Financial Feasibility Analysis of Borrow-to-Use Permit of Forest Area to Maximize Coal Reserve in PT. XYZ

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Abstract. PT. XYZ is a coal mining company located in East Kalimantan. The challenges and uncertainty of the future business pushed the company to develop strategies to increase the profit received. One opportunity is to propose a Borrow-to-Use Permit (PPKH) in an area that overlaps between PT. XYZ Coal Contract of Work (CCOW) and Production Forest to maximize the company's coal reserves. Before applying for the permit, the company must determine the feasibility of the project, as several payments required for the permit will increase the company's operating costs. The purpose of this paper is to analyze the financial feasibility of this project using the capital budgeting method, as well as to assess the risk associated with the project via sensitivity analysis and Monte Carlo simulation. The outcome of this study shows that the project is financially feasible to be executed with incremental cashflow‘s NPV greater than 0 which is US$ 76.764.736, and the risk analysis shows that the project will have a 69.6% probability of giving more value to the company, it still meets the level of acceptance set by PT. XYZ.

Keywords: Capital Budgeting; Borrow-to-Use Permit; Risk Analysis

1 Introduction

Indonesia is a major producer and exporter of coal especially thermal coal. Coal is the primary source of energy for electricity generation and is a necessary component for steel and cement production. The volatile and unpredictable nature of coal prices increases the risk associated with doing business in the coal mining industry. From early 2011 to mid-2016, the decline in global economic activity resulted in a significant drop in coal prices. Besides the global economic issues, the government's regulations also increase the challenges in the coal mining industry. Because of the uncertainty of the business, companies were forced to increase production efficiency through technical, administrative, and management of innovations to address the industry's challenges. PT. XYZ is an Indonesian mining company located in East Kalimantan. Coal is the primary product of PT. XYZ, and contributes significantly to national economic growth through tax and royalty payments. PT. XYZ operates several Production Areas, with Production Area B currently being one of them. In coal mining activities, before getting the coal, there are amounts of overburdened (waste) material that should be removed first. The waste material was then moved to the waste dump

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area using a dump truck which is mostly located outside the reserve (pit design) boundary. In production Area B, there is a problem which is not enough waste dump capacity available to accommodate all waste materials that should be removed. PT. XYZ needs to find a new location for the waste dump with enough capacity to maximize the coal recovery. Otherwise, some amount of coal could not be mined and will be left when the production in Area B is finished.

There is an opportunity for the company to utilize an area where there is an overlap between PT. XYZ Coal Contract of Work (CCoW) boundaries with Production Forest Area. To ensure production continuity by maximizing coal reserves in Project Area B, PT. XYZ needs to propose to the government a borrow-to-use permit at a forestry area (PPKH) in the overlapped area. The area will be used for waste dump locations as well as supporting infrastructures such as topsoil stockpiles and compliance points for water management. To use the area, PT. XYZ should complete some obligations and pay the government a leasing fee in the form of Non-Tax State Revenue (PNBP), depending on the proposed area's utilization and size which will increase the company's expenses. The approved new waste dump area is expected to help maximize the coal reserve in Production Area B. Before the permit is proposed to the government, an analysis is required to determine whether the proposed PPKH projects will give additional benefits to the company's profits. With the study conducted PT. XYZ should get a better picture of the feasibility of the project after reviewing the developed scenarios. The study is being conducted through financial analysis, and it is expected to provide information on the risk of the proposed project.

2 Literature Review

A feasibility study compares the costs and revenues resulting from the company's activity. With a feasibility study conducted before the initiation of an investor's investment, the investor will be aware of the project's expected profitability in advance [5]. A financial feasibility study is a quantitative tool for assessing the operating performance and financial condition of an investment [2]. Capital budgeting analysis is a popular technique for conducting feasibility studies. Capital budgeting is the process of analyzing and selecting the best investment that will generate revenue for a company, with the decision area encompassing new project development (expansion) or replacement projects [2]. While project development generates cash flow from a new line of business, replacement generates cash flow as a substitute from an existing one [4]. As a result, the opportunity cost will be incurred in the replacement project. A Free Cash Flow analysis is the best method for calculating the costs and benefits of capital budgeting opportunities [6]. Free cash flow can be used in two ways: free cash flow to the firm (FCFF), which is the cash flow available to both debt and equity holders, and free cash flow to the equity (FCFE), which is the cash flow available only to equity holders.

