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Feasibility Analysis of Truck Investment Using Net Present Value, Payback Period, and Internal Rate of Return at PT Swisstex Naratama Indonesia

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Abstract: PT Swisstex Naratama Indonesia is a private company engaged in the sale or distribution of chemicals for textiles. The problem of PT Swisstex Naratama Indonesia is the lack of a fleet of trucks to deliver products from the central warehouse to the warehouse in Solo City, so the company carries out the shipping process using the CV XYZ shipping service. Because there is a 15% increase in rental rates every year, PT Swisstex Naratama Indonesia plans to buy 1 new truck to overcome this problem, but there was a rejection of the request which made the company have to evaluate the investment in purchasing 1 truck unit whether it was feasible or not. The shipping request data used is data from 2020-2022, the demand for the next 5 years is analyzed using the forecast decomposition method. The methods used for investment feasibility analysis are Net Present Value, Payback Period, and Internal Rate of Return. The NPV obtained from purchasing a truck is –Rp 1,188,596,987 and the NPV from renting a truck is –Rp 1,464,905,648. Based on the Payback Period calculation, the company needs 4 years and 6 months to return the initial capital from its investment. This time is shorter compared to the economic fleet life span, which is 5 years. And based on the results of the truck investment calculation, the IRR value is 16.21 % . When compared to the required profit level of 15%, the IRR value from the calculation results is higher. By considering the NPV criteria, PP assessment and IRR, it can be concluded that the investment in purchasing a fleet of Mitsubishi brand trucks, type Colt Diesel Double FE 73 110 PS, can be implemented or is considered feasible.

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INTRODUCTION

Distribution companies act as a liaison between producers and consumers. The main task of a distribution company is to distribute product trade, both goods and services, until they reach the hands of end consumers. Transportation plays an important role in the success of a distribution company. Nowadays, almost all companies in the industry are facing increasingly fierce competition. To ensure customer satisfaction, companies need to plan or determine the right amount of products to meet market demand with quality, quantity and timeliness.

PT Swisstex Naratama Indonesia is a private company engaged in the sales or distribution of chemicals for textiles. The Head Office of PT Swisstex Naratama Indonesia is located in Bandung City. In addition, the company also has three other buildings, namely the central warehouse and laboratory, the Solo warehouse and office , and the Jakarta office. The constraints experienced by the company are regarding the lack of truck fleets, this is because even though the central warehouse has 5 means of transportation, namely 1 box car and 4 box trucks, PT Swisstex Naratama Indonesia still does not have a special truck fleet to send products from the central warehouse to the Solo warehouse. There is no truck fleet and driver assigned to make deliveries. For this reason, PT Swisstex Naratama Indonesia carries out the shipping process using a shipping service that has collaborated with PT Swisstex Naratama Indonesia, namely CV XYZ. The type of service chosen is to rent 1 truck unit with a maximum capacity of 6,000 Kg. The rental rate for a truck with a maximum capacity of 6,000 Kg at CV XYZ for shipping from the central warehouse to the Solo warehouse is as follows:

2020: Rp. 1,900,000 / shipment
2021: Rp. 2,000,000 / shipment
2022: Rp. 2,300,000 / shipment

The rental rate includes fuel, toll fees and truck driver fees. There was an increase in rental rates in 2022, compared to the previous year there was a 15% increase in rates. This is due to many factors, such as rising fuel prices, rising minimum wages for employees and rising toll fees. The following is data on shipping requests made by the Solo warehouse to the central warehouse

METHOD

conducted by conducting field observations of the problems that occur. Then a literature review or study is conducted on materials related to the problems in the company. The type of research conducted is descriptive, namely describing and interpreting data, facts, characteristics, and relationships between existing phenomena systematically and accurately. The data is then processed into information that produces conclusions

RESULTS AND DISCUSSION

Approximate Decomposition

Data processing is done by predicting shipping demand from 36 data that have been given. The method that will be used for forecasting is decomposition. To find out the shipping demand pattern, a time series analysis is carried out with a seasonal decomposition model using total product shipping demand data per month. This seasonal decomposition analysis aims to see the total shipping demand pattern per month to find out the pattern in the coming year. To obtain the seasonal index, there are several stages of calculation that must be carried out, namely:

Calculating the moving average (Moving average 1) 12 months, namely by the flatten data method from January - December and so on. The averaged data is placed in July, which is the center of 12 months with the formula: M (⟦ X^' ⟧ _7) = average (Y_1 ⟦ Y ⟧ _2, Y_3,…, Y_12)

Calculate the 2nd moving average (Moving average 2) in July from the average of July and August Moving average 1 with the formula:

⟦ CMA ⟧ _7=average (M (⟦ X^' ⟧ _7), M (⟦ X^' ⟧ _8))

⟦ CMA ⟧ _8=average (M (⟦ X^' ⟧ _8), M (⟦ X^' ⟧ _9))

Calculating the trend by sharing the actual data with Moving average 2, the trend results are separated between trend and cycle components, while the cycle is removed by the smoothing process. The trend data will then be used to find the seasonal component. By using the formula:

downward trend = Y_t/(M(⟦ X" ⟧ _t))

Look for the Seasonal Adjustment sign

Seasonal adjustment is then used to find the seasonal index. To find the seasonal adjustment, find Formerly Seasonal unadjustment (Us). Seasonal unadjustment in January is the average of the detrended data in 2020 to 2022 only in January. Likewise in February, March, etc. Then find the total and average seasonal unadjustment. The formula for finding seasonal adjustment (As) is:

As=Us x 12/ (Total US)
Seasonal Count

Seasonality is obtained with the Vlookup formula. Vlookup stands for Vertical Lookup, is a formula in Excel that functions to match data from two lists. Calculate seasonality is obtained with the Vlookup formula. Vlookup stands for Vertical Lookup, is a formula in Excel that functions to match data from two lists.

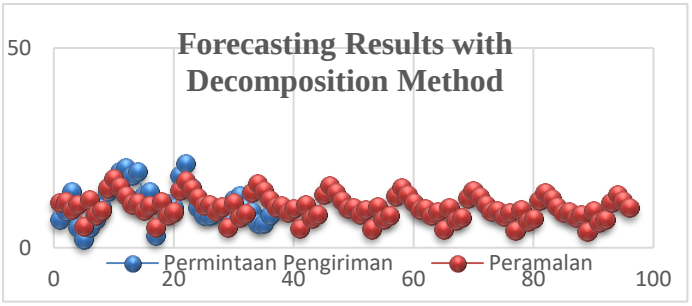
Unseasoned Count
Deseasonalized calculation is used to eliminate the influence of seasonal variation, namely Lot with seasonal data method divided by actual data. It can be written with the formula:

unseasoned = Y_t/S_t
Calculate the sign trend

At this time, the calculation of the mark trend uses the intercept and slope formulas in the excel application. The intercept function is to determine the mark variable. There are no free moment variables that are free 0 (zero). The trend value is calculated using the following formula: = INTERCEPT (deseasonalized; period) + (SLOPE deseasonalized; period) * period)

Estimated count
After getting seasonal signs and trends, forecasting can be done by calculating the forecast using the formula:
F_s = S_n x T_r = F_n = T_r
Information:
F_S = Estimated value
S_n = Seasonal Data
T_r = Trend Data
So we get:
F_1 = S_1 x T_1

F_2 = S_2 x T_2
and so on until F_96 so that the following forecasting results are obtained:



Count the error signs

The size of the error is the deviation between the actual visitor data and the forecast results. The estimated value of the estimate in the future, because it is still an estimate, there is also the possibility of forecasting errors. Forecasting errors are known by reducing actual data with forecast data. The following are the results of testing the forecast error value using the decomposition method:

Mean Square Error (MSE)
MSE is the mean square of forecast errors. The formula for calculating MSE is:

MSE= (∑▒ (Forecast Error) ^2)/n
Middle value = 658/36 = 18
Mean Absolute Deviation (MAD)
MAD is the average absolute value of the deviations. The calculation formula is:
MAD= (∑▒ (t Actual t-Forecast t))/n
= 124,45,48/36 = 3.4571
Mean Absolute Percentage Error (MAPE)
MAPE is calculated using the following formula:
MAPE= (∑▒ (Actual- Forecast)/Actual x 100% ⟧)/n
= (15.3127 x 100%)/36
= 42.53%

Alternative Investment Costs 1
Investment alternative 1 is to rent a truck at CV XYZ which has collaborated with PT Swisstex Naratama Indonesia. The rental fee for a single truck carrying a load of ±6,000 Kg is Rp. 2,300,000, the rental fee includes toll fees, material costs, fuel and driver costs. The rental rate increase is obtained every year, which is 15%. The calculation of the rental fee per year is as follows:

Rental Cost = Demand / Year x 1 times delivery rate
So the cost of renting a truck for 5 years is:

Year	Shipping Request	Rental price Delivery 1 time	Cost Rent/Year
Year 2023	130	Rp. 2,300,000	Rp. 299,000,000

Year 2024	126	Rp. 2,645,000	Rp. 333,270,000
Year 2025	121	Rp. 3,041,750	Rp. 368,051,750
Year 2026	117	Rp. 3,498,013	Rp. 409,267,463
Year 2027	113	Rp. 4,022,714	Rp. 454,566,724

Alternative Investment Costs 2

Investment alternative 2 is the purchase of a Mitsubishi Colt Diesel Double FE 73 110 PS truck with an economic life of 5 years. PT Swisstex Naratama Indonesia plans to purchase 1 unit of Mitsubishi Colt Diesel Double FE 73 110 PS truck with a maximum capacity of ±6,000 Kg and truck dimensions of 5,960 mm x 1,870 mm x 2,130 mm, box dimensions of 4,250 mm x 1,970 mm x 2,000 mm, number of tires 6, with a purchase price of Rp. 368,500,000 and a residual value of Rp. 230,000,000. The residual value was obtained from a car with the Mitsubishi Colt Diesel Double FE type in 2016, sourced from Jonathan (2023) who sold it in used condition in one of the online stores. The following are details of the operational costs of using the truck.

1. Cost of burning material

Estimated fuel used by trucks with a load of 1 liter/1 km. So the estimate for shipping products from the central warehouse to the Solo warehouse as far as 473 km requires 43 liters of diesel. The price of diesel as of January 2023 is IDR 6,800/Liter. Because the truck makes a round trip when delivering products to the Solo warehouse, the fuel cost is multiplied by 2.
The cost of burning material for 1 year is obtained from:

cost for 1 delivery = 43 Liters x Rp. 6,800/Liter x 2 = Rp. 584,800
BB Cost for 1 Year = BB Cost for 1 shipment x Number of Requests / Year
Example of Fuel Costs Year 1:
BB Cost Year 1 = Rp 584,800 x 1 30 = Rp 76,024,000

2. Toll fee from the central warehouse to the Solo warehouse is IDR 500,000.

Since the truck makes a round trip when delivering products to the Solo warehouse, the toll fee is multiplied by 2.
Toll fees for 1 year are obtained from:

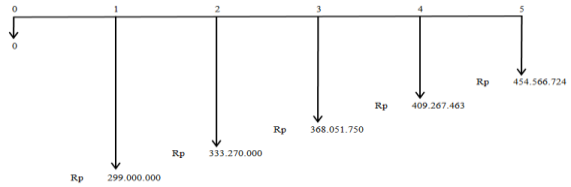
Annual Toll Fee = 1 Time Delivery Toll Fee x Number of Requests / Year
First Year Toll Fee Example:
Toll Fee Year 1 = Rp 1,000,000 x 130 = Rp 130,000,000
The operating costs each year vary according to the Estimated Shipping Request. Toll and fuel costs are multiplied by the number of shipping requests each year, while other costs such as oil change costs, maintenance costs, taxes, tire replacement costs, driver salaries and KIR costs have been set for one year. Based on the estimated shipping requests, the operational costs of the truck for 5 years are known to be:

Cost	Year 2023	Year 2024	Year 2025	Year 2026	Year 2027
Fuel	Rp130,000,000	Rp126,000,000	Rp121,000,000	Rp117,000,000	Rp113,000,000
Victim	Rp 76,024,000	Rp 73,684,800	Rp 70,760,800	Rp 68,421,600	Rp 66,082,400
Oil change	Rp 800,000	Rp 800,000	Rp 800,000	Rp 800,000	Rp 800,000
Maintenance	Rp 2,000,000	Rp 2,000,000	Rp 2,000,000	Rp 2,000,000	Rp 2,000,000
Tax	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000
Change Tire	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000	Rp 3,000,000

Wage Driver	Rp 41,769,540	Rp 41,769,540	Rp 41,769,540	Rp 41,769,540	Rp 41,769,540
KIR	Rp 600,000	Rp 600,000	Rp 600,000	Rp 600,000	Rp 600,000
Total	**Rp257,193,540**	**Rp250,854,340**	**Rp242,930,340**	**Rp236,591,140**	**Rp230,251,940**

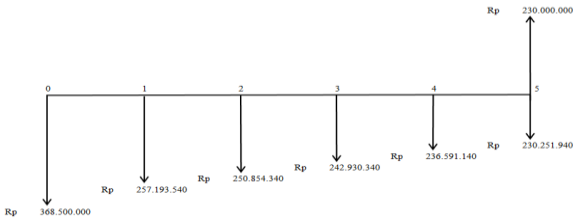
Alternative Investment Costs 2

Based on Bank Mandiri as of June 30, 2023, the effective rupiah basic credit interest rate is 8%/year. So with an interest rate of 8%, which alternative is more profitable between investment alternative 1 and investment alternative 2. The NPV value of investment alternative 1 can be calculated as follows:



NPV = PW Income – PW Expenditure
NPV A1 = 0 – (IDR 299,000,000 (P/F, 8 %, 1)
+ Rp 333,270,000 (P/F, 8%, 2)
+ Rp 368,051,750 (P/F, 8%, 3)
+ Rp 409,267,463 (P/F, 8%, 4)
+ Rp 454,566,724 (P/F, 8%, 5))
= -Rp 1,464,905,648

The NPV investment value of alternative 2 can be calculated as follows:



NPV A2 = IDR 230,000,000 (P/F, 8 %, 5)
– (Rp 368,500,000 + 257,193,540
(P/P, 8%, 1) + Rp 250,854,340
(P/P, 8%, 2) + Rp 242,930,340
(P/P, 8%, 3) + Rp 236,591,140
(P/P, 8%, 4) + Rp 230,251,940
(P/P, 8%, 5))
= -Rp 1,188,596,987

Depreciation

Analysis of investment depreciation of Mitsubishi Colt Diesel Double FE 73 110 PS type trucks using the straight line depreciation method so that it is known:

P = Rp.368,500,000
S = Rp. 23,000,000
N = 5 years
D n =(PS)/N = (Rp 368,500,000-Rp 230,000,000)/5
= Rp. 22,700,000
Book value per year:
BVt = P – nDn
BV 1 = Rp.340,800,000

BV 2 = Rp. 313,100,000
BV 3 = Rp. 285,400,000
BV 4 = Rp. 257,700,000
BV 5 = Rp. 230,000,000

Payback Period (PP)

The company's revenue estimate is an estimate of the amount of revenue after adding 1 truck fleet, with the following details:

1. Every day the company carries out product delivery activities, so its income is obtained by renting trucks.
2. Estimated income of Rp. 2,300,000, assumed if the truck is rented for traveling out using the market reference price for renting a truck per day for 24 hours.
3. The estimated demand is adjusted to the number of delivery requests to the Solo warehouse each year. It is also assumed here that the company rents trucks to other parties as long as the trucks are not used for delivery to the Solo warehouse.

