

FEASIBILITY STUDY OF INVESTMENT IN NEW CONVEYOR FACILITY FOR CHF SUPPLY POWER PLANT ABC PT XYZ



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Abstract

PLTU ABC is a coal-fired steam power plant that receives its coal supply from PT XYZ. At present, coal delivery relies on a single conveyor system with a capacity of 1,200 tons per hour. Since PT XYZ supplies coal based on the power plant's demand, the conveyor must remain operational 24 hours a day. Any unplanned maintenance on the conveyor can disrupt supply and result in lost electricity production. Monthly coal delivery targets have been established, necessitating alternative delivery methods in case the conveyor system fails. Three alternative solutions have been identified: leasing a temporary conveyor, investing in a new conveyor system, or switching to direct coal delivery via trucks. The capital expenditure estimates are based on historical purchase data, adjusted for inflation over the past five years. The financial analysis indicates that direct truck delivery offers the highest return on investment and stronger cash flow compared to either leasing or constructing a new conveyor system. The project's financial metrics include a Net Present Value (NPV) of IDR 51.22 billion, an Internal Rate of Return (IRR) of 60.13%, a Modified Internal Rate of Return (MIRR) of 24.54%, and a payback period of 1.55 years. Further validation using sensitivity analysis, scenario analysis, and Monte Carlo simulations showed that the probability of achieving a positive NPV ($NPV > 0$) is 65%. Based on these findings, it is concluded that direct delivery by trucks is more financially viable than investing in or leasing conveyor facilities.

Keywords: Capital Expenditure, Operation Expenses, DCF Model, Sensitivity Analysis, Monte Carlo Analysis

INTRODUCTION

PT XYZ, based in South Sumatra, operates in the coal mining sector, supplying coal to both domestic and international markets. Its domestic clients include power plants such as Suralaya, Tarahan, and those owned by PT XYZ itself. As part of its business expansion, PT XYZ is evolving from a coal producer into a broader energy company, in line with the Indonesian government's 35,000 MW power development initiative. In this transformation, PT XYZ currently manages a 2x100 MW power plant in Banjarsari, Lahat, which supplies electricity to the state utility, PLN. Acknowledging the limited lifespan of coal as a resource, PT XYZ is preparing for long term business sustainability. Beyond its routine capital expenditures, PT XYZ has allocated investment for the development of the Banko Tengah 2x660 MW Power Plant, referred to as the ABC Power Plant. The ABC Power Plant is a 2x660 MW mine-mouth coal-fired power facility being built near the Banko Tengah coal reserve in South Sumatra. It is set to become the largest coal power plant on Sumatra Island and the biggest mine-mouth thermal power station in Indonesia. Over an estimated 25-year operational life, the plant is projected to generate up to 8.6 billion kilowatt-hours (kWh) of electricity annually.

As a subsidiary of PT XYZ, the ABC Power Plant aligns with the company's mission to establish itself as a world-class energy provider. Once fully operational, the plant will require up to 5 million tons of coal annually. To ensure a stable and efficient coal supply, PT XYZ must invest in a modern conveyor system and supporting infrastructure.

Business Issues

The Coal Handling Facility (CHF) that supports coal supply to the ABC Power Plant currently operates with a single system for both loading and unloading, utilizing a reclaim feeder breaker (RFB) as the only discharge mechanism. As a result, coal delivery to the ABC Power Plant is heavily reliant on the continuous operation of this single reclaim feeder breaker. Below is a summary of the breakdown incidents the RFB has experienced over the past year.

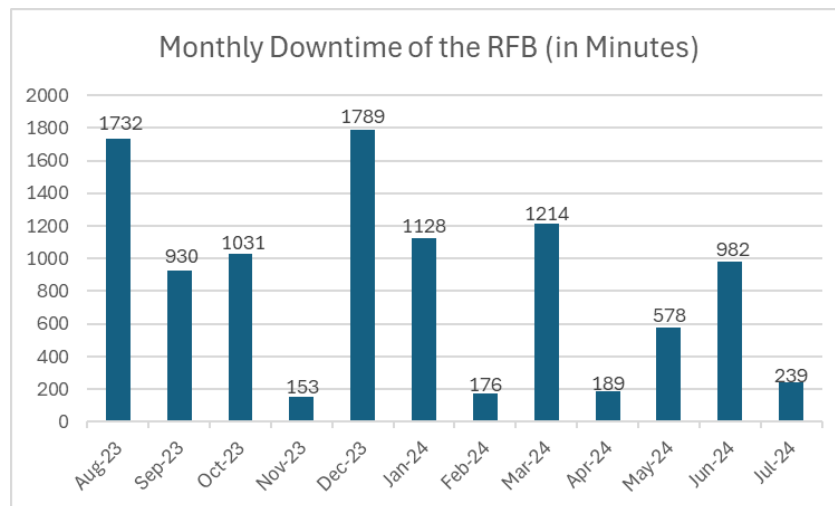


Figure 1.

Monthly Downtime of RFB Graphic

The graph indicates that equipment breakdown durations are unpredictable and vary significantly. Although the planning division has made considerable efforts to expedite repair

work, some challenges arise unexpectedly and are difficult to anticipate. A key issue in the field is the lack of backup units for the coal loading and unloading system. In the event of a prolonged breakdown, and if coal stock at the ABC coal-fired power plant becomes critically low, PT XYZ's only current contingency is to deliver coal directly by truck to ensure uninterrupted electricity generation at the ABC Power Plant.

