Labor income (Rp/kg)	M = Cx G
	b. Labor share(%)	N% = M/K x 100%
13	a. Profit (Rp/kg)	O = K – M
	b. Profit share(%)	P% == o/j x 100%
	Remuneration for Production Factors	
14	Margin (Rp)	Q = J –H
	a. Labor income (%)	R% = M/Qx100%
	b. Other input contributions (%)	S% = I/Q x 100%
	c. Profit	T% = O/q x 100%

Source : Hayami et al, (1987)

Financial feasibility analysis

Financial analysis is an examination that evaluates the feasibility of a business operation, which aims to assess funding needs and cash flow projections. This analysis involves comparing costs and benefits to determine whether a business will be profitable over its operational life (Pasaribu *et al.*, 2016). The information is organized in a tabular format and subsequently subjected to mathematical analysis, taking into account the components of the Financial Feasibility Analysis calculation, namely Net Present Value (NPV), Incremental Rate Of Return (IRR), Net Benefit/Cost Ratio (Net B/C Ratio), Break Even Point (BEP), Payback Period, and Sensitivity Analysis. Variable and fixed cost data are used to determine the total production cost or total cost.

The identification of assumptions is conducted to facilitate data processing, determining basic prices (COGS) and creating cash flow. The assumptions set include the number of employee working days, product selling prices, estimated increases in production capacity, increases in raw material costs, and business age (Kusuma, 2012). The calculation of installed capacity or actual cost of goods sold (HPP) is carried out by determining the selling price among tobacco producers, as well as calculating income using the equation. The subsequent step involves calculating cash flow to analyze the trends in financial inflows that the tobacco industry can generate. Cash flow calculations are carried out for Cashflow Before Tax and Cashflow After Tax.

1. NPV analysis

Net Present Value represents the net worth derived from subtracting the present value of costs from the present value of benefits.

$$NPV = \sum \frac{Bt - Ct}{(1+i)}$$

Information:
Bt = Revenue earned from year t
Ct = Costs incurred in the year t
N = Technical life of the project
t = Project year
i = Discount rate
The NPV value has three important meanings :

a. NPV ≥ 0. Then the project can be implemented
b. NPV = 0. So the project breaks even between costs and benefits, so it depends on the subjective judgment of decision making.

c. NPV ≤ 0. Then the project is not feasible.

2. IRR

The Internal Rate of Return (IRR) measurement method is carried out by conducting continuous trials using interpolation between interest rates which produces a small negative Net Present Value (NPV). The first trial value for NPV is denoted by NPV1 and the second is symbolized by NPV2. As long as one of the NPVs is not far from zero, the closest estimate of IRR can be obtained by solving the following equation:

$$\text{IRR} = i' \frac{NPV_1}{NPV_1 - NPV_2}(i' - i''$$

Keterangan:
NPV1 = *Net Present Value* which has a small positive value
NPV2 = *Net Present Value* which has a small negative value
i' = *Discount rate* which produces the smallest positive NPV
i''= *Discount rate* which produces the smallest negative NPV

3. Net Benefit/Cost Ratio (Net B/C Ratio)

$$\text{Net}\frac{\text{B}}{\text{C}}\text{Ratio} = \frac{\sum_t^n = \frac{Bt}{(1-i)^t}}{\sum_t^n = 1\frac{Ct}{(1-i)^t}}$$

Information:
B= Profit
C= cost
i= *discount rate*
t= period
Assessment criteria:
Net B/C Ratio>1 : The business is worth it because it provides benefits
Net B/C Ratio =1 : the business has no profit and no loss
Net B/C Ratio <1 : the business is not feasible because it suffers losses

4. *Break Even Point* (BEP)

Break Even Point (BEP) is the critical point where total revenue is equal to total costs. BEP can be determined based on production levels.