Annual income can be calculated using the formula:
Revenue = (One Year's Working Days - Annual Delivery Requests) x Rental Price/Day
It is known:
Number of working days in a year = 264 days
Truck rental price/day = Rp. 2,300,000
The following is the total data on the company's income from truck rentals for 5 years.

Information	One Year Delivery Request	Income
Year 1	130	Rp 308,200,000
Year 2	126	Rp 317,400,000
Year 3	121	Rp. 328,900,000
Year 4	117	Rp 338,100,000
Year 5	113	Rp 347,300,000

Payback Period in this study takes into account the time value of money or is called Discounted Payback Period. Discounted Payback Period is one of the payback period formulas that functions to calculate the time value of money, or is also called a method that considers the time value of money. In the 5th year, the income is the accumulation of the 5th year's truck rental income of Rp. 347,300,000 and the remaining value of Rp. 230,000,000.

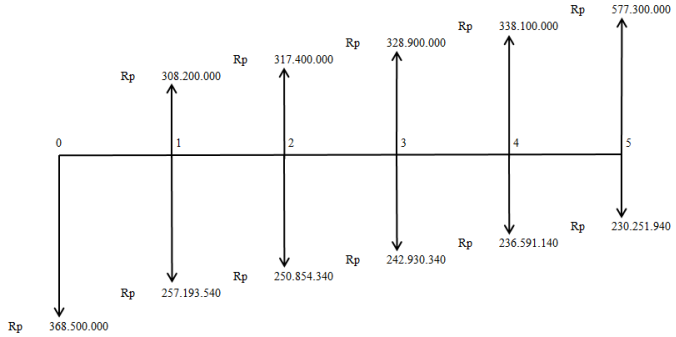
Year	Expenditure	Income	*Net Cash Flow*	(P/P,8%,t)	PW	Cumulative Cash flow
number 0	Rp. 368,500,000	Rp -	-Rp 368,500,000	1.0000	-Rp368,500,000	-Rp 368,500,000
1	Rp257,193,540	Rp308,200,000	Rp51,006,460	0.9259	Rp 47,226,881	-Rp Phone number 321.273.119
2	Rp250,854,340	Rp. 317,400,000	Rp66,545,660 people	0.8573	Rp 57,049,594 people	-Rp264,223,524
3	Rp242,930,340	Rp. 328,900,000	Rp85,969,660	0.7938	Rp 68,242,716	-Rp195,980,808
4	Rp236,591,140	Rp338,100,000	Rp101,508,860	0.7350	Rp 74,609,012	-

			people		million	Rp121,371,796 people
5	Rp230,251,940	Rp. 577,300,000	Rp347,048,060	0.6806	Rp236,200,910	Rp114,829,113

The following is the PP calculation:
PP = n +((ab)/(cb)) x 1 year = 4 + ((0-(-Rp 121,371,796)) (Rp 114,829,113 -(-Rp 121,371,796))) x 1 = 4.5 years 4 years 6 months

The cumulative cash flow is equal to zero, namely between the 3rd and 4th years. Using interpolation, the cash flow is 0 in the 4th and 5th years or 4 years and 6 months.

Internal Rate of Return (IRR)
After calculating the Payback Period, it is continued with IRR analysis by trial and error, which is the process of testing various profit levels to find the appropriate level of return on investment. The Internal Rate of Return on investment in the Mitsubishi Colt Diesel Double FE 73 110 PS truck is as follows:



NPV = PW Income – PW Expenditure
NPV = (IDR 308,200,000 (P/F, i %, 1)
+ Rp 317,400,000 (P/P, i %, 2)
+ Rp 328,900,000 (P/P, i %, 3)
+ Rp 338,100,000 (P/P, i %, 4)
+ Rp 577,300,000 (P/P, i %, 5))
– (Rp 368,500,000 + Rp 257,193,540 (P/F, i %, 1) + Rp 250,854,340
(P/P, 1%, 2) + 242,930,340
(P/P, i %, 3) + Rp 236,591,140
(P/P, i %, 4) + Rp 230,251,940
(P/P, 1%, 5))

