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Analysis of The Effect of Rising Costs and Decreasing Prices on The Financial Viability in Oil Palm Plantations of PTPN IV, Kebun Melati, Kecamatan Pegajahan Pegajahan and Perbaungan Districts, Serdang Bedagai

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ABSTRACT

This research discusses the Sensitivity Analysis of the Effect of Cost Increases and Price Decreases on Financial Feasibility in Oil Palm Plantation. Financial Feasibility is a tool used to analyze a business/project to determine whether or not a company is feasible in running its business, by examining the potential profits obtained from an investment/business. This research was conducted at PTPN IV oil palm plantation, Melati Plantation, Pegajahan and Perbaungan Districts, Serdang Bedagai Regency, North Sumatra Province. The research was conducted in June 2024, and the determination of the location was carried out intentionally (purposive) with the consideration that this area is one of the areas that have many oil palm plantations. In this study, researchers used two data, namely primary data and secondary data, where primary data was obtained through a direct interview process by asking questions that had been made, and then the relevant Plantation would provide a verbal response or written response represented by the Plantation Manager, This research uses a type of Quantitative research, which analyzes data by calculating data (in the form of numbers) obtained as it is (Real Price). This research uses a financial feasibility analysis method consisting of npv, net b/c, irr, and pbp. From the results of the research conducted, it can be concluded that the financial feasibility during the economic period of Oil Palm obtained, namely, NPV of Rp. 153,626,694,000, - Net B / C of 2.64, IRR of 21.03%, and Payback Period of 4 years 5 months. Sensitivity Analysis to 10% Price Decrease obtained Net Benefit Ratio (B/C) of 2,18 Net B/C>1, Internal Rate of Return (IRR) of 15,04% and Payback Period (PP) of 5 years 1 month. Sensitivity Analysis to 10% Cost Increase obtained Net Benefit Ratio (B/C) of 2,45 Net B/C>1, Internal Rate of Return (IRR) of 18,27% and Payback Period (PP) of 4 years 8 months.

Keywords: Net Present Value (NPV), Net Benefit Ratio (B/C), Internal Rate of Return (IRR), Payback Period (PP), Analysis Sensitivity.

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INTRODUCTION

Plantation commodities are the mainstay of Indonesia's national income and foreign exchange, which can be seen from the export value of plantation commodities, in 2022 the total export value of plantations will reach US$ 42.03 billion or equivalent to Rp. 624.9 trillion (assumption 1 US$= Rp 14,868). While based on Gross Domestic Product (GDP), the plantation subsector in 2022 grew 1.64 percent compared to 2021 (Y-on-Y). The national contribution to the plantation sub-sector to the national economy is increasing and is expected to strengthen plantation development as a whole.

Oil palm plantations are a part of the plantation sector that require substantial capital and investment costs. These ventures are carried out to generate future profits and are also expected to contribute to the local economy by creating job opportunities and improving the welfare of the workers. However, operating in this sector comes with numerous challenges, such as fluctuations in the price of fresh fruit bunches (FFB), rising production costs, and other changes related to the processing of oil palm products. To address these challenges, plantation managers need to understand the financial feasibility of the investments they make.

PT Perkebunan Nusantara II (Kebun Melati) is one of Indonesia’s state-owned plantation companies, with its Board of Directors based in Tanjung Morawa City, Deli Serdang Regency. PTPN II was officially established on March 11, 1996, through a merger between PTP IX and PTP II, marking the birth of a stronger and more consolidated entity in the plantation sector. Further developments occurred on December 1, 2023, when PTPN II, along with several other PTPNs, was integrated into PTPN I as a Supporting Co, as part of a broader restructuring effort to enhance management efficiency. Subsequently, on April 1, 2024, PTPN I entered into an Operational Cooperation Agreement (KSO) with PTPN I Regional VI, a strategic move aimed at strengthening regional operations. The collaboration continued to expand on May 1, 2024, when the KSO was extended to include PTPN IV Regional 2, highlighting the company’s commitment to strategic partnerships and sustainable growth. As one of the companies owned by the government, Jasmine

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Garden should also contribute profits to the state, but, unfortunately, the condition is not optimal (Republiknews.co.id). To improve the productivity of oil palm plantation land PTPN II in cooperation with PTPN IV Regional II manages oil palm plantation land located in Pegajahan District and Perbaungan, Serdang Bedagai Regency, North Sumatra province.