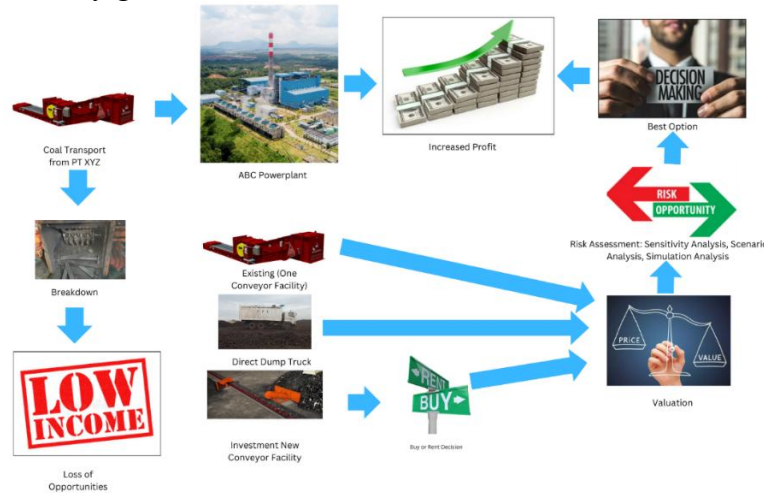


Figure 2.

Rich Picture of Investment Project Analysis

This rich picture illustrates that the existing conveyor facility has a capacity of 1,200 tons per hour. Coal deliveries currently total approximately 270,000 tons per month, or around 3 million tons annually. Once the power plant reaches full operational capacity, the delivery target will increase to 4 million tons per year. At present, there is only a single coal loading and unloading line. When an unexpected breakdown occurs, repair times can be lengthy, resulting in lost delivery opportunities.

One alternative to maintain supply during such disruptions is direct coal delivery by truck. However, this method incurs higher costs due to road maintenance requirements and slower delivery rates, as trucks have lower throughput per hour and must pass through the power plant's weighbridge. To meet the growing delivery targets efficiently, it is essential to evaluate and compare available options—direct trucking, constructing a new conveyor system, or leasing facilities. A comprehensive investment valuation and risk analysis, including simulation techniques, are needed to determine the most financially advantageous and reliable solution.

REVIEW OF LITERATURE

Theoretical frameworks play a crucial role in guiding investment project analysis, as they significantly influence the potential success of an investment. This process requires a thorough assessment of multiple factors, including financial performance and risk exposure. Choosing between direct trucking, constructing, or leasing a conveyor system is a strategic decision with substantial implications for operational efficiency and the overall cost of the project.

Investment Project Analysis

The Weighted average cost of capital (WACC) and Discounted Cash Flow (DCF) methods are employed to analyze the feasibility of an investment project analysis, which includes Capital Expenditures (CAPEX), Operating Expenses (OPEX), Tax, Depreciation, and discount rates.

Capital Expenditure

Capital expenditures refer to the funds that a company invests to acquire, upgrade, or maintain physical assets such as mining facilities, mining technology, or mining equipment. Capital expenditures are typically long term investments to operational efficiency, capacity, or future growth. Although capital expenditure itself increases firm value, some research suggests that capital expenditure with hedging reduces the market's dependence and potentially leads to over-investment. (Ullah, 2023).

Operating Expense

Operating expenses (OPEX) are the costs incurred by a company to run its day to day operations, resulting in benefits realized within a year. These expenses include employee wages, unit maintenance, service charges, rent, fuel, electricity, and more. The ratio of operating expenses to capital expenditures varies across industries. For example, renewable energy projects are capital-intensive, requiring significant initial investments but incurring lower ongoing operational costs (Breitschopf, 2022).

Tax and Depreciation

Tax is a critical factor in financial analysis, as it directly impacts a company's cash flow. Taxes refer to the governmental obligations that companies must pay based on their business activities. Depreciation, on the other hand, involves allocating the cost of fixed assets over time against annual income, ultimately determining the book value of these assets each year. The policies governing tax and depreciation can influence a company's management decisions. For instance, when an accelerated depreciation policy is applied without a corresponding tax rate adjustment, management may be incentivized to engage in earnings management, which could negatively affect the quality of the company's earnings. Thus, evaluating the impact of accelerated depreciation requires consideration of its effects on earnings quality. To mitigate opportunistic behaviors in policy implementation, more accurate structural designs, such as ensuring higher conformity between book and tax depreciation, as well as differentiating policies based on the scale of investment, should be considered (Wang, 2024).

Cash Flow Projection

Cash flows are a key component in financial valuation, categorized into three types: Operating flows (related to product or service sales), Investment flows (from purchasing and selling fixed assets or equity investments), and Financing flows (from debt and equity financing activities). Cash Flow Analysts monitor cash movements, ensuring liquidity and initiating transfers when needed. The ability to interpret complex financial data helps enhance market efficiency (Coulton, 2022).

Weighted Average Cost of Capital

The weighted average cost of capital (WACC) reflects the expected average future cost of capital over the long run, found by weighting the cost of each specific type of capital by its proportion in the firm's capital structure. The cost of capital represents the firm's financing costs and is the minimal rate of return that a project must generate to improve firm

value. All results and conclusions in academic works and practical valuations are based on the assumption that WACC is theoretically sound (Chen,2021).

Capital Budgeting Analysis

Research in capital budgeting often focuses on project scheduling and investment return comparisons. The discount rate, based on the company's cost of capital (often calculated using WACC), is used to assess the project's profitability. If the Net Present Value (NPV) is positive, the project is deemed profitable. Incremental expansion of the conveyor unit is necessary to achieve the best NPV between building and renting (Liu, 2019).

Risk Assessment

Comprehensive risk assessments are critical for project success. Traditional deterministic models have been compared with data-driven approaches to enhance risk management, addressing socio-environmental factors for long-term sustainability (Dranka, 2025).

Sensitivity Analysis

Sensitivity analysis helps identify key variables affecting output variability, allowing the simplification of complex models and faster results generation. It is crucial for model calibration, optimization, and validation, ensuring only significant parameters are included (Zhang, 2024).