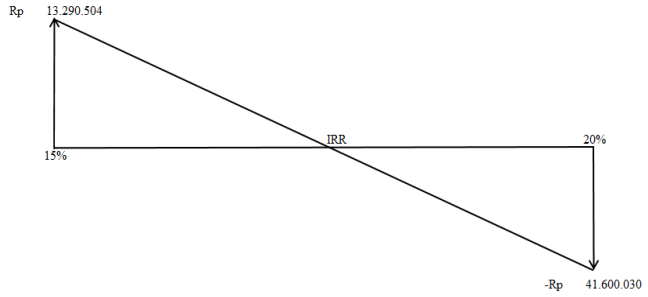
The Internal Rate of Return on investment in the Mitsubishi Colt Diesel Double FE 73 110 PS truck was searched by trial and error, so that 2 interest conditions were obtained, namely:

1. Interest rate 1 (i 1) = 15%
2. Interest rate 2 (i 2) = 20 %

NPV uses 1st rate interest, namely:
NPV 1 = (IDR 308,200,000 (P/F, 15%, 1)
+ Rp 317,400,000 (P/F, 15%, 2)
+ Rp 328,900,000 (P/F, 15%, 3)
+ Rp 338,100,000 (P/F, 15%, 4)
+ Rp 577,300,000 (P/F, 15%, 5))
– (Rp 368,500,000 + Rp 257,193,540 (P/F, 15%, 1) + Rp 250,854,340
(P/P, 15%, 2) + Rp 242,930,340 (P/P, 15%, 3) + Rp 236,591,140 (P/P, 15%, 4) + Rp 230,251,940 (P/P, 15%, 5))

= Rp. 13,290,504
NPV uses 2-rate interest, namely:
NPV 2 = (IDR 308,200,000 (P/F, 20%, 1)
+ Rp 317,400,000 (P/F, 20%, 2)
+ Rp 328,900,000 (P/F, 20%, 3)
+ Rp 338,100,000 (P/F, 20%, 4)
+ Rp 577,300,000 (P/F, 20%, 5))
– (Rp 368,500,000 + Rp 257,193,540
(P/P, 20%, 1) + Rp 250,854,340
(P/P, 20%, 2) + Rp 242,930,340
(P/P, 20%, 3) + Rp 236,591,140
(P/P, 20%, 4) + Rp 230,251,940
(P/P, 20%, 5))
= -Rp 41,600,030

After knowing the NPV with 2 times interest, by interpolation the IRR is obtained as follows:



$$IRR = I_1 + \frac{NPV_1}{NPV_1 - NPV_2}\ (I_2 - I_1)$$

$$IRR = 20\% + \frac{\text{Rp } 13.290.504}{\text{Rp } 13.290.504 - (-\text{Rp } 41.600.030)}\ (20\% - 15\%)$$

$\boldsymbol{IRR}$= 16.21 %

Estimated Shipping Request

In this study, forecasting is based on shipping demand data from the previous three years (2020-2022). The data shows cyclical and seasonal behavior, with constant wave lengths but varying between cycles. The decomposition method is used to forecast shipments from the Solo warehouse to the central warehouse because it is effective in predicting data with trends and seasons.

The forecasting process is considered valid if the overall test results are in accordance with the expected output. From the previous 36 periods, 60 forecast periods were generated. The forecasting results were evaluated using the Mean Squared Error (MSE) of 18, Mean Absolute Deviation (MAD) of 3.4571, and Mean Absolute Percent Error (MAPE) of 44.53%. The MSE and MAD values that are close to zero and the MAPE value between 20% -50% indicate that the forecasting model is quite good.

The results show a decline in shipping demand over the next five years, particularly a significant decline in May each year. Interviews indicated that this decline was due to the Ramadan and Eid holiday seasons, where demand increases before but drops during the holidays. Accurate forecasting allows companies to optimize shipping and logistics for the

coming years. Anticipated demand information helps in planning efficient shipping routes, better resource allocation, and avoiding supply-demand imbalances. Understanding the factors that influence shipping demand allows companies to effectively manage critical variables, leading to improved cost control, such as optimizing promotional spending, adjusting pricing, and managing inventory levels appropriately.