The managed land area of 1,826.54 hectares includes immature crops (TBM), productive crops (TM), as well as productive crops without proper treatment (TMTP). Given this situation, a financial feasibility analysis is still necessary—both for new plantations to be developed and for those already in operation—to determine and provide a clear picture of the profit potential and risks, and to assess whether the plantation business plan is feasible to continue.

The Jasmine Garden has an area of 1,826.54 ha, which is divided into three departments with the composition; AFD I by 31 %, AFD II by 34 %, and AFD III 35 % of the total area. More details can be seen in the following table :

Tabel 1. Luas wilayah Kebun Melati

Afdeling	Luas TM (Ha)	Luas TBM (Ha)	Total (Ha)
I	524,08	49,16	573,24
II	517,75	95,78	613,53
III	552,61	87,16	639,77
Total Melati	1.594,44	232,10	1.826,54

Sumber : Data PTPN IV, Kebun Melati 2024

A financial feasibility analysis needs to be done in the oil palm plantation business to find out about the investments made in accordance or not with rencana the initial plan, financial analysis is also carried out to minimize large losses and fatal to a plantation business, as well as to find out whether the investment made/has been running for this benefit dengan comparing between expenses, receipts and return periods, so that financial feasibility analysis becomes an important tool in strategic decision making.

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RESEARCH METHODS

This research was conducted at PTPN IV oil palm plantation, Kebun Melati, Pegajahan, and Perbaungan subdistrict, Serdang Bedagai regency, North Sumatra province. The research was carried out in June 2024, and the determination of the location was carried out deliberately (*purposive*) with the consideration that this area is one of the areas that has many kebun kelapa oil palm plantations. In this study, the researchers used two data, namely primary data and secondary data, where the primary data is obtained through a direct interview process by asking questions that have been made, and then the Plantation will give a verbal response or a written response represented by the plantation Manager, this study uses a type of quantitative research, namely analyzing the data by calculating data (in the form of numbers) obtained as is (*Real Price*). This study uses the method of financial feasibility analysis consisting of npv, net b / c, IRR, and PBP. By the formula :

1.1 *Net Present Value* (NPV)

$$NPV = \sum_{t=1}^{n} \frac{Bt - C_t}{(1+i)^t}$$

Description:

Bt = gross social benefit with a project in Year t

Ct = represents gross social costs for the project in Year t

i = Discount factor

N = economic life of the project

t = Year, the first year is as the first year of investment or year 0

Decision Rules :

"NPV>0 (positive NPV): then the business is feasible because the benefits received are greater than the costs incurred.

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NPV<0 (negative NPV): then the business is not feasible to be implemented, because the costs incurred are greater than the benefits received."

1.2 *Net Benefit Rasio* (B/C)

$$Net\ BCR = \frac{\sum \text{ Present Value Net Bnenfit yang positif}}{\sum \text{ Present Value Net Benefit yang negatif}}$$

Decision Rules:

Net BCR >1: then the business is profitable and feasible to operate.

Net BCR <1: then the business is unprofitable and unfit to operate.

1.3 *Internal Rate of Return* (IRR)

The IRR value indicates the ability of an investment or business to generate *a return* or level of profit that can be used. i.

$$IRR = i + \frac{NPV1}{(NPV1 - NPV2)}(i_1 - i_2)$$

Dimana: IRR = Internal Rate of Return

NPV_1 = NPV dari discount rate yang rendah

NPV_2 = NPV dari discount rate yang tinggi

I_1 = Tingkat discount rate menghasilkan NPV1

I_2 = Tingkat discount rate menghasilkan NPV2

1.4 *Payback Period* (PP)

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The Payback Period is a period/period required farmers to pay back all the costs that have been incurred.

$$\text{PBP} = \text{Tp-1} \sum \bar{I}i - \sum Bicp - 1\ n\ i=1\ n\ i=1\ Bp$$

Where:

PBP = Payback period

Tp-1 = the year before there was PBP

Ii = amount of investment that has been discounted

Bicp-1 = Jumlah benefit yang telah di-discount sebelum payback period

Bp = Jumlah benefit pada payback period

1.5. Sensitivity Analysis

Sensitivity analysis is used to see the impact of a changing situation on the results of a feasibility analysis.