Scenario Analysis

Scenario Analysis Technique (SAT) assesses how different independent variables affect dependent outcomes. It creates plausible scenarios to study potential risks and improve decision-making, safety strategies, and system optimization (He, 2025).

Simulation Analysis

Monte Carlo Simulation (MCS) uses random sampling to analyze risk and uncertainty, helping assess the inherent variability in input variables for sustainability and other indicators (Mitropoulos, 2017).

Conceptual Framework

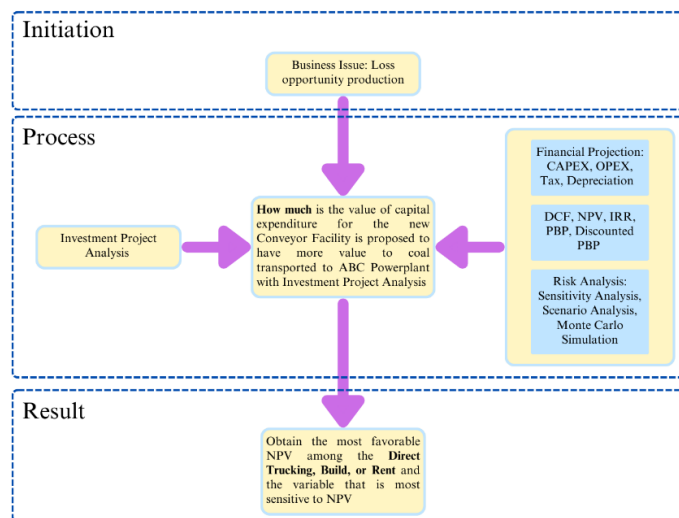


Figure 3.
Conceptual Framework

The conceptual framework addresses business issues by evaluating three options: direct trucking, building a new conveyor, or renting a facility. These alternatives aim to resolve

production and coal transport disruptions at the ABC Powerplant due to conveyor breakdowns. Financial projections, including revenue, capital expenditures, and operating expenses, will be analyzed using the DCF method to identify the highest NPV. A risk assessment will be conducted using Monte Carlo simulations, sensitivity, and scenario analysis to ensure reliable results. The final valuation will be presented to management for approval.

RESEARCH METHOD

This research uses primary and secondary data from external and internal sources. With sensitivity analysis and scenario analysis, financial analysis utilizes primary data to generate financial projections and risk factor dynamics.

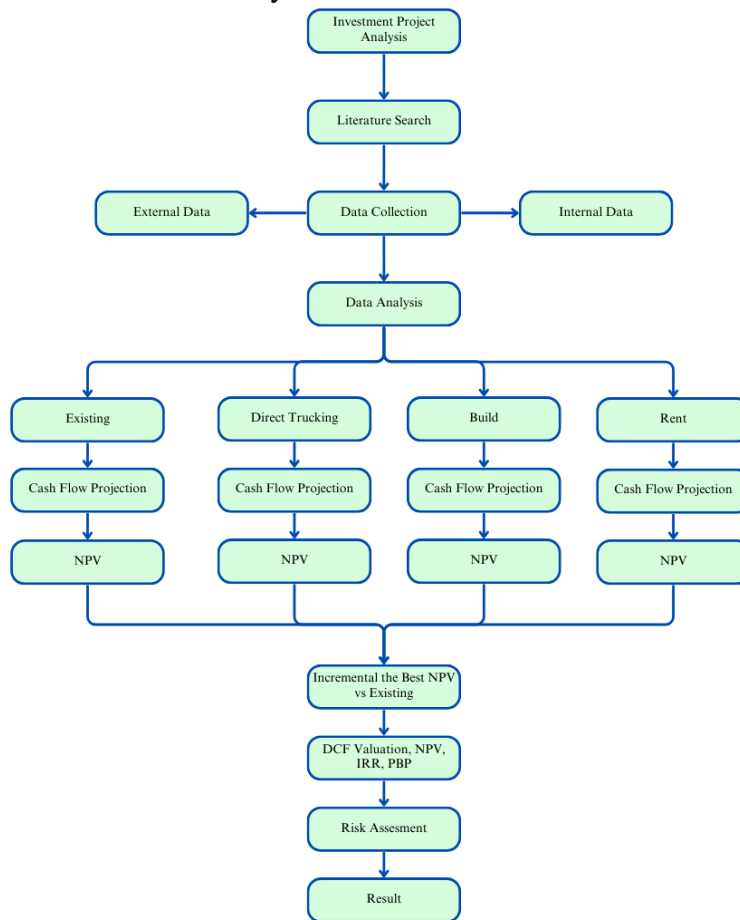


Figure 4.
Research Design

Data Collection Method

Data was collected through two main approaches: External data, which includes information from the global coal market, the Ministry of ESDM website, inflation rates, WACC component values, and tax data; and internal data, which consists of expense reports, production reports, historical CAPEX, rental prices, electricity costs, and 10-year production targets.

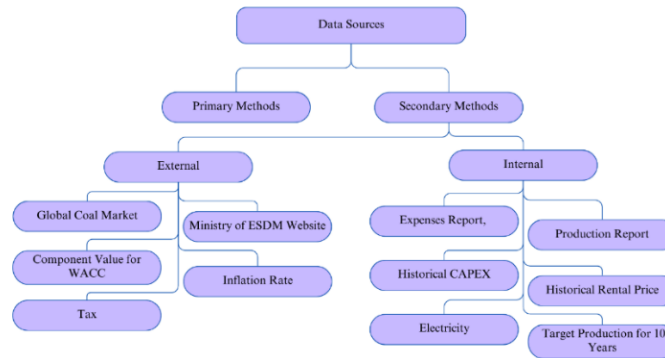


Figure 5.
Data Collection Method

Revenue

Revenue is calculated by multiplying the production target data for the next ten years with the cost per ton for coal delivery to ABC Powerplant from PT. XYZ, considering the options of direct trucking, building, or renting a new conveyor facility.

$$Revenue = Capacity\ Unit \times Cost\ per\ Ton$$

Capital Expenditure

The capital expenditure analysis method uses historical data multiplied by average inflation. In 2020, we used this data to build a conveyor facility with the exact specifications, and we obtained inflation data from external data from Bank Indonesia.

