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Analysis Project Investment: Study Case Build Inloading Conveyor

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ABSTRACT

This research examines the coal transportation system at Site Port S, a PT BCX coal mining concession. The site serves as a transit terminal for coal hauled from Site B using trucks, where the coal is dumped via two inloading conveyors. Currently, the daily haul truck capacity is 50,000 tons, while the conveyors handle 54,000 tons daily. However, when one of the conveyors is under maintenance or experiencing technical issues, production opportunities are lost, jeopardizing the achievement of future coal production targets, especially as peak production is expected over the next three years. To address this, the research aims to assess the feasibility of building a new inloading conveyor to serve as a backup system. The research uses capital expenditure (CAPEX) calculations, including previous inloading conveyor costs and inflation rates, as well as operating expenses (OPEX) and cost per ton to operate the plant. A discounted cash flow (DCF) analysis was conducted to determine the net present value (NPV) of building or renting a new conveyor unit. With a weighted average cost of capital (WACC) of 11.9%, the NPV results show a positive $4.8 million for building a new unit, compared to a negative $22.3 million for renting. The results indicate that building a new conveyor unit is significantly more profitable than renting. Additionally, owning the unit provides flexibility, as it could potentially be used at other sites in the future. The findings have important implications for optimizing coal transportation systems and ensuring long-term production efficiency.

Keywords: Capital Expenditure, Operation Expenditure, Investment Analysis, DCF Model, Monte Carlo Analysis.

INTRODUCTION

The coal mining industry, especially Indonesian coal, is still in demand by industrialized countries such as China, India, Japan and European countries (Ali et al., 2023). Since the covid storm subsided from 2021 to 2023, Indonesia's coal production has increased (Arifbillah et al., 2023). At the end of 2023, coal production exceeded the target by 112%, 775.2 million tons and in 2024 the Indonesian government targets coal production to 710 million tons, up 2.8% from the previous year's target (Agustina, 2017). Major mining companies in Indonesia have contributed to this achievement, one of which is PT BCX. PT BCX has 5 mining sites, site B is the site with the

largest production, the coal that has been crushed at site B will be taken to Port S using a double haul truck 28 km away, with a capacity of 50000 tons per day.

Figure 1. Hauling Road Map

The production target for the next 8 years (2025 - 2032) has its own challenges related to the achievement of production which is the company's KPI. It needs to be a special concern for the sustainability of the supply chain at Port S.

The Company is the Holding Company of PT XYZ, the Main Entity of the Company's Subsidiary which operates in the coal mining industry with mine sites spread across 4 areas, Site L, Site B, Site S, and Site G. From the four mine sites, it is able to produce coal that is marketed under 5 names, namely Ebony, Mahoni-B, Agathis, Sungkai, and Sungkai B.