BEP on production basis:

$$BEP_{(V)} = \frac{\text{FC}}{\text{P} - \text{V}}$$

Information:
FC = Fixed costs (Rp)
VC = Variable costs (Rp)
C = Production (Kg)
P = Sales units (Rp)
S = Total sales (Rp)
V = Variable cost per unit (Rp)

5. Pay Back Period (PBP)

$$\text{PBP} = \frac{\text{Investment}}{\text{Net Cash/year}}\text{x 1 year}$$

Assessment criteria:
PBP> maximum period: effort is not feasible
PBP< maximum period: feasible effort

6. Sensitivity Analysis

Sensitivity analysis is employed to assess the degree to which the feasibility analysis of a business can proceed despite the presence of varying objectives and constraints, as well as the variable values change. The method used for sensitivity testing is the switching value method (replacement value). Replacement value analysis is used to determine the extent to which changes in sales value and variable costs will produce normal profits, namely Net B/C Ratio equals 1 NPV with 0 or close to it, IRR equals the applicable interest rate and PBP equals the period used.

RESULTS AND DISCUSSION

Regional overview

Jember Regency is situated in the East Java Province. Jember Regency is a city located in the middle of the Tapal Kuda area, East Java Province. Administratively, the Jember Regency is organized into 31 sub-districts, which include 28 sub-districts comprising a total of 226 villages, along with 3 sub-districts that contain 22 additional sub-districts. The climate of Jember Regency is a tropical monsoon climate (Am) with two different seasons, namely the rainy season and the dry season. The rainy season in the Jember Regency area usually takes place from November to mid-April and is caused by the influence of the westerly monsoon which is wet, humid and carries a lot of water vapor. Meanwhile, the dry season occurs from May to mid-October and is caused by the dry easterly monsoon winds.

Tobacco (Nicotiana tabacum L) is a plant whose leaves are used as raw materials for making cigarettes. Tobacco has a taproot and has root hairs. The tobacco stem is rather round, getting thinner towards the tip, soft and strong with a diameter of about 5 cm. Leaves and buds grow on each segment of the stem. The number of leaves in one plant can reach 28-32 strands. In Indonesian, tobacco is an absorption from a foreign language. The Spanish word "Tabaco" is considered to be the origin of the word in the Arawakan language, especially in the Taino language in Karabia, it is said to be a roll of leaves on this plant or it could also be from the word "Tabago", a type of Y-shaped pipe for inhaling tobacco smoke (Parwati et al, 2017).

Jember Regency, located in East Java Province, Indonesia, is known as one of the main tobacco production centers in the country. Jember Regency has the potential to produce tobacco in several areas in Jember Regency. The total production of tobacco plants in 2022 in Jember Regency will be 27,251 tons and will increase to 37,821 tons in 2023 (Badan Pusat Statistik Provinsi Jawa Timur, 2024). Jember Regency produces several varieties of tobacco, including Virginia and Burley tobacco. Virginia tobacco is known for its milder taste, while Burley tobacco has a stronger taste. Recent trends show an increase in Burley tobacco production due to higher demand from international markets (Harlianingtyas *et al.*, 2021). Voor-Oogst tobacco is tobacco that is planted at the conclusion of the rainy season, with the harvesting phase occurring during the dry season. Meanwhile, Besuki Na-Oogst tobacco is tobacco that is planted at the end of the dry season and harvested during the rainy season (Trimo & Hidayat, 2021).

The development of tobacco productivity in Jember Regency continues to change every year. These productivity changes have been accumulated in Figure 1:

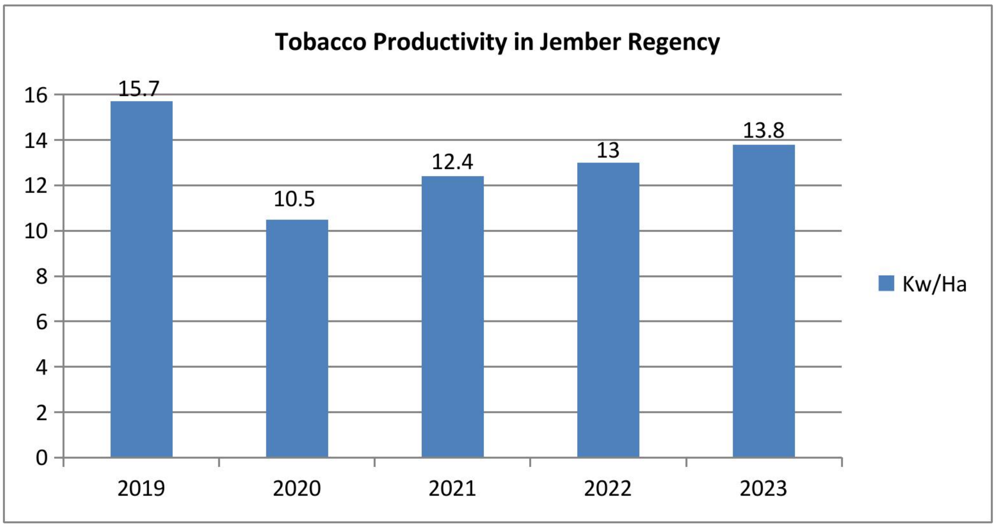

Figure 1. Tobacco productivity in Jember Regency 2019-1023
Source: Processed data, (2024)

Tobacco production in Jember Regency fluctuates from year to year. Tobacco plant production can decrease due to various factors, including extreme weather that occurs and causes tobacco plants to not have sufficient water for cultivation. Farmers in Jember face challenges in adapting their cultivation practices to cope with changing climate conditions (Harlianingtyas *et al.*, 2021).

Selection of potential locations for development of the non-smoking tobacco agroindustry

The selection of potential locations for the development of non-cigarette tobacco agro-industry is used to determine the most potential areas for the development of non-cigarette tobacco products in Jember Regency. According to Badan Pusat Statistik Kabupaten Jember, (2024) based on the results of literature review and discussions with experts, several alternative potential locations for the development of non-cigarette tobacco agro-industry were obtained, including: Wuluhan District, Kalisat District, Sukowono District and Mayang District. These areas were selected based on the areas with the highest productivity in Jember Regency.

The assessment of alternative selection of potential locations for the development of non-cigarette tobacco agroindustry is carried out by considering a number of criteria based on literature reviews and expert opinions because of the benefits of the experience of experts in their fields. These criteria are land availability, infrastructure, market availability, raw material availability, community support, workforce availability, transportation facilities and government regulations. availability of labor, means of transportation and government regulations. Determining alternative scores against certain criteria is done by giving a value to each alternative based on the criteria score, namely a scale of 1 to 9, which means the higher the score, the more important the criteria (Rusdianto, 2016).

Tabel 2. Assessment of potential locations for the development of non-smoking tobacco agroindustry

No	Potential locations for non-smoking tobacco development	Weight	Priority
1	Wuluhan	9.056	1
2	Kalisat	8.951	4
3	Sukowono	9.045	2
4	Mayang	8.991	3

Source: Processed data, (2024)

Based on the table, it can be seen that the priority results of the potential location for the development of non-cigarette tobacco agroindustry that was selected are Wuluhan District. This is because Wuluhan District has the highest tobacco productivity in Jember Regency, has quite good infrastructure and meets the criteria for potential locations in the development of non-cigarette tobacco agroindustry in Jember Regency. According to Badan Pusat Statistik Kabupaten Jember (2024) and expert opinion, Wuluhan District is the area with the highest tobacco productivity in Jember Regency, so it is very supportive for establishing a non-cigarette tobacco industry.