Operating Expense

Operating expenses for this valuation include costs for spare parts replacement, service work, workforce, fuel, and electricity. The analysis will use the ratio of operating expenses to actual production in the same year to evaluate these parameters, calculated using the following formula:

$$Operating\ Expense\ Ratio = \frac{Operating\ Expense}{Production}$$

Operating Expense Ratio

We will calculate the mean, minimum, and maximum values based on the operating expense ratio for each year from 2020 to 2024.

Rental Contract

The rental data for the conveyor facility units is obtained from vendor quotations, which specify the cost per ton.

Tax and Depreciation

After determining revenue, initial investment, and operating costs, the earnings after tax are calculated by incorporating taxes, interest, depreciation, and amortization. PT XYZ applies an optimal combination of equity and debt, which is reflected in the loan interest within the financial model. Since PT XYZ does not report any intangible assets, amortization is not applicable. Consequently, the cash flow is influenced only by taxes and depreciation.

Depreciation is calculated using the straight-line method, taking into account the salvage value, as shown in the following formula:

$$\text{Depreciation} = \frac{\text{Capital Expenditure} - \text{Salvage Value}}{\text{Usefull Life}}$$

Weighted Average Cost of Capital (WACC)

The Weighted Average Cost of Capital (WACC) is determined using the Capital Asset Pricing Model (CAPM). WACC represents the weighted average of the costs of equity and debt, where the cost of equity is derived from CAPM. For this calculation, the risk-free rate is based on government bond yields, followed by the determination of the cost of debt and the proportion of equity and debt. The resulting WACC reflects the company's overall cost of capital, as represented by the formula below:

$$WACC = \left(\frac{E}{V} \times RE\right) + \left(\frac{D}{V} \times RD\right)$$

RE = Cost of Equity

RD = Cost of Debt

E = Market Value of Equity

D = Market Value of Debt

V = Total Capital

Discounted Cash Flow (DCF)

The Discounted Cash Flow (DCF) method is employed to assess the value of an investment by calculating the present value of its expected future cash flows. This approach incorporates the time value of money, recognizing that cash received in the future is worth less than cash received today. The DCF formula is expressed as follows:

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

CF₁ = Cash Flow Year 1

CF₂ = Cash Flow Year 2

CF_n = Cash Flow Year n

n = Number of Year

i = Discounted Rate

Net Present Value (NPV)

The Net Present Value (NPV) represents the difference between the present value (PV) of future cash inflows and outflows. In practice, NPV is widely used to evaluate the profitability and feasibility of potential investments or projects, serving as a key metric in capital budgeting and fund allocation decisions.

The following provides a general interpretation guideline for NPV results:

- NPV > 0: The project is accepted (profitable)
- NPV = 0: The project is at a break-even point
- NPV < 0: The project is rejected (not profitable)

A positive NPV indicates that a project or investment is expected to generate economic value, while a negative NPV suggests that it will destroy value.

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

R_t = Net Cash Flow Period of t

i = Discount Rate

t = Number of Period

Internal Rate of Return (IRR)

The Internal Rate of Return (IRR) is a metric used in financial analysis to assess the profitability of potential investments. It is the discount rate that makes the net present value (NPV) of all cash flows from a project equal to zero.

The IRR can be expressed as:

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

An alternative method to solve for IRR is the following:

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

t = Number of Period

Payback Period (PBP)

The Payback Period measures the length of time required for an investment to recover its initial cost through the cash flows it generates. The shorter the payback period, the faster the investment returns capital, making the project more attractive.

Discounted Payback Period (DPP)

The Discounted Payback Period refines the traditional payback method by accounting for the time value of money. It estimates the time required for the discounted cash flows to equal the initial investment, providing a more accurate assessment of project recovery.

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

Sensitivity Analysis

Sensitivity analysis evaluates how changes in key input variables affect the output results. In this study, eight parameters are analyzed: coal price, mining cost, non-direct production cost, inflation rate, WACC, dump truck procurement cost, interest rate, and electricity cost. Each parameter is varied using the swing method, applying a maximum deviation of +20% and a minimum deviation of -20% from the forecasted values to assess their impact on the Net Present Value (NPV). The resulting NPVs from each scenario are then compared to determine the magnitude of variation and the degree of sensitivity of each parameter. A tornado chart is utilized to visually identify which parameters exert the greatest influence on NPV, highlighting the most critical factors to consider in investment decision making.

Scenario Analysis

Scenario analysis is employed to illustrate how the most sensitive parameters identified in the sensitivity analysis influence the NPV under base, worst, and best-case scenarios. Parameters that fluctuate by more than 20% from their forecasted values are selected for this analysis. The base scenario represents the average conditions, while the best and worst scenarios are derived from empirical data covering the period 2020–2024.

Simulation Analysis

The Monte Carlo simulation is applied using the Triangular Distribution Random method, which is appropriate when the available data for influencing factors consists of fewer than 30 observations.