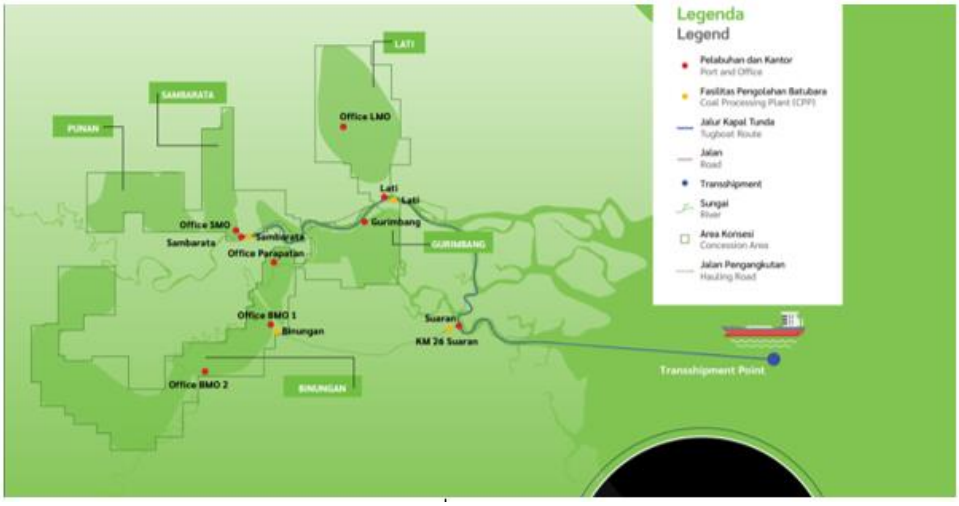

Figure 2. Concession Area PT. XYZ

On September 7, 2005, PT XYZ was founded under the name PT RSC to conduct business in the areas of real estate, trading, mining, plantation construction, agriculture, printing, industry, transportation, and services. The company became a holding company in 2006 and grew by purchasing PT ART With this move, the Company concentrates its business operations in mining, which is handled entirely by Armadian subsidiary PT XYZ.

The Company, a leading thermal coal producer in Indonesia, expanded and became a key player in the industry (Setyawan et al., 2023). In 2010, it raised 3,400,000,000 from 10% of 34.000.000.000 shares through an initial public offering. In 2011, Asia Resource Minerals PLC acquired the Company, and in the same year, it acquired two companies (Sari, 2019).

Asia Coal Energy Ventures Limited (ACE) bought 94.19% of Asia Resource Minerals PLC's shares in 2015 (Hartana, 2017), thereby becoming an indirect controller of the company. However, in 2016, Vallar Investment UK Limited sold 84.74% of the company's shares to PT Sinarindo Ekamulya, an affiliate of Sinar Mas Group, which therefore became the company's main and controlling shareholder.

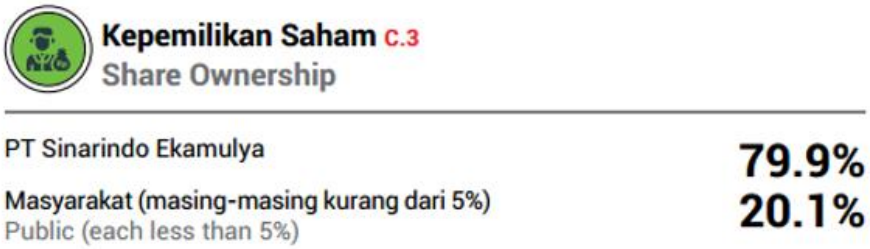

Figure 3. Share Ownership PT. XYZ

The company is committed to maintaining business sustainability by providing high-quality coal and maintaining competitiveness (Nisa et al., 2024). Despite being delisted from the Indonesia Stock Exchange in 2017, it prioritizes innovation, progress, and trust in its operations. Its subsidiary, PT XYZ, has four sites with 433.8 million tons of coal reserves.

At Port S there is an In Loading Conveyor that serves dumps from haul trucks. There are 2 In Loading Conveyor Units with a total maximum capacity of 3000 Ton Per Hour, historically the unit capacity according to its utility is around 2400 Ton Per Hour in total. With this capacity, 2 units of In Loading Conveyor are not able to serve haul trucks.

The problem arises when one of the In-loading Conveyor maintenance or breakdown, there will be a loss opportunity production coal hauling up to 1⁄2 or more of the production capacity of the hauling. The In-loading Conveyor is always maintenance once a week alternately for 12 hours. To be able to offset the production of the Truck Loading Conveyor, it is necessary to add the In-loading Conveyor at km 28, so that there is no loss of opportunity production due to maintenance or breakdown.

The issues outlined above reveal several potential challenges. First, there is a significant production loss risk, with an estimated average of 496,373 tons per month or $27.5 million per month, based on the July 2024 coal price (ICI4 at $55.31 per ton, according to JWC, 2023). Additionally, there is a potential for production halts at Site B, as the stockpile capacity is limited to 118,000 tons. If the coal is not promptly transported from Site B to Port S, the stockpile will reach capacity within 3 to 4 days, given that approximately 41,000 tons of coal are brought to Site B each day. This situation poses a risk to both the production process and the overall supply chain, as further mining output would have no storage space.

To mitigate these risks, it is essential to build or rent a loading conveyor with a capacity of 1,500 tons. This will help increase the loading capacity of haul trucks at Port S and provide a backup in case one of the conveyors is out of service due to maintenance or operational issues.