Sensitivity analysis is useful to assess the extent to which changes in the elements in the financial aspects of the economy affect the business being run. To assess the feasibility of the economic financial aspects of an investment, sensitivity analysis is usually carried out during a certain period due to possible changes in various elements or conditions. Element or condition. These elements are in the form of changes in the increase in sales prices and due to the increase in the cost of cost of goods sold. The test of a decision to find how much inaccuracy the use of an assumption can be tolerated without resulting in the invalidity of the decision is an investment decision. To see what will happen to the results of the analysis of the project, if there is something wrong or change in the basis of the calculation of costs or benefits. In the calculation, it is assumed that the cost increases by 10 percent and the price decreases by 10 percent, which will get the results whether it is still feasible or not feasible.

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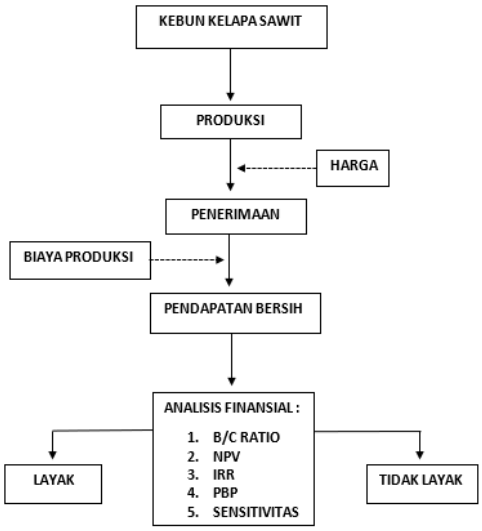

RESULTS AND DISCUSSION

Kelayakan Financial feasibility is a tool used to assess the possibility of profit obtained from investment. Analysis Financial analysis is an analysis that compares antara costs and benefits to determine whether a project will be profitable over the life of the project, expressed in nilai terms of present value to determine criteria the feasibility or profitability criteria of a project (Soetriono 2006). In this context, feasibility refers to the extent to which a project or venture can generate sufficient cash flow to justify initial outlays and biaya operations. This assessment includes an evaluation of projected revenues, biaya production costs, arus cash inflows dawn, and outflows, as faktor well as risk factors that may affect the financial performance of an entity.

Analysis Financial analysis is based on the actual situation dengan using data price data and production data that is found in the field (*real price*) (Picaulina, 2015). The following will explain the costs that are usually incurred by an oil palm plantation. The costs used in analyzing the financial viability of plantations include investment costs, fixed costs (depreciation), and variable costs (plant maintenance costs produced). Data obtained from the field based on interviews, TBM-1 (planting year 2023) to TM-13 (planting year 2008), so that the calculation of feasibility analysis

starts from 2024 to the remaining economic life of the plant. The following table general assumptions of oil palm plantations.

Tabel 3. Asumsi Umum Kebun Sawit (Rp. 000)

No.	Uraian	Nilai	Satuan	Keterangan
I.	**Umum**			
	Pertumbuhan Kenaikan Harga Sawit	8,13%	Persen	
	Suku Bunga Bank	9,41%	Persen	
II.	**Lahan Kebun**			
	Total Luas Lahan yang di tanam Kebun Melati	1.670,84	Ha	
	Kesesuaian Lahan	S3		
III.	**Komposisi Tanaman**			
	Tahun Tanam 2008	128,57	Ha	
	Tahun Tanam 2011	162,08	Ha	
	Tahun Tanam 2012	12,22	Ha	
	Tahun Tanam 2013	391,27	Ha	
	Tahun Tanam 2017	90,44	Ha	
	Tahun Tanam 2018	529,67	Ha	
	Tahun Tanam 2019	124,49	Ha	
	Tahun Tanam 2023	232,10	Ha	
IV.	**Biaya Pemeliharaan Tanaman K. Sawit/ha/Tahun**			
	Jumlah	9.902	Rp. 000	
V.	**Harga Tandan Buah Segar (TBS)**			
	Harga Dasar TBS	2.135	Rupiah	per kilogram
	Biaya Panen	247	Rupiah	per kilogram
VI.	**Lain-lain**			
	*Depresiasi Tanaman	22	Tahun	4,55%

Sumber : Data PTPV IV, Kebun Melati

**) Penyusutan dari total Investasi*

In calculating the feasibility of oil palm plantations used several assumptions, namely :