This simulation performs up to 1,000 iterations to estimate the mean, maximum, minimum, and probability distribution of the NPV outcomes. The results provide insights into the range and likelihood of potential outcomes, supporting data-driven decision-making in project evaluation. The Triangular Distribution Random Number formula is expressed as follows:

(formula to be inserted as specified in the model)

```
Code:
Function RandomTriangular(Minimum As Double, Mode As Double, Maximum As Double) As Double
    Dim LowerRange As Double, HigherRange As Double, TotalRange As Double, CumulativeProb As Double
    Application.Volatile
    LowerRange = Mode - Minimum
    HigherRange = Maximum - Mode
    TotalRange = Maximum - Minimum
    CumulativeProb = Rnd()
    If CumulativeProb < (LowerRange / TotalRange) Then
        RandomTriangular = Minimum + Sqr(CumulativeProb * LowerRange * TotalRange)
    Else
        RandomTriangular = Maximum - Sqr((1 - CumulativeProb) * HigherRange * TotalRange)
    End If
End Function
```

Figure 6.
The Formula of Triangular Distribution Random Number

RESULTS AND DISCUSSION

The investment project analysis is conducted based on several key assumptions related to revenue calculation, capital expenditures, operating expenses, taxes, and depreciation.

Revenue Calculation

Revenue is calculated based on the difference in production targets resulting from lost opportunities due to unplanned maintenance over the next 10 years at the ABC Power Plant. This difference is multiplied by the cost per ton, which is set at USD 31.4 per ton in accordance with the existing contract. It is assumed that the cost per ton will remain constant throughout the 10-year projection period, as shown in the table below.

Table 1.
Revenue Calculation

Year	Unit	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Opportunity Production	Ton	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538
Coal Price	Rp/ton	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420
Revenue	Rp Million	84,957	84,957	84,957	84,957	84,957	84,957	84,957	84,957	84,957	84,957

Capital Expenditure

Capital expenditures for new investments, direct trucking, and rentals are calculated based on data from similar conveyor facility purchase projects in 2020. The cost is then adjusted to reflect the current inflation rate, which is based on the average inflation value of the past five years (2.82%). Financing is assumed to be 60% debt, with instalments over a 5-year term, in line with the company's policies and direction. The estimated project cost for 2025 is as follows:

Table 2.
Capex for New Invest Conveyor Facility

In IDR

No	Description	Unit	2025
Capital Expenditure for New Invest			2,82%
	Civil Work	Ls	12,131,654,016
	Auto lubrication & Electrical System Procurement	Ls	11,409,403,976
	Mechanical Procurement	Ls	24,195,804,983
	Vibrating Feeder Including Chute & Receiving Hopper	Ls	2,601,021,930
	Instalation	Ls	1,000,000,000
Grand Total CAPEX			51,337,884,905

Table 3.
Capex for Direct Trucking

In IDR

No	Description	Unit	2025
Capital Expenditure for Direct Trucking			2,82%
	Dump Truck Procurement	Ls	19,029,439,957
	Civil Work	Ls	20,564,140,845
	Portable Coal Crusher Procurement	Ls	4,112,828,169
	Weight Bridge Procurement	Ls	1,542,310,563
Grand Total CAPEX			45,248,719,534

Operating Expenses

Operating expenses for new invest, direct trucking and rent are estimated using historical data.

Table 4.
Opex for New Invest Conveyor Facility

OPEX for New Invest		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
- Mining Cost		38,186,311,131	39,263,434,022	40,370,939,365	41,509,684,157	42,680,549,572	43,884,441,637	45,122,291,937	46,395,058,332	47,703,725,703	
- Electricity		1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	
- Planned Maintenance		16,075,861,500	5,000,000,000	5,141,035,211	5,286,048,609	5,435,152,405	5,588,461,979	5,746,095,962	5,908,176,333	6,074,828,513	
- Non Direct Production Cost		12,909,696,999	13,273,841,368	13,648,257,172	14,033,234,139	14,429,070,167	14,836,071,559	15,254,553,256	15,684,839,084	16,127,262,003	
- Interest	8.71%	2,682,917,865	2,232,024,391	1,741,858,095	1,208,998,314	629,726,447	-	-	-	-	-
- Depreciation		2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	2,053,515,396	
- Royalty	6%	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	
Total Operating Cost		0	78,174,834,060	68,089,346,346	69,222,136,408	70,358,011,784	71,494,545,157	72,629,021,740	74,442,987,720	76,308,120,316	78,225,862,785

Table 5.
Opex for Direct Trucking

OPEX for Direct Trucking		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
- Mining Cost		40,225,221,503	41,359,856,025	42,526,495,232	43,726,041,880	44,959,424,190	46,227,596,568	47,531,540,338	48,872,264,505	50,250,806,535	
- Electricity		584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	
- Planned Maintenance		2,000,000,000	2,056,414,085	2,114,419,443	2,174,060,962	2,235,384,791	2,298,438,385	2,363,270,533	2,429,931,405	2,498,472,583	
- Non Direct Production Cost		12,909,696,999	13,273,841,368	13,648,257,172	14,033,234,139	14,429,070,167	14,836,071,559	15,254,553,256	15,684,839,084	16,127,262,003	
- Interest	8.71%	2,364,698,083	1,967,284,898	1,535,257,024	1,065,599,522	555,034,853	-	-	-	-	-
- Depreciation		1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	
- Royalty	6%	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	
Total Operating Cost		0	64,991,533,782	66,149,313,573	67,316,346,069	68,490,853,701	69,670,831,199	70,854,023,710	72,641,281,325	74,478,952,192	76,368,458,319

Table 6.
Opex for Rent

OPEX for Rent		2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
- Mining Cost		38,186,311,131	39,263,434,022	40,370,939,365	41,509,684,157	42,680,549,572	43,884,441,637	45,122,291,937	46,395,058,332	47,703,725,703	
- Electricity		1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	1,169,125,506	
- Rental Cost		25,000,000,000	25,705,176,056	26,430,243,043	27,175,762,026	27,942,309,894	28,730,479,809	29,540,881,667	30,374,142,565	31,230,907,287	
- Non Direct Production Cost		12,909,696,999	13,273,841,368	13,648,257,172	14,033,234,139	14,429,070,167	14,836,071,559	15,254,553,256	15,684,839,084	16,127,262,003	
- Royalty	6%	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	
Total Operating Cost		0	82,362,539,299	84,508,982,616	86,715,970,750	88,985,211,491	91,318,460,802	93,717,524,175	96,184,258,030	98,720,571,151	101,328,426,163

Tax and Depreciation

According to Government Regulation No. 18 of 2025 issued by the Republic of Indonesia, the applicable corporate income tax rate for coal mining businesses is set at 22%. Depreciation is calculated using the straight-line method with an assumed salvage value of zero.