Wuluhan District is a fairly strategic area, namely in the southern area of Jember Regency with a distance of 26 km from the center of Jember City. A strategic location near the market can make it easier to find out changes in consumer tastes and reduce the risk of damage during transportation. The strategic position of Wuluhan District shows that transportation facilities support the activities of business actors to make a profit because industry can operate well and smoothly

Value added analysis

Added value analysis is a way to see how much the value of raw materials that have been treated has changed. Input, output and price values; revenue and profits; and remuneration to owners of production factors are three parts of this added value. According to Safira (2021), added value analysis functions to measure the remuneration received by managers and the employment opportunities that can be created by managers. Analysis of the added value of agricultural products can be done by calculating the added value per kilogram of raw materials in each production cycle (Herdiyandi *et al.*, 2017). The outcomes of the added value analysis for the non-cigarette tobacco agroindustry, conducted using the Hayami method, are presented in the table 3.

The conclusions drawn from the value-added calculation presented in the table, there are 3 products as alternatives for calculating added value. These products were obtained from the results of interviews from the relevant agencies who recommended 3 non-cigarette products for calculating added value, then the product with the highest added value will be analyzed for its financial feasibility. The high added value results from tobacco processing make the tobacco processing sector have an output multiplier that is greater than the output multiplier of other sectors in a region so that it has a potential economic impact and can be used as a priority sector for development (Slamet *et al.*, 2022).

The Hayami method is employed to determine the added value by assessing the production or output of liquid smoke products from 5 kg of tobacco waste input can produce 7 kg of liquid smoke. In the biopallet product, an input of 8 kg of tobacco waste produces an output of 14 kg of biopallets. Meanwhile, for bio briquette products, an input of 8 kg of tobacco waste produces an output of 10 kg of bio briquettes

The convection factor value can be calculated by dividing the amount of output produced by the amount of raw materials used. From the results of calculations for the non-cigarette tobacco agro-industry on liquid smoke products, the conversion value was obtained, namely 1.40, which means that 1 kg of tobacco stem waste can produce 1.40 kg of liquid smoke products for biopellet products. The conversion value was obtained, namely 1.75, which means that in 1 kg of tobacco stem waste, 1.75 biopellet products are obtained. In the bio briquette product, the results obtained are the same as bio pellets, namely a conversion value of 1.25, which means that in 1 kg of tobacco stem waste you can get 1.25 kg of bio briquettes.

Tabel 3. Hayami method added value analysis calculations

No	Output, Input and Price	Liquid Smoke	Biopelet	Bio Briket
1	Output (Kg)	7	14	10
2	Input (Kg)	5	8	8
3	Labor (HOK)	2	2	2
4	Conversion factor	1,40	1,75	1,25
5	Labor coefficient (HOK)	0,300000	0,250000	0,250000
6	Output price (Rp/Kg)	Rp 55.000	Rp 35.000	Rp 28.000
7	Direct labor wages (Rp/HOK)	Rp 50.000	Rp 50.000	Rp 50.000
II	Revenue and Profits			
8	Price of raw materials (Rp/Kg)	Rp 2.500	Rp 2.500	Rp 2.500
9	Other input contributions (Rp/Kg)	Rp 50.000	Rp 30.000	Rp 18.000
10	Output value (Rp/Kg)	Rp 77.000	Rp 61.250	Rp 35.000
11a.	Added value (Rp/Kg)	Rp 24.500	Rp 28.750	Rp 14.500
11b	Value added ratio (%)	31,82%	46,94%	41,43%
12a	Direct labor income (Rp/Kg)	Rp 15.000	Rp 12.500	Rp 12.500
12b	Labor share (%)	61,22%	43,48%	86,21%
13a	Profit (Rp/Kg)	Rp 9.500	Rp 16.250	Rp 2.000
13b	Profit rate (%)	38,78%	56,52%	13,79%
III	Remuneration for Owners of Production Factors			
14a	Margin (Rp/Kg)	Rp 74.500	Rp 58.750	Rp 32.500
14b	Direct labor income (%)	20,13%	21,28%	38,46%
14c	Contribution of other inputs (%)	67,11%	51,06%	55,38%
14d	Company owner's profit (%)	12,75%	27,66%	6,15%