Comparison of Investment Alternative 1 and Investment Alternative 2

Each year, operating costs slightly exceed the cost of alternative investment option 1. However, at the beginning of year 0, the company must incur a significant outlay to purchase the truck. The cost comparison between purchasing and leasing the truck can be assessed using the Net Present Value (NPV) method. In this method, the difference between the cash inflows (receipts) and cash outflows (costs) for the two investment options—purchasing the truck and leasing it—is calculated, using an interest rate of 8% and an economic life of 5 years.

After the calculation, the NPV for purchasing a truck (investment alternative 1) is -Rp 1,464,905,648, while for renting a truck (investment alternative 2) is -Rp 1,188,596,987.

Based on the calculation, it can be concluded that purchasing a truck has a higher negative NPV compared to renting a truck, which is -Rp 1,188,596,987. Negative NPV (NPV <0) indicates that the inflow is smaller than the outflow. However, the NPV calculation is not only used to evaluate the feasibility of an investment but also to compare which investment is better when there are two or more options available. Thus, between the two alternatives, buying a truck is more profitable than renting it. Renting a truck proves to be a less profitable investment because the overall cost is higher compared to buying.

Investment Feasibility Analysis

Payback Period in this study considers the time value of money, which is called the Discounted Payback Period. This period is the time required to recover the investment cost using future cash flows that have been discounted to reflect the time value of money (Adhari, 2020). The calculation method involves adding the present value of cash inflows each year until it equals the initial investment amount. The result is a period of time measured in years, which shows how long it will take to recover the investment cost from the discounted net cash flow.

Based on the calculation, the company needs 4 years and 6 months to return the initial capital invested, while the economic life of the fleet is 5 years. The Payback Period is shorter than the specified economic period, indicating that the truck investment is feasible.

After conducting the Payback Period analysis, the next step is to conduct an Internal Rate of Return (IRR) analysis using a trial and error approach. This process tests various rates of return to identify the appropriate rate of return on investment. The range of returns tested ranges from lower expected returns to higher returns. Through this analysis, the company can determine whether the investment is feasible based on the expected rate of return, which helps in understanding the potential profitability of the investment.

For the truck investment, the calculated IRR is between 15% and 20% interest rates. Using interpolation, the IRR for the truck investment is determined to be 16.21%. The minimum acceptable rate of return (MARR) set by PT Swisstex Naratama is 15%, which is in line with the rental rates charged to other companies each year. Since the calculated IRR exceeds the required rate of return, it indicates that the proposed truck investment is feasible.

Simply put, if the IRR is higher than the minimum required rate of return or the cost of borrowing, it indicates that the investment has sufficient potential.

CONCLUSION

Based on the analysis of the previous discussion, several conclusions were obtained. First, the company incurs lower costs when investing in the purchase of a Mitsubishi Colt Diesel Double FE 73 110 PS truck compared to renting a truck with a similar capacity for a five -year period, assuming an interest rate of 8%. This conclusion is supported by the calculation of the Net Present Value (NPV) which shows that the NPV for purchasing a truck is -Rp 1,188,596,987, while the NPV for renting a truck is -Rp 1,464,905,648. Thus, investing in purchasing a Mitsubishi truck proves to be more profitable than choosing the lease option. In addition, after five years of use, the truck can be resold, generating an income of Rp 230,000,000, while leasing does not provide additional income.

Second, the Payback Period calculation shows that the company needs 4 years and 6 months to recover the initial capital from the investment. This period is shorter than the economic life of the fleet, which is 5 years. Furthermore, the Internal Rate of Return (IRR) for truck investment is calculated at 16.21 % . When compared to the required profit level of 15%, the IRR exceeds this threshold. By considering the evaluation criteria of Payback Period and IRR, it can be concluded that investing in purchasing Mitsubishi trucks is a worthy and valuable decision for the company.

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