Table 7.
Income Statement Projection for Direct Trucking

Capital Expenditure	IDR Million	45,248
Bank Loan Installment	60%	27,149
Lifetime	Year	10
Salvage Value	%	0

Variable	Unit	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034
Depreciation	IDR Million	-	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809
Salvage Value	IDR Million	-	-	-	-	-	-	-	-	-	-
Total Depreciation	IDR Million	-	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809	1,809

Income Statement Projection

After we chose the assumptions, we calculated a financial projection for the next 10 years from the New Invest, Direct Trucking, and Rental schemes.

Table 8.
Income Statement Projection for Direct Trucking

Cashflow for Direct Trucking:			Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Revenue (+)			84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057	84,956,761,057
	Coal Volume	ton	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538	182,538
	Coal Price	Rp/ton	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420	465,420
Total Operating Cost (-)			-	66,149,313,732	67,316,346,069	68,490,853,701	69,670,831,199	70,854,023,710	72,041,281,325	73,231,540,338	74,427,596,568	75,624,264,505	76,821,048,319
- Mining Cost			40,225,221,503	41,359,856,025	42,526,495,232	43,726,041,880	44,959,424,190	46,227,596,568	47,531,540,338	48,872,264,505	50,250,806,535	51,668,233,158	53,116,823,158
- Electricity			584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753	584,562,753
- Planned Maintenance			2,000,000,000	2,056,414,085	2,114,419,443	2,174,060,962	2,235,364,791	2,298,438,385	2,363,270,533	2,429,951,405	2,498,472,583	2,568,947,105	2,640,484,105
- Non Direct Production Cost			12,909,696,999	13,273,841,368	13,648,257,172	14,033,234,139	14,429,070,167	14,836,071,559	15,254,553,256	15,684,839,084	16,127,262,003	16,620,000,000	17,127,262,003
- Interest	8.71%		2,364,698,083	1,967,284,898	1,535,257,024	1,065,599,522	555,034,853	-	-	-	-	-	-
- Depreciation			1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781
- Royalty	6%		5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663	5,097,405,663
Net Income Before Tax			-	18,807,447,484	17,640,414,988	16,465,907,356	15,285,929,857	14,102,737,347	12,915,479,731	11,717,808,866	10,514,339,738	9,300,948,319	8,079,692,319
Tax (-)	22%		-	4,137,633,446	3,880,891,297	3,622,459,618	3,362,904,569	3,102,602,216	2,709,405,541	2,305,117,950	1,898,426,602	1,482,009,631	1,059,692,319
Net Income After Tax			-	15,572,877,274	14,669,809,038	13,795,523,891	12,843,407,738	11,923,025,289	11,000,135,131	9,606,074,191	8,172,690,914	6,688,876,136	5,183,489,401

Cash Flow Projection

From the net income after tax, we create financial projections for the next 10 years for cash flow from operating activity, cash flow from investing activity, and cash flow from financing activity of New Investments, Direct Trucking, and Rent.

Table 9.
Cash Flow Projection for Direct Trucking

Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10	
Cash flow from operating activity												
Net Profit		15,572,877,274	14,669,809,038	13,759,523,691	12,843,407,738	11,923,025,289	11,000,135,131	9,606,074,191	8,172,690,914	6,698,876,136	5,183,489,401	
Depreciation		1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	1,809,948,781	
(Increase)/Decrease in Account Receivables		-	-	-	-	-	-	-	-	-	-	
(Increase)/Decrease in Inventory		-	-	-	-	-	-	-	-	-	-	
Increase/(Decrease) in Account Payables		-	-	-	-	-	-	-	-	-	-	
Increase/(Decrease) in Accruals		-	-	-	-	-	-	-	-	-	-	
Total Cash Flow from Operating Activities		17,382,826,056	16,479,757,819	15,569,472,472	14,653,356,519	13,732,974,070	12,810,083,912	11,416,022,972	9,982,639,696	8,508,824,917	6,993,438,183	
Cash flow from investing activity												
(Increase)/Decrease in Marketable Securities		-	-	-	-	-	-	-	-	-	-	
(Increase)/Decrease in Land		-	-	-	-	-	-	-	-	-	-	
(Increase)/Decrease in Plant & Equipment		(45,248,719,534)	-	-	-	-	-	-	-	-	-	
Total Cash Flow from Investing Activities		(45,248,719,534)										
Cash flow from financing activity												
Increase/(Decrease) in Long-Term Debt		27,149,231,720	(4,562,723,137)	(4,960,136,322)	(5,392,164,196)	(5,861,821,698)	(6,372,386,367)	-	-	-	-	
Total Cash Flow from Financing Activities		27,149,231,720	(4,562,723,137)	(4,960,136,322)	(5,392,164,196)	(5,861,821,698)	(6,372,386,367)					
Net Cash Flow		(18,099,487,814)	12,820,102,918	11,519,621,497	10,177,308,276	8,791,534,822	7,360,587,703	12,810,083,912	11,416,022,972	9,982,639,696	8,508,824,917	6,993,438,183

WACC Calculation

The calculation of WACC:

$$WACC = \left(\frac{40\%}{100\%} \times 12.025\% \right) + \left(\frac{60\%}{100\%} \times 5.674\% \right) = 8.89\%$$