The Weighted Average Cost of Capital (WACC) must be calculated in order The Weighted Average Cost of Capital (WACC) must be calculated to determine the expected return on investment for investors. WACC is the expected cost of capital for the company's various capital sources, including debt and equity, weighted to reflect the relative weight of debt and equity in the total capital structure. The WACC of a business is generally defined as the required rate of return on the entire enterprise [1]. Internal Rate of Return (IRR), Modified Internal Rate of Return (MIRR), Payback Period, Discounted Payback Period, Net Present Value (NPV), and Profitability Index are the most frequently used methods for evaluating

long-term asset investments [2]. However, the project will be analyzed in this study using NPV techniques. The NPV is the net present value of future cash inflows and outflows generated by an investment project. It is used to determine the viability of a business venture [1]. A positive net present value suggests that the plan should be accepted, whereas a negative net present value suggests that it should be rejected. When the NPV is greater than zero, the investment is considered acceptable because the investor will receive a return greater than the initial investment, thereby profiting from the investment.

Capital budgeting assumes that the risk level of investment projects for the firm is similar. In other words, it was assumed that all projects were equally risky and that accepting one had no bearing on the company's overall risk [1]. Variability must be taken into account when determining the risk and return on investment of a project. Sensitivity analysis is a behavioral technique for identifying sensitive variables by examining a range of possible values for a given variable. Sensitivity analysis considers only one parameter at a time, but all parameters may change concurrently. The company can prevent this constraint by utilizing scenario analysis, which takes all parameters into account simultaneously to determine the effect of various scenarios, including optimistic, most likely, and pessimistic scenarios [7]. Simulation analysis can be used to assess the risk associated with a project [1]. Monte Carlo simulation is frequently used to describe the process of modeling and simulating a random-effects framework: various random scenarios are constructed and pertinent statistics are obtained to evaluate the framework [8].

3 Methodology

This study concentrated on financial analysis to resolve the business issue. The first step of this study was collecting primary and secondary data related to the business issue. The primary data was gathered through interviews and observations with the strategic development division in PT. XYZ, while the secondary data was gathered from historical data and other published sources such as journals, statistics data, and books to support the primary data. The next step was conducting the financial analysis from the collected data. The financial analysis in this study was developed to compare two production scenarios: Scenario A, which maintains the current production plan and assumptions without implementing the forestry permit, and Scenario B, which projects the production plan as the result of implementing the forestry permit's parameters and assumptions.

The primary and secondary data of the production plan in each scenario were collected and analyzed to develop the pro forma financial statement for the life of the project's duration of each Scenario A and Scenario B. Then the financial statement was used to generate each of the Scenario's Free Cash Flow to The Firm (FCFF). The incremental FCFF was then calculated by subtracting the FCFF obtained from implementing the permit (Scenario B) with the FCFF without implementing the permit (Scenario A). The incremental cash flow projected from both scenarios will be analyzed to determine whether or not the proposed project is financially feasible. Capital budgeting techniques such as Net Present Value (NPV) have been used to determine the project's incremental value. NPV calculation will use the Weighted Average Cost of Capital (WACC) calculation to discount the future cash flow into present value in 2022.

4 Results and Discussion

The data and assumptions collected have been developed to generate financial statements such as pro forma income statements and balance sheets. The revenue of the project was calculated from coal production data multiplied by forecasted coal price. The calculation uses the annual historical Newcastle 6,322 kcal/kg GAR coal price forecasted using Moving Average (MA3) combined with Auto Regression. The additional cost impacted by the implementation of the permit in the form of Non-Tax Revenue (PNBP) payment to the government, rehabilitation, compensation of forest investment, and community development will be included in Cost of Good Sold (COGS).

Table 1. Production & Parameters Data Comparison

Year		2023	2024	2025	2026	2027	2028	2029	2030	2031
Overburden Removed (kbcm)	No PPKH	101,601	80,154	80,154	80,154	80,154	80,154	80,154	74,876	48,233
	PPKH	101,601	101,601	101,601	101,601	101,601	101,601	101,601	96,323	69,679
Coal Production (kton)	No PPKH	11,699	7,431	10,426	7,915	8,730	10,690	10,062	13,778	10,961
	PPKH	11,699	10,141	13,135	10,624	11,440	13,399	12,772	16,487	13,670
Waste Dump Hauling Distance (meters)	No PPKH	3,417	3,406	3,013	3,024	3,074	3,524	2,651	2,886	2,711
	PPKH	3,417	3,524	3,425	3,024	2,939	2,914	2,651	2,886	2,711
IPPKH Cost (in thousand US$)	No PPKH	-	-	-	-	-	-	-	-	-
	PPKH	2,635	515	2,924	4,935	5,567	4,394	9,312	1,794	4,701
Investment (in thousand US$)	No PPKH	14,771	2,860	4,013	3,046	3,360	4,114	3,873	5,303	4,218
	PPKH	23,682	9,676	5,055	4,089	4,403	5,157	4,915	6,345	5,261