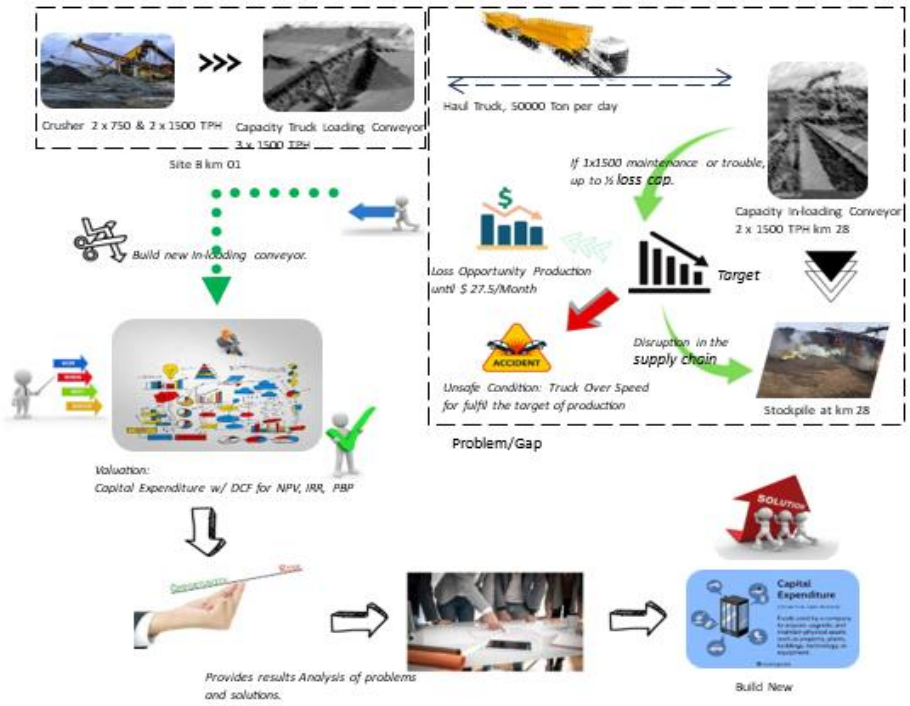

Figure 4. Rich Picture for Investment Project Analysis

With an out-loading conveyor capacity of 3 x 1500 TPH in km01 with 40 truck hauling with 9 trips per day per truck, production forecast averages 2,500 MT per day per Truck. From Hauling into In-loading Conveyor in km28 with capacity 2 x 1,500 TPH with an average of 18 working hours can produce up to 41,000 MT a day under normal conditions, if there is alternate maintenance then it will lose production opportunities up to 496,373 Ton Per Month or $27.5 Mio per month and. It takes built or rent 1 x 1500 TPH In-loading new conveyor to offset production from

Hauling. However, analysis and valuation of the investment will need to be done to obtain management approval.

Based on the background and business issues described, this research will focus on three main aspects. First, this research analyzes the feasibility of building an In-loading Conveyor system compared to the option of renting a conveyor system for this investment project. This analysis was conducted to determine the most efficient and profitable option for the company, taking into account production capacity and long-term operational needs. Secondly, this study evaluates the amount of capital investment required for the addition of the In-loading Conveyor or the proposed rental option, so as to provide more value to coal production at Port S, based on the production target for the next 8 years. This investment analysis uses the Investment Project Analysis method to evaluate the impact of investment on increasing production capacity and the company's financial returns. Third, this study identifies the variables that are most sensitive to the movement of NPV in this investment project analysis. The benefits of this research are, first, to provide in-depth insights for the management of PT XYZ regarding the feasibility of investing in the new In-loading Conveyor facility, so that the right decisions can be made regarding the development of supply chain support infrastructure. Second, this research is expected to reduce potential production losses due to limited coal stock capacity and downtime at the existing In-loading Conveyor facility. Third, this research also provides guidance for companies in managing operational risks, so as to improve overall operational efficiency and support the achievement of production targets in the long term. Thus, the results of this study can be used as a basis for making strategic investment decisions in the future.

RESEARCH METHODS

Research Design

This research uses primary data. Financial analysis utilizes primary data to generate financial projections, risk factor dynamics with Sensitivity and scenario Analysis.