1. In calculating plantation income during the future projection period (starting from 2024 to 2047: 24 years), it is assumed that there is an increase in the selling price of FFB, the average selling price of FFB yang obtained from existing data sources of Rp. 2.135 / Kg (source: Sipasbun in the last 5 years processed)
2. The cost of plant maintenance obtained from the interview data is Rp. 9.902.000./Year (per ha), and harvest costs of Rp. 247 / kg, while the interest rate used is the interest rate on loans from banks of 9.41 %

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Investment Costs

An investment is an expense incurred at the beginning of a project/venture. In terms of conducting an oil palm plantation business, investment costs are incurred at the beginning to plant oil coconut starting from :

a. Land purchase
b. Land clearing
c. Nursery
d. Land cover crop (LCC)
e. TBM 1
f. TBM 2
g. TBM 3
h. Fixed Costs

Investment Cost Kebun Of Jasmine Garden :

Tabel 3. Biaya Investasi (Rp. 000)

Tahun Tanam	Luas (ha)	Investasi /ha	S/d. Tahun 2024	2025	2026
2008	128,57	56.419	7.253.728		
2011	162,08	56.419	9.144.312		
2012	12,22	56.419	689.434		
2013	391,27	56.419	22.074.870		
2017	90,44	56.419	5.102.490		
2018	529,67	56.419	29.883.192		
2019	124,49	56.419	7.023.540		
2023	232,1	56.419	8.705.242	2.087.708	2.301.786
Total	**1.670,84**				94.266.303

Sumber : Data PTPN IV, Kebun Melati

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From the table above it can be seen that the investment costs incurred by The Jasmine Garden for the overall area is Rp. 94,266,303,000 is calculated based on the area per ha multiplied by the investment cost per ha.

Cost of Tetap

Fixed costs (maintenance costs) are costs that are relatively large and will continue to be incurred even though production is obtained a lot or a little. Fixed costs are calculated for oil palm plantations as the cost of depreciation(depreciation), depreciation costs are the cost of capital lost during the economic life of the plant, in this case for oil palm plants during the economic age of 25 years minus the crop has not produced for 3 years. The cost of depreciation per thing per year is Rp. 2.564.478,-

Variable Costs

Variable costs are costs that are influenced to a large extent by the production obtained in the people's oil palm plantation business, variable costs are costs that are routinely incurred in every production business where the amount depends on the number of products to be produced (Ardana, 2008).

Variable costs that are taken into account in oil palm include the cost of fertilizers, herbicides, harvesting, and labor costs. Plant maintenance costs an average of Rp. 9,902,000 per ha/year, and the average harvest cost of Rp. 247 per / kg.

Biaya Total

Total cost is the sum of all fixed costs (depreciation) and variable costs incurred to produce several products in a certain period. Here we can see in the table, the cost of total palm oil plantations

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Tabel 4. Biaya Total (HPP) Kebun Melati (Rp. 000)

Tahun	Biaya Depresiasi	Biaya Perawatan	Biaya Panen	Biaya Total (HPI
2024	3.689.617	14.245.796	3.743.086	21.678.499
2025	3.689.617	14.245.796	3.828.253	21.763.665
2026	4.085.310	16.543.952	4.309.649	24.938.911
2027	4.085.310	16.543.952	4.411.550	25.135.707
2028	4.085.310	16.543.952	4.458.763	25.287.547
2029	4.085.310	16.543.952	4.467.814	25.296.598
2030	4.085.310	16.543.952	4.453.132	25.281.916
2031	4.085.310	16.543.952	4.442.237	25.271.021
2032	4.085.310	16.543.952	4.421.994	25.250.778
2033	4.085.310	15.270.906	4.386.992	23.613.015
2034	4.085.310	15.270.906	4.052.561	23.278.585
2035	4.085.310	15.270.906	4.023.254	23.249.278
2036	4.085.310	13.666.059	3.982.577	21.188.102
2037	4.085.310	13.545.061	3.552.641	20.605.831
2038	4.085.310	9.670.871	3.438.489	15.614.085
2039	4.085.310	9.670.871	2.484.873	14.660.470
2040	4.085.310	9.670.871	2.480.010	14.655.607
2041	4.085.310	9.670.871	2.465.421	14.641.018
2042	4.085.310	8.775.372	2.445.273	13.493.440
2043	4.085.310	3.530.804	2.167.266	6.612.537
2044	4.085.310	2.298.156	882.220	4.094.844
2045	4.085.310	2.298.156	583.564	3.796.187
2046	4.085.310	2.298.156	583.564	3.476.935
2047	4.085.310	2.298.156	556.817	3.450.189