Source: Processed data, (2024)

The added value is calculated by deducting the output value from the contributions of other inputs and the cost of raw materials. In the case of liquid smoke products, the resulting added value amounts to IDR 24,500 per kilogram. The added value ratio reached 31.82%. This means that for every Rp. 100 of product value, Rp. 31 is the added value generated. Meanwhile, for biopellet products, the added value obtained is 28,750 per kg with a value added ratio of 46.96%. This shows that for every Rp. 100 of product value, Rp. 46 is the added value generated. For bio briquette products, the added value obtained is 14,500 with an added value ratio of 41.43%, which means that for every Rp. 100 of product value, Rp. 41 is the added value generated. The added value ratio describes the percentage of product value obtained from the price of raw materials and other input materials (Febriyanti *et al.*, 2017).

The amount of added value is greatly influenced by the costs of raw materials and capital for the costs of contributing other inputs (Ria *et al.*, 2015). The added value calculated in this context is still gross added value, which does not take into account direct labor income. Direct labor income is obtained from the labor coefficient (HOK) multiplied by direct labor wages, namely IDR 50,000/HOK in one production. From this calculation, an income of 15,000/kg for liquid smoke production is obtained. Meanwhile, for the production of biopellets and biobriquettes, direct labor income is 12,500/kg. This means that the income earned by workers for each kilogram of liquid smoke is IDR 15,000 and the income of workers for the production of each kilogram of biopellets and bio briquettes is IDR 12,500. The calculated direct labor income influences the market share percentage.

Financial feasibility analysis

The process of evaluating the feasibility of a non-cigarette tobacco agro-industry business with biopellet products is carried out by analyzing projected cash inflows and cash outflows throughout the life of the project or investment. Cash flow will be formed from estimated initial costs, working capital, operating costs, production costs and income. To determine the feasibility of a non-cigarette tobacco agro-industry business, measuring tools are used, namely Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit/Cost Ratio (Net b/c Ratio), Break Even Point (BEP), and Pay Back Period (PBP)(Asben *et al.*, 2024).

Assumption

The core assumptions employed in the financial analysis of the non-cigarette tobacco agro-industry have been modified to reflect the circumstances present during the period of the research and are founded on calculations obtained from various other factors. In addition, as a starting point for financial analysis, it is important to establish the assumptions that will form the basis for estimating investment costs. The assumptions for the financial feasibility analysis of the biopellet agroindustry were chosen because this product is the product with the most potential to be developed. The assumptions of the financial feasibility analysis can be seen in Table

Tabel 4. Financial feasibility analysis assumptions

No	Description	Unit	Mark
1	Production for one year	Kg	134,400
3	Bank interest	%	6.00%
4	Monthly production	Kg	11,200
5	Initial business capital	Rp	1,420,861,800
6	Loan capital	Rp	3,315,344,200
7	Variable costs per Kg	Rp	10,469
8	Number of working days	Day	26
9	Months worked per year	Month	12
10	Working hours per day	O'clock	12
11	Number of shifts	Shifts	1
12	Capacity usage	%	100
13	Production per day	Kg	431
14	Raw material requirements	Rp	214,800,000
15	Average price	Rp	35,000
16	Gross income	Rp	4,704,000,000
17	Laba sebelum bunga dan pajak	Rp	2,193,694,000

Source: Processed data, (2024)

Financial feasibility analysis of non-smoking tobacco agroindustry

Financial feasibility analysis is a consideration when making decisions about accepting or rejecting a planned business idea or project. Financial feasibility analysis is a comprehensive examination of a business or project aimed at assessing its viability and determining whether it is worthwhile to pursue. The result of the financial feasibility assessment for the non-cigarette tobacco agroindustry are presented in the table.

