

Valuation for High-Risk Coal Mining Project Case Study: PT. Berau Coal Block Parapatan

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Abstract

The coal mining industry is a high-cost and high-risk business and is significantly exposed to high turbulence of uncertainties. Valuation and assessment of a business project that is described as having high complexity and uncertainty requiring a comprehensive analysis. Parapatan Block of Binungan Site, part of CCoW of PT. Berau Coal is an active mining area in the last year, which previously stopped operating for six years. The valuation method used by PT Berau Coal to value a Mining Project is Discounted Cash Flow (DCF). Both the DCF and RO methods are used to evaluate the economical feasibility of the planned project of Parapatan Block of Berau Coal. The studied mining project is financially feasible by providing the positive value of NPV for all three technical scenario options, reviewed with the DCF valuation methods, the base 4-year production period (base option), 18 years production period with LCT Moda (option-1), and 18 years production period with bridge Moda (option-2). Provide the NPV as US\$ 10.62 million for base option, US\$ 10.10 million for option-1, and US\$ 8.30 million for option-2. Further studies to optimize coal reserves mining using the Real Options method resulted in an option-1 scenario as an option that could be proposed to management. Option-1 provides the best average NPV value supported by the Expand Option scenario, a technical scenario in the form of accelerating investment and increasing production of the Parapatan Pit mine. Option-1 generates US \$ 21.48 million NPV with 38% IRR. Furthermore, this option offers the opportunity for a statistically highest maximum NPV of US\$ 248 million.

Keywords: valuation, uncertainty, DCF, real option, managerial flexibility.

1. Introduction

Indonesian coal mining continues to be a significant player in the global coal mining industry and becomes one of the world's largest thermal coal exporters. For 2020, through the Ministry of Energy and Mineral Resources (MEMR), the Indonesian government set the coal production target of 550 million tons; with 72% targeted to be exported abroad. Due to a huge amount of investment and a high risk of failure in opening new exploration areas in the mining industry, a comprehensive analysis is required to review, estimate, and ensure the project delivers a positive return to the corporate. Also, amid the high uncertainty in the coal industry, the impact of business on surroundings, the best practices of operational options throughout the exploration, and the financial prospect of a project for long last will be crucial for an investor to execute a project. Therefore it will be the main issue in this research.

PT Berau Coal as one of the oldest mining corporation and simultaneously as one of the biggest mining company in Indonesia, it represents the complexity of production in coal mining sector entirely. Moreover, the shrinking of coal reserves at its operation areas also strengthens the position of comprehensive analytics should be applied in this case. Therefore, use PT. Berau Coal operations, precisely to new exploration project at Binungan (Block Parapatan) as the

focus study/limitation of this research is already adequate. This will assess the business potential and its risks of the Parapatan project to determine whether it is positively profitable or not to the company through calculating the project value based on the estimated performances that this project can generate over the period given.

2. Literature Review

2.1 Financial Parameter; Net Present Value (NPV)

Net present value (NPV) is the method used by a lot of companies in capital budgeting and investment planning to evaluate profitability investment projects over their entire life. The calculation of NPV is used to find today's value of a future stream of payments. According to Gitman & Zutter, 2015: 449, the NPV is found by subtracting a project's initial investment (CF₀) from the present value of its cash inflows (CF_t) discounted at a rate equal to the firm's cost of capital (r):

NPV=Present value of cash inflows-Initial investment

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - CF_0$$

When NPV is used, both inflows and outflows are measured in terms of present dollars. NPV calculations require the selection of a discount rate to represent the future risk that can be unreliable if the wrong rate is selected (Gitman & Zutter, 2015: 534).

2.2 Mine Valuation

Valuation is the process that links risk and returns to determine the worth of an asset (Gitman & Zutter, 2015: 291). While the idea of valuation in creating a fair market value is to determine the price that closely resembles the true value of an asset (Mun, 2006: 55). Moreover, in valuing a mining company's shares, it can be done using fundamental analysis to analyze information, as well as projections of that information to produce an appropriate valuation for the company. Some methods that can be performed for fundamental analysis include the Discounted Cash Flow (DCF) method and the Real Option (RO) method.

2.3 Discounted Cash Flow (CDF)

For an investor, the value of a company is the present value of all cash flows that will be generated by the company in the future. This concept can also be called the Discounted Cash Flow (DCF) model in which the factor that reduces the value of money received in the future is the discounted rate. There are several approaches used in the DCF model, namely the Dividend Discount Model and Free Cash Flow.

According to Welch (2009), the estimated Net Present Value (NPV) is a method that has many advantages. The NPV will identify the things that need attention (expected future cash flows) and how different cash flows will affect different times (through discounted rates). This theory provides a detailed relationship between input data and the final count results.

The equation of value from the free cash flow method is (Damodaran, 2002):

$$Value = \sum_{t=1}^n \frac{CF_t}{(1+r)^t}$$

Remark:

n = Operation periods

CF_t = Cash flow in t periods

r = Discount rate reflects the level of risk

So according to the above equation, the determining factor in the NPV value is the determination of the discount value.