Sumber : Data Diolah

Acceptance Of Oil Palm Plantations

acceptance is everything that can increase the income of a project (Sunarto et al., 2016). Receipts are obtained by calculating the multiplication between the production with the selling price of production / FFB. Production results are influenced by the care taken and also the age of the plants on the plantation, the better the maintenance done, the more pull the production results produced. The source of the price (FFB) was taken from SIPASBUN 2024 by looking at the price data for the last 6 years, hargal sold an average FFB of Rp 2.135/Kg. FFB prices increased for the next 6 years but after no increase again (flat). Below you can see the table of plantation receipts per year.

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Tabel 5. Total Penerimaan Kebun Melati (Rp. 000)

Tahun	Total Produksi / Tahun (Ton)	Harga Jual (kg)	Total Penerimaan / Tahun
2024	15.157,581	2.135	32.355.774
2025	15.502,463	2.308	35.782.398
2026	17.451,871	2.496	43.556.958
2027	17.864,527	2.699	48.211.834
2028	18.055,717	2.918	52.689.453
2029	18.092,369	2.918	52.796.409
2030	18.032,903	2.918	52.622.907
2031	17.988,784	2.918	52.494.160
2032	17.906,810	2.918	52.254.947
2033	17.765,069	2.918	51.841.326
2034	16.410,799	2.918	47.889.347
2035	16.292,119	2.918	47.543.021
2036	16.127,398	2.918	47.062.338
2037	14.386,376	2.918	41.981.757
2038	13.924,119	2.918	40.632.815
2039	10.062,465	2.918	29.363.890
2040	10.042,773	2.918	29.306.423
2041	9.983,694	2.918	29.134.023
2042	9.902,104	2.918	28.895.931
2043	8.776,318	2.918	25.610.705
2044	3.572,541	2.918	10.425.249
2045	2.363,135	2.918	6.896.008
2046	2.363,135	2.918	6.896.008
2047	2.254,825	2.918	6.579.941

Sumber : Data Diolah

Profit And Loss Calculation

Based on research (Haloho, 2020) states that income is a receipt minus production costs, the results are expressed in profits/losses. In smallholder plantations obtained from the proceeds reduced by the total costs incurred, if it produces a positive value then it can be said that the business makes a profit, on the contrary if it gets a negative value then it can be said that the business carried out is not profitable.

Tabel 8. Perhitungan Laba Rugi (Rp. 000)

Tahun	Pendapatan / Penjualan	HPP	Total Laba Rugi
2024	32.355.774	21.678.499	10.677.276
2025	35.782.398	21.763.665	14.018.732
2026	43.556.958	24.938.911	18.618.047
2027	48.211.834	25.135.707	23.076.127
2028	52.689.453	25.287.547	27.401.906
2029	52.796.409	25.296.598	27.499.811
2030	52.622.907	25.281.916	27.340.991
2031	52.494.160	25.271.021	27.223.139
2032	52.254.947	25.250.778	27.004.169
2033	51.841.326	23.613.015	28.228.311
2034	47.889.347	23.278.585	24.610.762
2035	47.543.021	23.249.278	24.293.744
2036	47.062.338	21.188.102	25.874.236
2037	41.981.757	20.605.831	21.375.926
2038	40.632.815	15.614.085	25.018.730
2039	29.363.890	14.660.470	14.703.420
2040	29.306.423	14.655.607	14.650.816
2041	29.134.023	14.641.018	14.493.005
2042	28.895.931	13.493.440	15.402.492
2043	25.610.705	6.612.537	18.998.168
2044	10.425.249	4.094.844	6.330.405
2045	6.896.008	3.796.187	3.099.820
2046	6.896.008	3.476.935	3.419.072
2047	6.579.941	3.450.189	3.129.752
Total	**872.823.622**	**426.334.764**	**446.488.858**

Sumber : Data Diolah

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In the table above, it can be seen that the total profit obtained by PTPN IV's oil palm plantation, Kebun Melati from 2024 to 2047 is Rp. 446.488.858.000. Because the results obtained are positive, the oil palm plantation business is worth trying

Financial Feasibility Analysis

Financial feasibility is a tool used to assess the possibility of profit obtained from an investment. Financial analysis is an analysis that compares costs and benefits to determine whether a project will be profitable over the life of the project, expressed in terms of present value to determine the feasibility or profitability criteria of a project (Soetriono 2006).