Production Area B currently has been operating for six years, and the financial analysis was focused on the periods where there were changes in parameters between Scenario A and Scenario B. The evaluation period of this study was nine years from 2023 until 2031 when the changes in cash flow occur between the two scenarios. The major changes in production data between both scenarios are in waste material to be removed, coal production and waste removal hauling distance as the impact of new overburden (waste) dump location availability. To support the project, there will also be a change in the capital for land compensation and infrastructure construction as seen in Table 1. In both scenarios, the project will be fully paid using equity, so there will be no debt incurred. From the financial statement, Free Cash Flow to the Firm (FCFF) was then calculated as seen in Table 2 and Table 3. In this analysis, the value of Free Cash Flow to the Firm (FCFF) and Free Cash Flow to Equity (FCFE) were the same because there would be no debt allocated to the project.

4.1 Free Cash Flow (FCF)

a) Scenario A. This scenario was assumed as the base case, which represents the current conditions of PT. XYZ without implementing the permit. The FCFF resulting from Scenario A can be seen in Table 2.

Table 2. Free Cash Flow to the Firm without Implementing PPKH. (in thousand US$)

Scenario A (No PPKH)	2023	2024	2025	2026	2027	2028	2029	2030	2031
Earnings Before Interest and Taxes (EBIT)	268,164	39,362	145,933	53,543	120,500	128,526	111,801	259,578	247,024
Tax of EBIT	53,633	7,872	29,187	10,709	24,100	25,705	22,360	51,916	49,405
Net Operating Profit After Tax	214,531	31,490	116,746	42,835	96,400	102,821	89,441	207,662	197,620
Profit Sharing	21,453	3,149	11,675	4,283	9,640	10,282	8,944	20,766	19,762
Net Operating Profit After Profit Sharing	193,078	28,341	105,071	38,551	86,760	92,539	80,497	186,896	177,858
Depreciation & Amortization	-	1,204	1,613	2,282	2,891	3,731	5,102	7,039	16,560
Operating Cash Flow	193,078	29,545	106,684	40,833	89,651	96,270	85,599	193,935	194,417
Net Current Asset Investment	181,804	(99,789)	38,037	(33,935)	23,405	12,575	(12,648)	46,214	(39,292)
Net Fixed Asset Investment	14,771	2,860	4,013	3,046	3,360	4,114	3,873	5,303	4,218
Free Cash Flow to the Firm (FCFF)	**(3,497)**	**126,474**	**64,635**	**71,722**	**62,885**	**79,580**	**94,375**	**142,418**	**229,491**

b) Scenario B. This scenario was developed by assuming implementation of the permit (PPKH), so there are several changes in input parameters compared to Scenario A as seen in Table 1. The FCFF from Scenario B can be seen in Table 3.

Table 3. Free Cash Flow to the Firm Implementing PPKH. (in thousand US$)

Scenario B (PPKH)	2023	2024	2025	2026	2027	2028	2029	2030	2031
Earnings Before Interest and Taxes (EBIT)	265,529	77,149	162,640	88,044	171,631	181,505	138,160	290,397	278,136
Tax of EBIT	53,106	15,430	32,528	17,609	34,326	36,301	27,632	58,079	55,627
Net Operating Profit After Tax	212,423	61,720	130,112	70,435	137,305	145,204	110,528	232,318	222,509
Profit Sharing	21,242	6,172	13,011	7,044	13,731	14,520	11,053	23,232	22,251
Net Operating Profit After Profit Sharing	191,181	55,548	117,101	63,392	123,575	130,683	99,475	209,086	200,258
Depreciation & Amortization	-	1,204	2,586	3,429	4,247	5,347	7,066	9,524	21,131
Operating Cash Flow	191,181	56,752	119,687	66,821	127,821	136,031	106,542	218,610	221,389
Net Current Asset Investment	181,804	(65,093)	33,324	(34,631)	25,195	8,794	(12,335)	43,761	(35,110)
Net Fixed Asset Investment	23,682	9,676	5,055	4,089	4,403	5,157	4,915	6,345	5,261
Free Cash Flow to the Firm (FCFF)	**(14,305)**	**112,169**	**81,308**	**97,363**	**98,224**	**122,080**	**113,961**	**168,504**	**251,238**

c) Incremental Cash Flow. By subtracting FCFF from Scenario B to FCFF from Scenario A, the incremental cash flow from both scenarios was calculated. The Incremental Free Cash Flow will show the gains received by the company from implementing the permit compared to the current production plan without the permit, as shown in Table 4.