2.4 Real Option (RO)

Real Option (RO) gives the option to buy or sell several assets at a certain price on or before the expiration date. There are two types of options used/used in general, namely: call option and put option. Factors that determine the value of these options include the current value of the asset, variations in the value of the asset, time to

expiration, dividends paid on the asset, strike price, a risk-free rate that matches the age of the option. (Haq, 2018, p. 61)

RO has two internal and external risks that have different approaches in assessing risk in cash flow, namely:

- Option Pricing Method. This method is used to model external risks that will arise from markets such as commodity prices. This method will apply risk-adjusted probabilities to calculate premium risk based on information from the market.
- Decision Tree Method. This method is used to model technical internal risks such as the size of coal reserves. This method will apply the probability of success factor to a technical parameter based on past data or expert justification. (Haq, 2018, p. 68)

In this study, the RO method used is the option pricing approach with a deterministic model that uses price risk adjustment and time risk adjustment.

3. Methods

This study will be conducted through a situational analysis that will further review both the external and internal factors which influence the project's financial performance. PESTLE (Political, Economic, Social, Technology, Legal, and Environmental) will be used to analyze the external environment. Value Chain Analysis will be used to understand the internal business environment. Moreover, a root cause analysis will be conducted to summarize the result of external and internal analysis for the company to determine the causes of the business problem as the basis for evaluating various solution strategies and implementation methodology. After the completion of data gathering, the project feasibility will be determined through a proper application of financial planning, mining valuation method, preliminary portrait, and analysis of the project's risks, and define suitable strategies to improve the company's control mechanism to ensure the certainty of project return is manageable.

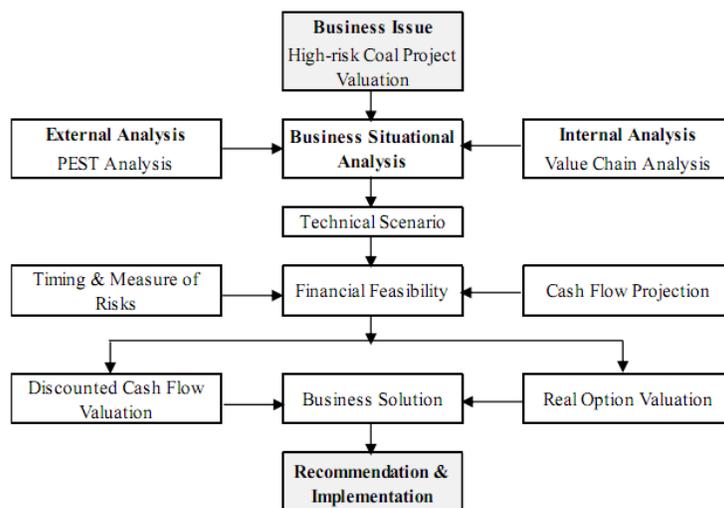


Figure 1 Research Framework

4. Results and Discussion

4.1 Results and Discussion

Based on the 2017 report of the Indonesia Mineral Reserve Committee (KCMI) on PTBC, the annual projected production plan of the project is around 1.03 million tons. Currently, the company has a 5-year scale mining plan, accommodating the exploitation of 2.07 million coal reserves for the 2021 – 2024 period.

Several production scenarios were generated from an analysis of internal conditions with the consideration of the number of reserves, geographic conditions and access of the mining area to the port, and mining equipment capacity. Here are the two possible options with 18 years production period and variations in the modes of

transportation to cross the river, which is part of the barrier between the mining area and the location of Binungan's coal processing plant and the port (Table 1), were produced.

Table 1 Mining Production Plan and profile of Parapat Block

| Parameter | Unit | Base | Option-1 | Option-2 |
|-----------------------------------|-------------|---------|----------|----------|
| Technical Condition | | | | |
| Production Period Scenario | | 4 Years | 18 Years | 18 Years |
| Transport Moda to cross the river | | LCT | LCT | Bridge |
| Waste Disposal Location | | Parapat | Parapat | Bin14 |
| Mining Profile | | | | |
| Waste Removal | Million BCM | 15.77 | 160.68 | 160.68 |
| Coal Getting | Million Ton | 2.07 | 17.43 | 17.43 |
| Mining Stripping Ratio | BCM/ Ton | 7.63 | 9.22 | 9.22 |
| Waste Hauling Distance | Km | 1.85 | 1.89 | 2.34 |
| Coal Hauling Distance | Km | 7.72 | 13.08 | 13.08 |

4.2 Project Investment

To implement the project, Berau Coal is required to invest a multi-year high capital investment. It is also required to include the various infrastructure construction and land preparation, which varies for each option. The variations that arise related to the following aspects,