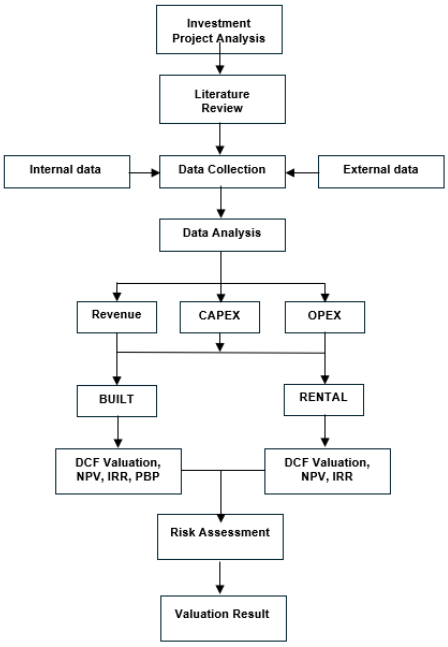

Figure 5. Research Design

Data Analysis Method

Revenue: production target data for the next 8 years is used to determine revenue by multiplying the cost per ton that PT BCX has determined to operate the Port S Plant from 2025 until 2032.

$$Revenue = Target\ Production \times Cost\ per\ Ton$$

CAPEX & Rental: Analysis method for capex, using historical data multiplied by average inflation, the data used is capex data to build a conveyor with the same unit in 2016. Inflation data is obtained from external data from BI (Indonesia, 2024). Data Rental of unit conveyor benchmark from contract in other site, use cost per ton details.

OPEX: The opex data used for this valuation is the replacement of spare parts, service work, manpower, fuel & electricity. The value that will be used for analysis of the parameters in opex is the ratio value, which is obtained from Opex divided by Actual production in the same year. With the following formula:

$$Opex\ Ratio = Opex / Production$$

After knowing the opex ratio in each year 2020 - 2023, the Mean, Min, and Max values are sought.

Cash flow projections are used to ascertain a business's cash generation capacity and cash requirements by estimating future cash inflows and outflows (Klinefelter & McCorkle, 2009). And how the actual opex can used to determine cash flow projection to provide the cash generated ability.

WACC is a cost of capital calculation based on the sum of debt and equity of the Company. In this research, PT BCX in carrying out operations at the Port S Plant does not use debt, purely from equity that has been budgeted. So that the calculation of WACC uses a method without debt, 100% using equity. As in the formula below, the method used external data to determine the cost of equity with a risk free rate for 8 years taken from external data (PHEI, 2024b), because the calculation uses USD, the Risk Free rate is reduced by the rating-based default spread. The beta used to determine the cost of equity is adjusted to the Mining industry (Stern.nyu, 2024), while the equity risk premium is adjusted to the business in the country operated.

NPV: The difference between the present value (PV) of a future stream of cash inflows and outflows is known as the net present value. Practically, NPV is extensively applied to ascertain the apparent profitability of a possible investment or project to guide important decisions on capital budgeting and allocation of funds. This is a general guideline for interpreting the net present value (NPV) of an undertaking or investment (Damodaran, 2012).

NPV > 0 : the project Accept

NPV = 0 : Break event point project

NPV < 0 : the Project Reject

A positive NPV indicates that a project or investment will generate positive economic value, while a negative NPV indicates that value will be loss.

$$NPV = \sum_{t=0}^{n} \frac{R_t}{(1+i)^t}$$

The internal rate of return is a variable utilized in financial analysis to determine the profitability of prospective investments. The discount rate is used to set all cash flows in a discounted cash flow analysis to zero (Damodaran, 2012), meaning their net present value (NPV). The IRR formula of project is as follows:

$$IRR\% = \frac{(Future\ Value)^{\frac{1}{t}}}{Present\ Value} - 1$$

The Payback Period is a metric that quantifies the duration before an investment yields a return to earn back its initial investment using the cash flows it generates. The more the cash flows from a possible project can balance the initial investment, the more likely the company will go on with project development (Damodaran, 2012). Subtracting the yearly cash flow from the cost of the initial investment is the most basic way to determine the payback period.