Table 4. Incremental Free Cash Flow to the Firm. (in thousand US$)

	2023	2024	2025	2026	2027	2028	2029	2030	2031
FCFF Scenario A (No PPKH)	(3,497)	126,474	64,635	71,722	62,885	79,580	94,375	142,418	229,491
FCFF Scenario B (PPKH)	(14,305)	112,169	81,308	97,363	98,224	122,080	113,961	168,504	251,238
Incremental Cash Flow (B-A)	**(10,808)**	**(14,305)**	**16,674**	**25,641**	**35,339**	**42,500**	**19,586**	**26,086**	**21,747**

4.2 Weighted Average Cost of Capital (WACC)

a) Cost of Equity. This study used the Capital Asset Pricing Method (CAPM) to calculate the cost of equity, this method required several parameters such as risk-free rate, beta, and risk premium. The risk-free rate was collected from 10 Years of Indonesia's government bond yields to maturity data in October 2021 which is 6,37% [11]. Data on equity risk premium and beta for individual markets were collected from Damodaran´s website which was updated in January 2021. According to Damodaran, the Beta of the mining & energy

industry is 0.83% and the Equity Risk Premium in Indonesia is 6.56% [9] [10]. From the calculation, the cost of equity used for this project is 11.82% (1).

$$r_e = R_F + (\beta_L * ERP)$$
$$r_e = 6.37\% + (0.83\% * 6.56\%)$$
$$r_e = 6.37\% + (5.44\%)$$
$$r_e = 11.82\% \quad (1)$$

b) Cost of Capital. After calculating the cost of equity, the next step of the analysis was calculating the cost of capital. In the period of analysis, the project will be funded 100% from equity. The project does not require big initial investment because it has already been operating for years. In this study, because there will be no debt required, refers to Weighted Average Cost of Capital (WACC) calculations, the cost of capital was equal to the cost of equity which is 11.82% (2).

$$WACC = (0\% \times Cost\ of\ Debt) + (100\% \times Cost\ of\ Equity)$$
$$WACC = 0 + 11.82\%$$
$$WACC = 11.82\% \quad (2)$$

4.3 Feasibility Analysis

In capital budgeting, the Net Present Value (NPV) parameter was used to check whether the project is feasible or not. For the NPV calculation, the future incremental free cash flow was discounted using WACC at 11.82%. The result of Net Present Value (NPV) in 2022, calculated from the incremental Cash Flow, is greater than 0, which is US$ 76.764.736. With a positive NPV, it showed that the project in Scenario B will give more value to PT. XYZ compared to Scenario A. In other words, implementing Project Scenario B (PPKH) will be feasible for PT. XYZ.

4.4 Risk Analysis

After the feasibility of the projects was analyzed, a risk analysis was conducted to check the sensitivity of the given variables or parameters to the incremental value of the project. Risk analysis in this study included Sensitivity Analysis and Monte Carlo Simulation.

a) Sensitivity Analysis

The analysis included changing the values of input parameters by 20% higher or lower than what was assumed. The result of this analysis helped this study to focus only on risks that have a high impact on the project's incremental value. The result of the sensitivity analysis can be seen in Figure 1 and Figure 2.