Tabel 5. Financial Feasibility Analysis of the Tobacco Biopellet Agroindustry

No	Parameter	Unit	Amount
1	Break Even Point (BEP)	Unit	45,720
2	Pay Back Period (PBP)	Tahun	2.24
3	Net Present Value (NPV)	Rp	9,728,771,339
4	Internal Rate of Return (IRR)	%	68.75%
5	Net Benefit/Cost Ratio (Net B/C)	-	1.39

Source: Processed data, (2024)

The financial feasibility analysis results for the biopellet agroindustry are presented in the table, it shows that the NPV value for the development of the biopellet agroindustry is IDR 9,728,771,339. These results show that the biopellet agroindustry makes a profit in 10 years of IDR 9,728,771,339. According to Oktaviyanti *et al.* (2017), a project is considered worth pursuing if the NPV value is more than 0. So it can be concluded that this biopellet agroindustry is worth pursuing because the NPV is more than 0.

The analysis results indicate that the IRR value stands at 68.75%, this means that when compared with the interest rate set at 6%, investment in the non-cigarette tobacco agroindustry is profitable to develop. According to Oktaviyanti *et al.* (2017), a project is said to be worth pursuing if the IRR value is more than bank interest. So it can be concluded that the biopellet agroindustry is worth pursuing because the IRR value is more than the applicable bank interest.

If the Net Benefit-Cost Ratio exceeds 1, the business is deemed viable; on the other hand, if the Net Benefit-Cost Ratio falls below 1, the business is regarded as unviable. The analysis indicates that the Net Benefit-Cost Ratio stands at 1.39. This suggests that the non-cigarette tobacco agroindustry yields profits that are 1.39 times greater than the total costs incurred. According to (Rusdianto *et al.*, 2018) the B/C Ratio value shows that the profits obtained are greater than the costs incurred by the company.

The break-even point calculation for the non-cigarette tobacco agro-industry shows that the minimum production that must be achieved is 45,720 units per year. This, when compared with the planned production capacity, is still smaller, making it worth pursuing. The Payback Period (PBP) refers to the duration required to recover the initial investment. Financial analysis indicates that the payback period for the invested capital is 2.24 years. Consequently, this implies that the investment in the non-cigarette tobacco agroindustry will be recouped by the end of the second year of the investment's duration.

Sensitivity analysis

Sensitivity analysis can be carried out using a switching value approach. This method is used to try various changes to determine the maximum level of increase or decrease that can affect the feasibility of a business. Sensitivity analysis of the financial feasibility of the biopellet agroindustry using five change scenarios using the switching value method, namely raw material prices increasing by 10%, raw material prices increasing by 20%, raw material prices increasing by 30%, decreasing product selling prices by 10%, decreasing product selling prices by 20%, and decreasing product selling prices by 30%. This method is in line with research by Winarti (2016), which uses the same percentage increase in raw material prices and decrease in selling prices. The results of the sensitivity analysis of the financial feasibility of the tobacco biopellet agroindustry can be seen in Table.

Tabel 6. Sensitivity analysis of the financial feasibility of the tobacco biopellet agroindustry

No	Eligibility Criteria	BEP	PBP	NPV	IRR	Net B/C	Information
1	Raw materials rise 10%	46,102	2.28	Rp 9,509,875,104	67.41%	1.38	Worthy
2	Raw materials rise 20%	46,49	2.32	Rp 9,290,978,869	66.06%	1.37	Worthy
3	Raw materials rise 30%	46,885	2.36	Rp 9,072,082,633	64.72%	1.36	Worthy
4	Selling prices fall 10%	53,476	2.87	Rp 6,266,586,390	47.72%	1.25	Worthy
5	Selling prices fall 20%	64,401	3.99	Rp 2,804,401,441	25.97%	1.11	Worthy
6	Selling prices fall 30%	80,937	6.57	Rp -657,783,508	0.41%	0.97	Not feasible

Source: Processed data, (2024)

The results of the sensitivity analysis in the table show that a 10% increase in standard prices does not affect financial feasibility decisions. This can be seen from several eligibility criteria which still indicate a feasible decision. The positive NPV value is IDR 9,509,875,104, the IRR value is greater than the discount rate determined at 67.41%, the B/C Ratio value > 1, namely 1.38. The BEP value is below the annual production amount, namely 46,102 units per year, and the PBP is less than the project life, namely 2.28 years of ongoing investment.