$$Payback\ Period = \frac{Initial\ Investment}{Cash\ Flow\ per\ Year}$$

A valuation method **Discounted Cash Flow (DCF)** is employed to estimate the value of an investment by calculating the present value of its anticipated future cash flows. It considers the time value of money, which posits that cash received in the future is worth less than cash received today (Nenkov & Hristozov, 2023). The DCF Formula is:

$$DCF = \frac{CF_1}{(1+i)^1} + \frac{CF_2}{(1+i)^2} + \cdots + \frac{CF_n}{(1+i)^n}$$

The Discounted Payback Period is a method for estimating how long it will take for a project to earn enough cash to cover its costs and turn a profit.

$$Discounted\ Payback\ Periode = Years\ until\ BEP - \frac{Uncovered\ Amount}{Recovery\ Year\ Cash\ Flow}$$

RESULTS AND DISCUSSION

Revenue Calculation

Revenue from the project is based on the production target for the next 8 years (in the table) at the Port S plant multiplied by the cost per ton provided by the Company to run the Port S plant, 1.14 $/ton. The cost per ton is assumed to be the same for the next 8 years. As shown in the table below:

Table 1. Revenue Calculation

Year		2025	2026	2027	2028	2029	2030	2031	2032
Coal Production	MT Mio	12.00	13.76	10.68	8.18	4.83	1.71	1.16	0.93
UA 30%	MT Mio	3.60	4.13	3.20	2.45	1.45	0.51	0.35	0.28
Cost Per Ton	$/ton	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Revenue	$ Mio	4.10	4.70	3.65	2.80	1.65	0.59	0.40	0.32

Capital Expenditure & Rental Contract

Capital expenditures are based on purchasing projects with the same type of conveyor in 2017, and the cost is adjusted to the current inflation value. The inflation value uses the average inflation value of the last ten years (Haq, 2019). Obtained 3.8%. So that the project cost for 2024 is obtained as follows:

Table 2. Capex for New In loading Conveyor

No	Description	Unit	2024 *In USD*
Capex For New Inloading Conveyor			
1	General Preparation	AU	418,718.02
2	Earth Work	AU	762,752.97
3	Civil Work	AU	1,094,865.38
4	Mechanical & Structural Work	AU	3,300,486.87
5	Electrical Work	AU	1,379,097.79

No	Description	Unit	2024 *In USD*
Total			6,955,921.04
Contingencies 10%			695,592.10
Grand Total CAPEX			7,651,513.14

Operation Expenses

The calculation of operational expenses below is based on historical data, which is then divided by tonnage data for the same year to get the cost per ton for each year. Cost per ton Operation Expenses is used to determine the cost of Operation expenses based on production projections.

Table 3. Cost per Ton Operation Expenses

Year	Part/Service	SLA	FUEL	ELECTRICITY	TOTAL	*$/Ton*
2020	$ 522,273.38	$ 263,333.33	$ 633,430.61	$ 345,883.83	$ 1,764,921.15	0.1664
2021	$ 333,248.54	$ 263,333.33	$ 692,560.50	$ 332,632.78	$ 596,581.87	0.0556
2022	$ 342,147.28	$ 276,500.00	$ 1,069,683.20	$ 654,080.73	$ 618,647.28	0.0508
2023	$ 345,678.38	$ 288,942.50	$ 620,038.88	$ 1,046,320.10	$ 634,620.88	0.0461

Rental Contract

The rental cost of the new conveyor unit is based on contracts that PT BCX has carried out at other plants. With Capex, Depreciation, Maintenance, and other components. The contract rate for rental units is as follows:

Table 4. Rental Rate

BCX Production	Unit	Rate
0 - 4Mton	IDR/t	15500
4 - 6Mton	IDR/t	15500
6 - 8Mton	IDR/t	13500
8 - 10Mton	IDR/t	13500
> 10Mton	IDR/t	13500

For Rental excluding fuel and electricity, fuel and electricity are also calculated at cost per ton to be used as Operation Expenses on the Rental side.