Capital Budgeting Analysis

We calculate NPV using the DCF Method for new investment, direct trucking, and rent. Based on the analysis, Direct Trucking is significantly more profitable than New Investment in a New Conveyor Facility and Renting. Besides NPV, we also calculate the IRR, the payback period, the discounted payback period, and the profitability index in the table below:

Table 10.
IRR, PBP, discounted PBP, and the PI for Direct Trucking

Discount Rate		8.89%									
Description	Year 0	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7	Year 8	Year 9	Year 10
Net Cashflow	(18,099,487,814)	12,820,102,918	11,519,621,497	10,177,308,276	8,791,534,822	7,360,587,703	12,810,083,912	11,416,022,972	9,982,639,696	8,508,824,917	6,993,438,183
Cumulative Cashflow	(18,099,487,814)	(5,279,384,896)	6,240,236,601	16,417,544,877	25,209,079,699	32,569,667,402	45,379,751,314	56,795,774,286	66,778,413,981	75,287,238,899	82,280,677,081
Present Value Cashflow	(18,099,487,814)	11,773,834,016	9,716,078,258	7,883,373,835	6,254,178,752	4,808,885,961	7,686,176,592	6,290,709,279	5,051,921,280	3,954,641,896	2,985,071,329
Cumulative Present Value Cashflow	(18,099,487,814)	(6,325,653,798)	3,390,424,460	11,273,798,294	17,527,977,046	22,338,863,007	30,023,039,599	36,313,748,878	41,365,670,158	45,320,312,054	48,305,383,383
NPV (Rp Billion)		48.31									
IRR		62.04%									
Payback Period		1.46									
Discounted Payback Period		1.65									
Profitability Index		2.67									

Risk Analysis

We identify and assess potential risks that could impact the viability and profitability of the investment project through the application of sensitivity analysis, scenario analysis, and simulation techniques.

Sensitivity Analysis

As shown in Table 11 and Figure 7, the Tornado Chart highlights that Coal Price, Mining Costs, and Indirect Production Costs are the most influential factors affecting NPV. Among these, coal price has the highest impact an increase in the price per ton of coal leads to a corresponding rise in NPV.

Table 11.
Calculation for Sensitivity Variable

Variable	Unit	Current	+20%	Base	-20%	Current	+20%	-20%	%+20%	%-20%
		Assumptio	Swing		Swing	NPV	Swing NPV	Swing NPV	Swing NPV	Swing NPV
Electricity	Rp Billion	0.58	0.70	0.58	0.47	48.31	47.72	48.89	-1%	1%
Interest	%	8.71%	10.45%	8.71%	6.97%	48.31	47.35	49.24	-2%	2%
Dump Truck Procurement	Rp Billion	19.03	22.84	19.03	15.22	48.31	46.00	50.61	-5%	5%
WACC	%	8.89%	10.66%	8.89%	7.11%	48.31	43.69	53.50	-10%	11%
Inflation Rate	%	2.82%	3.38%	2.82%	2.26%	48.31	41.22	55.20	-15%	14%
Non Direct Production Cost	Rp Billion	14.68	17.61	14.68	11.74	48.31	33.82	62.79	-30%	30%
Mining Cost	Rp Billion	45.73	54.88	45.73	36.59	48.31	2.68	93.44	-94%	93%
Coal Price	Rp/ Million Ton	0.47	0.56	0.47	0.37	48.31	128.66	35.08	166%	-173%

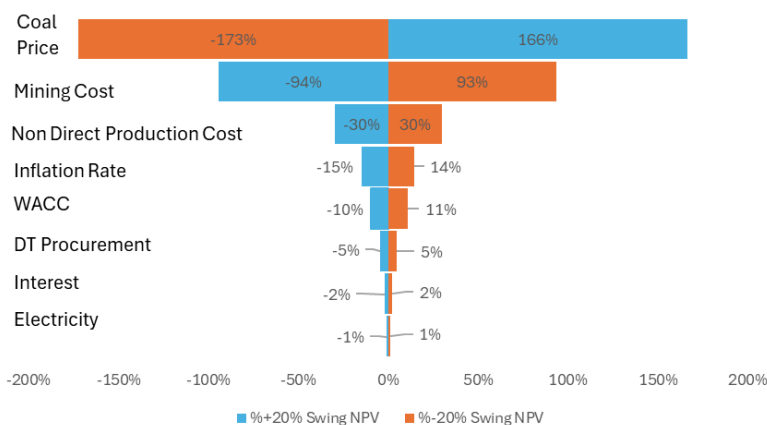


Figure 7.
Tornado Chart Sensitivity Analysis

Scenario Analysis

Following the sensitivity analysis, parameters with fluctuations exceeding 20% from the forecasted values namely coal price, mining cost, and indirect production cost were identified. These variables were then analyzed further using Scenario Analysis to evaluate the NPV outcomes under three different conditions: Worst Case, Base Case, and Best Case.

Table 12.
Scenario Analysis

Variable	Unit	Worst	Base	Best
Coal Price	Rp/ Million Ton	0.29	0.47	0.76
Mining Cost	Rp Billion	63.32	45.73	38.28
Non Direct Production Cost	Rp Billion	19.90	14.68	12.51
Inflation Rate	%	5.95%	2.82%	1.32%
NPV	Rp Billion	-283.05	51.22	376.66
IRR	%	-	60.13%	314.20%
MIRR	%	-	24.54%	48.41%
Payback Period	Year	-	1.55	0.32
Discounted Payback Period	Year	-	1.76	0.35
Profitability Index	x	-15.18	2.83	21.12

The results of the scenario analysis indicate that, among the three conditions, the best case scenario yields the highest NPV compared to both the base case and worst case scenarios, as presented in Table 12.