The feasibility criteria for raw material prices to increase by 20% does not affect the financial feasibility decision. This can be seen from the financial feasibility criteria, the NPV value is positive at IDR 9,209,978,869, the IRR value is greater than the discount rate determined at 66.06%, the net B/C Ratio > 1, namely 1.37, the BEP value is below the production amount, namely 46,490 units per year, and the PBP is still less than the project life, namely 2.32. year. The third scenario, if the price of raw materials rises by 30%, shows that the biopellet agro-industry is still feasible to run. This is due to the positive NPV value of 9,072,082,633, the IRR value being greater than the discount rate determined at 64.72%, the Net B/C Ratio value > 1, namely 1.36. The BEP value is below the annual production amount, namely 46,885 units per year, and the PBP is less than the project life, namely 2.36 years of ongoing investment.

In scenarios 4 and 5, changes in the selling price reduction variable are used, namely 10%, 20% and 30% respectively. A reduction in the selling price of 10% and 20% still shows a decision that is feasible to implement because each financial feasibility criteria measurement tool used such as NPV, IRR, net B/C Ratio, BEP, and PBP still produces a value that is categorized as feasible to implement. A 10% reduction in the selling price shows an NPV of IDR 6,266,586,390, an IRR value of 47.72%, a Net B/C Ratio value > 1, namely 1.25, a BEP value of 53,476 units per year, and the PBP is still less than the project life, namely 2.87 years. With a 20% reduction in selling price, the project is still feasible to run because the results of the measuring instrument used still show positive results, namely NPV of IDR 2,804,401,441, IRR value of 25.97%, Net B/C Ratio > 1, namely 1.11, BEP value of 64,401 units per year, and PBP is still less than the project life, namely 3.99 years. Meanwhile, a 30% reduction in the selling price indicates a decision that the financial analysis is not feasible to carry out, because according to several criteria the financial analysis has a value that does not meet the business feasibility requirements to be carried out, namely the NPV has a negative value of IDR -657,783,508, the IRR value is still below the discount rate of 0.41%, the Net B/C Ratio value is < 1, namely 0.97, the BEP value is 80,937 units per year, and produces a PBP value of 6.57 years old. This shows that when the selling price has decreased by 30%, the agro-industry is not suitable for development, resulting in losses if not handled properly.

CONCLUSION

The findings indicate promising opportunities for the advancement of the non-cigarette tobacco agro-industry in Jember Regency, particularly highlighting the Wuluhan District as a key area for such development. The findings from the Added Value Analysis conducted with the Hayami method indicate that the biopellet product possesses the greatest added value, amounting to IDR 28,750, which corresponds to a profit percentage of 46.94%. The financial feasibility results show that the non-cigarette tobacco agroindustry in biopellet products is feasible to run. These eligibility criteria show that at an interest rate of 6% the NPV value is IDR 9,728,771,339, the IRR value is 68.75%, the Net B/C Ratio is 1.39; production break-even point of 45,720 units per year, return on capital for 2.24 years. Sensitivity analysis of financial feasibility with raw material price increases of 10%, 20%, and 30% shows that the decision is feasible. In the sensitivity analysis, a decrease in product selling price of 10% and 20% still shows a feasible decision, but a 30% decrease in selling price shows an unfeasible decision because several financial feasibility criteria have values that do not meet business feasibility requirements

ACKNOWLEDGEMENT

We would like to thank the Institute for Research and Community Service of Muhammadiyah Jember University for funding this research with contract number: 344/II.3.AU/LPPM/Riset/2024 and all parties who have been involved in research activities.

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