To calculate the financial feasibility analysis of the oil palm plantation at PTPN IV, Kebun Melati, located in Pegajahan and Perbaungan Subdistricts, Serdang Bedagai Regency, North Sumatra Province, the author used plantation age data ranging from TBM-1 (immature plants) to TM-13 (productive plants). The interest rate applied in this analysis is 9.41%, which reflects the current prevailing bank interest rate.

Tabel 9. Nilai NPV, B/C, IRR, dan PP (Rp. 000)

Uraian	Rp/Ha
NPV	153.626.694
B/C	2,54
IRR	21,03 %
PBP	4 Tahun 5 Bulan

Sumber : Data Diolah

Based on the description in the table above, it can be seen that the NPV value is greater than 0 (positive NPV), amounting to Rp 153,626,694,000, which indicates that the oil palm plantation business at Kebun Melati, located in Serdang Bedagai Regency, North Sumatra Province, is feasible for development. The Net B/C value obtained is 2.54 (Net B/C > 1), meaning that the oil palm plantation business is financially viable to operate. Meanwhile, based on the calculations, the

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IRR value is 21.03%, which is significantly higher than the prevailing bank interest rate of 9.41%. Therefore, the oil palm plantation business conducted by Kebun Melati is considered feasible. This study is in line with the findings of Ballqis (2020), who stated that properly managed oil palm plantations can yield a favorable IRR. Thus, the oil palm plantation business at Kebun Melati, located in Serdang Bedagai Regency, North Sumatra Province, is viable to pursue.

Chart 10. Price Sensitivity Analysis 10% Price Decrease

Description	Rp.000,-
NPV	110.684.696
B/C	2,18
IRR	15.04%
PP	5 Tahun 1 Bulan

In the table above, it can be seen that if the price is assumed to decrease by 10%, the NPV value >0 (positive NPV) with a value of Rp.110.684.696.000,- Berdasarkan perhitungan yang dilakukan nilai IRR sebesar 15.04% masih lebih besar dari nilai tingkat suku bunga yang berlaku, yaitu sebesar 9,41% yang artinya usaha perkebunan kelapa sawit di Kebun Melati Kabupaten Serdang Bedagai, Provinsi Sumatera masih tetap layak untuk di kembangkan.

Chart 11. Is analyst's cost sensitivity up and down 10 %

Description	Rp.000,-
NPV	135.418.149
B/C	2.45
IRR	18,27%
PP	4 Tahun 8 Bulan

In the table above, it can be seen that if it is assumed that the cost increases by 10%, the NPV value >0 (positive NPV) with a value of Rp. 135.418.149.000, - which means that the oil palm plantation business masih is still feasible to develop. The Net value of B/C obtained is 2.4,45 Net B/C>1)

then the oil palm plantation business is feasible to be cultivated. Based on the calculation made IRR value of **18.27,27%** is greater than the value of the prevailing interest rate, the prevailing interest rate of 9.4,41% therefore the business of oil palm plantations in the Garden Melati Kabupaten SerdanG BedaGai, province sumatera still worthy to be developed. The findings of this study are in line with the results of research Suliyanto (2010).

CONCLUSION

Based on the research conducted, the oil palm plantation financial feasibility analysis for PTPN IV, Kebun Melati, located in Pegajahan and Perbaungan Subdistricts, Serdang Bedagai Regency, covering an area of 1,670.84 hectares over the economic lifespan, shows a total revenue of Rp. 872,823,622, with annual depreciation costs per hectare amounting to Rp. 2,564,478. The cost of sales is Rp. 426,334,764, resulting in a profit of Rp. 446,488,858.

The financial feasibility analysis yields the following results: NPV of Rp. 153,626,693,800, a Net B/C ratio of 2.64, an IRR of 21.03%, and a Payback Period of 4 years and 5 months.

Based on the sensitivity analysis, even with a 10% decrease in price, the plantation remains viable with an IRR of 15.04%. If costs rise by 10%, the IRR is still positive at 18.27%.

Therefore, based on the financial feasibility analysis, PTPN IV, Kebun Melati, located in Pegajahan and Perbaungan Subdistricts, Serdang Bedagai Regency, is considered a viable plantation for operation.

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