Figure 8 shows that the NPV distribution follows a normal curve, with kurtosis and skewness values near zero. The majority of NPV values are close to the average, and the probability of NPV being less than 0 is 6%. With a 94% probability of NPV being greater than 0, this investment is considered a viable option.

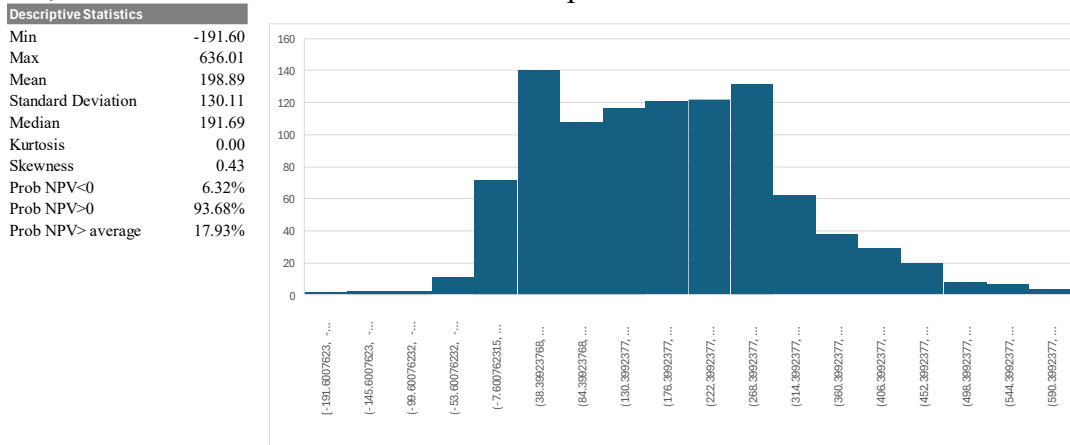


Figure 8.
Simulation Analysis Result

Business Solution:

A Discounted Cash Flow (DCF) analysis evaluated three business options: new investment in a conveyor facility, direct trucking, and renting. The goal was to identify the most profitable option based on net present value (NPV). The analysis revealed that direct trucking provides the highest NPV of 48.31 billion Rupiah, compared to renting at -40.38 billion Rupiah and a newly invested conveyor facility at 27.16 billion Rupiah. Direct trucking generates higher income after adjusting for the time value of money. Sensitivity analysis indicates that coal price fluctuations significantly impact business decisions. Changes in coal cost per ton can affect NPV by $\pm 166\%$ with a swing of $\pm 20\%$, highlighting the need for monitoring and optimization to maximize profits. Additionally, the cycle time for the dump truck's loading and unloading must be calculated to ensure smooth production and profitability in line with the investment project analysis.

Implementation Plan & Justification:

The implementation plan for direct trucking, based on the investment project analysis, is as follows:

1. **Procurement of dump trucks:**
 - o One fleet consisting of six dump trucks, each with a 42 cubic meter capacity.
2. **Build supporting facilities for coal transport:**
 - o Road, portable coal crusher, and weight bridge for coal transport.
 - o The project is scheduled to start in July 2025, with additional revenue expected from 2025 to 2035.
3. **Risk Management:**

- **Safety:** Hazard risk assessments will be conducted during the project design phase to identify potential accidents and implement mitigation measures.
- **Project:** Ensure coordination between divisions to minimize disruptions and ensure the project progresses according to plan.



Figure 9.
Layout for Direct Trucking Coal Transport

No	Task Name	Division in Charge	Jul-25	Aug-25	Sep-25	Oct-25	Nov-25	Dec-25	Jan-26	Feb-26	Mar-26	Apr-26	May-26
1	Engineering & Procurement	Infrastructure Development Division, Engineering Division, and Procurement Division	█	█	█	█	█	█	█				
2	Civil Work	Infrastructure Development Division, Engineering Division, and Safety, Health, & Environment Division			█	█	█	█					
3	Mechanical Work	Infrastructure Development Division, Engineering Division, and Safety, Health, & Environment Division				█	█	█	█				
4	Electrical System Installation	Infrastructure Development Division, Engineering Division, and Safety, Health, & Environment Division					█	█	█				
5	Commissioning	Infrastructure Development Division, Engineering Division, and Safety, Health, & Environment Division							█	█	█		

Figure 10.
Project Timeline for Direct Trucking Coal Transport

CONCLUSION

According to the analysis of investment projects conducted in this research, we use the DCF Method to calculate NPV, IRR, PBP, Discounted PBP, and Profitability Index. Rental options have negative NPV (NPV<0) while direct trucking has the best NPV of 48.31 Rp Billion, IRR 62.04%, Payback Period of 1.46, Discounted Payback Period of 1.65, and profitability index of 2.67. We conducted a Sensitivity analysis using eight variables/parameters. Of these, the most sensitive to NPV is the Coal Price, with ±166%. Using scenario analysis, the NPV for the optimist condition is 335.35 billion Rupiah; for the pessimist condition, it is -193.79 billion Rupiah. Using Monte Carlo simulation, the probability of NPV < 0 is 6%, NPV > 0 is 94%, and the probability of NPV > average is 18%.

Based on the findings of this study, we recommend that the company take the following action to increase profitability: The NPV of direct trucking coal transport is higher than the new investment in conveyors, rent, existing equipment, and CAPEX values, which can increase a company's profits, to obtain a more favorable NPV, a long-term contract scheme with ABC Powerplant should be established, and the agreement for the coal price for PT XYZ should be above 32 \$/ton, use a long-term contract in mining with a vendor so the mining cost will become more controllable and much lower, and restricted employee hiring

that does not correlate to core business. Use workload analysis and efficiency so the non-direct production cost increase is insignificant.

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