Table 5. Cost Per Ton Fuel & Electricity

Year	Total	*$/Ton*		
2020	979,314.44	0.09	Mean:	0.11
2021	1,025,193.28	0.10	Min:	0.09
2022	1,723,763.93	0.14	Max:	0.14
2023	1,666,358.98	0.12		

WACC

Table 6. WACC

Calculation		Remark
RF : Risk Free Rate	4.59%	Risk Free Rate Indonesia for Marc 2024: (PHEI, 2024a)
ERP	7.62%	According to: https://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/ctrprem.htm
β : Beta of the security	0.96	According to: http://pages.stern.nyu.edu/~adamodar/New_Home_Page/datafile/Betas.html
Cost of Equity, We	11.9%	*We =R_F+β*ERP*
WACC : 100% Cost of Equity	11.9%	

Discounted Cash Flow Calculation

Calculation of cash flow for installing new units based on revenue and opex that have been analyzed previously using a tax of 22% as in the table below :

Table 7. Discounted Cash Flow Calculation

Year		0	1	2	3	4	5	6	7	8
		2024	2025	2026	2027	2028	2029	2030	2031	2032
Coal Production	Mio Ton	-	12.00	13.76	10.68	8.18	4.83	1.71	1.16	0.93
UA 30%	Mio Ton		3.60	4.13	3.20	2.45	1.45	0.51	0.35	0.28
BC to BCE	$/ton	-	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Reveneu	$ Mio	-	4.08	4.68	3.64	2.78	1.64	0.58	0.40	0.32
Inflation	%	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
OPEX Ratio (Part&Service, SLA, Fuel, Electricity)	$/ton	-	0.08	0.08	0.09	0.09	0.09	0.10	0.10	0.10
OPEX (Part&Service, SLA, Fuel, Electricity)	$ Mio	-	0.96	1.14	0.92	0.73	0.45	0.16	0.12	0.10
Depreciation	$ Mio	-	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)	(0.91)
EBT	$ Mio	-	3.13	3.55	2.72	2.06	1.20	0.42	0.28	0.22
Tax	$ Mio	-	(0.69)	(0.78)	(0.60)	(0.45)	(0.26)	(0.09)	(0.06)	(0.05)
EAT	$ Mio	-	2.44	2.77	2.12	1.60	0.93	0.33	0.22	0.17
Investment	$ Mio	(7.65)		-	-	-	-	-	-	-
Depreciation; Add Back	$ Mio	-	0.91	0.91	0.91	0.91	0.91	0.91	0.91	0.91
Residual Value	$ Mio	-	-	-	-	-	-	-	-	0.38
CF	$ Mio	(7.65)	3.35	3.67	3.03	2.51	1.84	1.23	1.13	1.46
Accumulated CF	$ Mio	(7.65)	(4.30)	(0.63)	2.40	4.91	6.76	7.99	9.12	10.58
PV	$ Mio	(7.65)	2.99	2.93	2.16	1.60	1.05	0.63	0.51	0.60
Accumulated PV	$ Mio	(7.65)	(4.66)	(1.73)	0.44	2.04	3.09	3.72	4.23	4.83

Year		0 2024	1 2025	2 2026	3 2027	4 2028	5 2029	6 2030	7 2031	8 2032
NPV	$Mio	4.83								
IRR	%	33.00								
Payback Period	years	2.17								
Discounted Payback Period	years	2.59								

The NPV from the DCF analysis for the installed unit amounted to $ 4.38 Mio, IRR 33%, Payback Periode of 2.17 year, and discounted payback period of 2.59 years.

With the same analysis, the calculation of NPV for rental using the DCF method with the same tax, the calculation results are as shown in the table below:

Table 8. Discounted Cash Flow Calculation

Year		0 2024	1 2025	2 2026	3 2027	4 2028	5 2029	6 2030	7 2031	8 2032
Coal Production	Ton Mio	-	12.00	13.76	10.68	8.18	4.83	1.71	1.16	0.93
UA 30%	Ton Mio		3.60	4.13	3.20	2.45	1.45	0.51	0.35	0.28
Cost Per Ton	$/Ton	-	1.14	1.14	1.14	1.14	1.14	1.14	1.14	1.14
Reveneu	$ Mio	-	4.08	4.68	3.64	2.78	1.64	0.58	0.40	0.32
Inflation	%	-	0.04	0.04	0.04	0.04	0.04	0.04	0.04	0.04
Rental Set Include Spare Part, SLA & GA	$ Mio	-	7.09	2.77	2.15	1.65	0.97	0.34	0.23	0.19
Operation Cost Ratio (Fuel+Electricity)	$/Ton	-	0.11	0.12	0.12	0.13	0.13	0.14	0.14	0.15
Operation Cost (Fuel + Electricity)	$ Mio	-	1.35	1.61	1.30	1.03	0.63	0.23	0.16	0.14
Total Plant Operational Cost	$ Mio	-	8.45	8.45	8.45	8.45	8.45	8.45	8.45	8.45
Depreciation	$ Mio	-	-	-	-	-	-	-	-	-
EBT	$ Mio	-	(4.36)	(3.76)	(4.81)	(5.66)	(6.80)	(7.86)	(8.05)	(8.13)
Tax	$ Mio	-	0.96	0.83	1.06	1.25	1.50	1.73	1.77	1.79
EAT	$ Mio	-	(3.40)	(2.93)	(3.75)	(4.42)	(5.31)	(6.13)	(6.28)	(6.34)
Investment	$ Mio	-		-	-	-	-	-	-	-
Depreciation ; Add Back	$ Mio	-	-	-	-	-	-	-	-	-
Residual Value	$ Mio	-	-	-	-	-	-	-	-	0.38
CF	$ Mio	-	(3.40)	(2.93)	(3.75)	(4.42)	(5.31)	(6.13)	(6.28)	(5.96)
Accumulated CF	$ Mio	-	(3.40)	(6.34)	(10.09)	(14.50)	(19.81)	(25.94)	(32.22)	(38.18)
PV	$ Mio	-	(3.04)	(2.34)	(2.68)	(2.82)	(3.02)	(3.12)	(2.86)	(2.42)
Accumulated PV	$ Mio	0	(3.04)	(5.38)	(8.06)	(10.88)	(13.90)	(17.02)	(19.88)	(22.31)
NPV	$ Mio	(22.31)								

The NPV from the DCF analysis for the installed unit amounted to $ -22.31 Mio. A Discounted Cash Flow (DCF) analysis was used to assess two business options: building or renting

the in-loading conveyor. The primary goal was to determine the most profitable option based on net present value (NPV). The DCF analysis shows that building the in-loading conveyor has a greater NPV $ 60.63 Mio than renting $45.97 Mio. This means that the investment in building the conveyor will provide higher income in the future after correcting for the time value of time. And Sensitivity analysis shows that the variable price coal to PT. XYZ has a significant influence on business decisions. Changes in cost per ton can significantly affect NPV ±26.6% with swing ± 20%, so it needs to be monitored and optimized to maximize profits.

CONCLUSION

The conclusion of the project analysis shows that a positive Net Present Value (NPV) value indicates the project is profitable within the next eight years. Based on the calculation, the NPV for building the in-loading conveyor is higher compared to the rental option, which is analyzed through the Existing, Build, and Rent method. Through the investment project analysis that has been conducted using the Discounted Cash Flow (DCF) method to calculate NPV, Internal Rate of Return (IRR), Payback Period (PBP), and Discounted Payback Period (DPBP), the results show that both options have NPV more than zero. After sensitivity analysis, scenario analysis, and simulation using the Monte Carlo method, the comparison between the existing and build options resulted in an NPV of $18.7 million, IRR of 73.04%, Payback Period of 1.34 years, and Discounted Payback Period of 1.56 years. Sensitivity analysis using three variables shows that the most sensitive variable to NPV is the price of coal sold to PT XYZ, with a sensitivity of 27%. Recommendations that can be given to the company are as follows: First, the NPV of the building option is much greater than the renting option, so the construction of the in-loading conveyor can significantly increase the company's profit. Second, it is recommended that the new in-loading position be built as close as possible to the existing in-loading to reduce rehandling costs. Third, the price of coal sold to PT XYZ should not be below $1.1/ton in order to obtain a more favorable NPV.

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