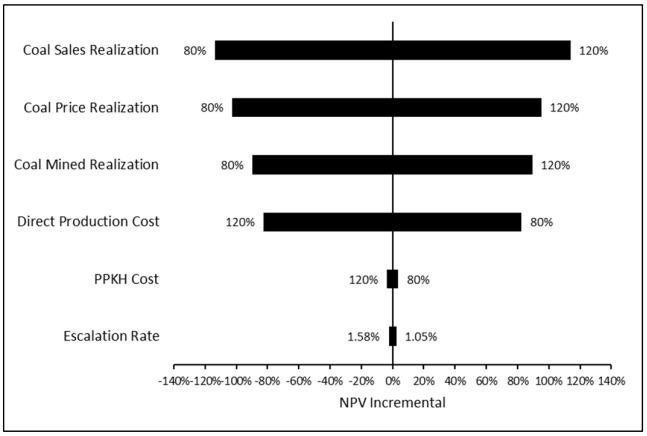

Fig. 1. Tornado Diagram of Sensitivity

In the Tornado Diagram and Spider Chart, the impact of 20% changes in input parameters on the incremental NPV could be seen. From sensitivity analysis as seen in Figure 1, by comparing the input parameter changes to their effect on incremental NPV, the biggest influence came from four parameters, which are coal sales realization, coal mined realization, coal price realization, and direct production cost. These four input parameters should be getting more attention from the company to ensure the success of the project. Whether the input value was directly proportional or inversely to the incremental NPV also could be seen in Figure 2. For example, the increase in the coal sale realization, coal price realization, coal mined realization increased incremental NPV; and the increase of direct production cost, PPKH cost, and escalation rate resulted in the reduction of incremental NPV.

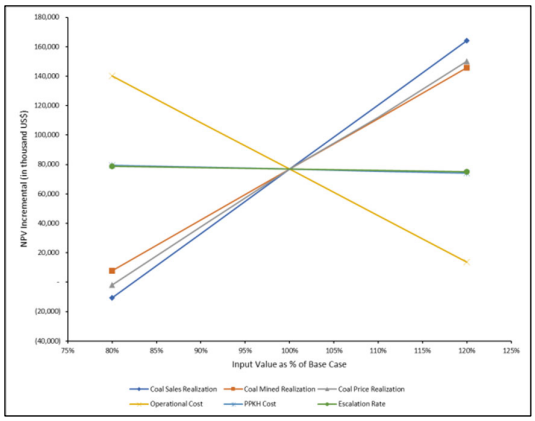

Fig. 2. Spider Chart of Sensitivity

b) Monte Carlo Simulation

The four most influential parameters were then analyzed using Monte Carlo simulation to model the probability of every possible result that appears based on the changes in the parameters that affected the simulation results.

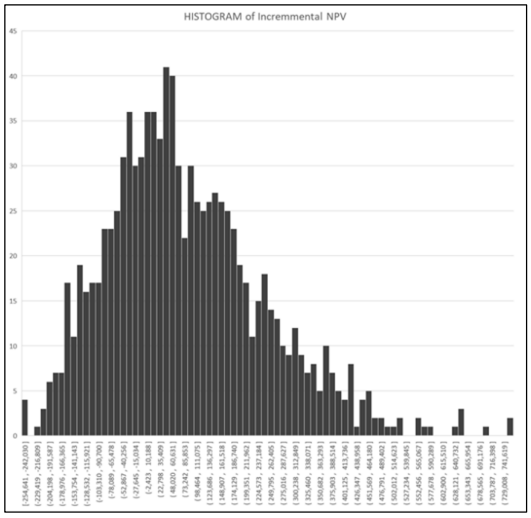

Fig. 3. Histogram of NPV Distribution, Monte Carlo Simulation

In this study's Monte Carlo, 1000 simulation data were generated from four sensitive parameter inputs that were randomly calculated to simulate the process of sampling for probability distributions. Company historical data from 2010 to 2020 was used for the input scenario of this analysis. The Monte Carlo simulation resulted in a 69.6% probability that this project (Scenario B) will give a bigger value to PT. XYZ compared to the existing Scenario A. The result of the Monte Carlo simulation could be seen in the histogram of incremental NPV in Figure 3.

5 Conclusions

The analysis showed that PT. XYZ will need to propose a Borrow-to-Use Permit of forest area (PPKH) for an overburden (waste) dump location to maximize the coal reserves in Production Area B. Before proposing the permit to the government, a financial analysis needs to be conducted to assess the feasibility of the project. Using capital budgeting technique analysis, the incremental NPV from both of the project's scenarios is US$ 76.764.736. Based on the decision criteria rule, a positive incremental NPV means that the project Scenario B will give a bigger value if compared to Scenario A. From the financial feasibility analysis, it can be concluded that implementing the PPKH project will give more value to the company. After the financial analysis had been conducted, a risk analysis was then performed to check the influence of several input parameters on the incremental value. The sensitivity analysis showed that four input parameters highly influence the feasibility of the project, which are: coal sales realization, coal mined realization, coal price realization, and operational cost. Then, the four sensitive parameters were then further analyzed with Monte Carlo Simulation. Monte Carlo Simulation analysis showed a 69.6% probability that implementing the PPKH project will give more value to the company, so the project implementation will be categorized as low risk.

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