Table 2 Investment Requirement of Parapat Block Mining

| Parameter | Unit | Base | Option-1 | Option-2 |
|--------------------------|------|------|----------|----------|
| Investment | | | | |
| Coal handling facilities | US\$ | 3.15 | 5.52 | 5.52 |
| Road / bridges | US\$ | - | - | 5.00 |
| Ancillary facilities | US\$ | 0.11 | 0.11 | 0.11 |
| Others | US\$ | 0.05 | 0.05 | 0.05 |
| Land Acquisition | US\$ | 1.90 | 19.85 | 18.08 |

4.3 Revenue Projection

In this study, 1000 sampled randomized - dynamic stochastic price model approach is used to determine the price assumptions as part of the review factor for all valuation methods. The difference in model calculations for the two methods above can be seen in figure 2 below.

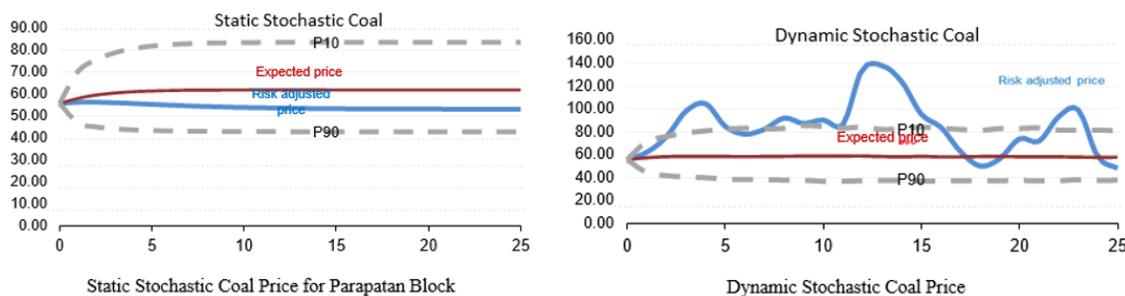


Figure 2 Static and Dynamic Stochastic Coal Price Scenarios for Parapat Block

On the picture above displayed the 30,000 price paths that have been made with P10, P50 and P90 percentile size, illustrates the price forward per year. It can be seen that 85% confidence (the confident boundary) is at \$40 per ton and \$70 per ton.

4.4 Weighted Average Cost of Capital

To calculate the cost of equity, the risk-free rate used base on the IBPA 10 Years Indonesian Bond Yield is 2.78%, while the Indonesia-Country-Risk premium at Q4 2019 is 3.30%, and the 1.12 Beta value of the global beta for the mining and metal industry. The geomean calculation of JKSE monthly changes of closing price from January 2017 to December 2019 every month used as the market rate of return. The cumulative value of the market rate of return for the corresponding period (January 2017-January, 2019) is 8.51%. Base on all the data components above, the cost of equity of the project is 12.50%.

With 53:47 debts to equity portion according to the average liabilities to assets (L/A) ratio of PT. Golden Energy Mines (GEMS) of Berau Coal capital structure assumption, given that the cost of debt and equity is 5.77% and 12.50% respectively, the cost of capital of the project is 7.56%.

Table 3 References for WACC calculation

| Parameters | References | Time Range |
|-----------------------|-------------------------------------|---------------------------|
| Risk Free Rate | IBPA 10 Years Government Bond Yield | Last 10 years |
| Country Risk Premium | Indonesia-Country-Risk | Q4 2019 |
| Beta | Damodaran's Beta Index | As of January 2020 |
| Market rate of return | Calculation of JKSE monthly changes | January 2017-January 2019 |

5. Result and Discussion

The analysis results show the studied mining project is financially feasible by providing the positive value of NPV for all three technical scenario options, reviewed on DCF valuation methods. Provide the NPV as US\$ 10.62 million for base option, US\$ 10.10 million for option-1, and US\$ 8.30 million for option-2. Meanwhile, the real options analysis approach presents additional investment technical options related to increased production, bringing up option-1 resource maximization supported by the Expand Option scenario provide highest NPV offered, US\$ 21.48 million NPV with 38% of IRR (Table 2). This technical scenario is in the form of accelerating investment and increasing the Parapatan Pit mining production capacity and becomes the basis for selecting the best option for the management of Berau Coal. Furthermore, this option offers the opportunity for the highest maximum NPV value of US \$ 248 million statistically.

Table 4 Mine valuation result of Parapatan Block

| Parameter | Unit | Base | Option-1 | Option-2 |
|-----------------------------|--------------|-------|----------|----------|
| Discounted Cash Flow | | | | |
| NPV | Million US\$ | 10.62 | 10.10 | 8.30 |
| IRR | % | 137% | 14% | 15% |
| Real Option | | | | |
| Abandon Option | | | | |
| NPV | Million US\$ | 9.20 | | |
| IRR | % | 123% | | |
| Delay Option | | | | |
| NPV | Million US\$ | 9.20 | (6.47) | (7.31) |
| IRR | % | 123% | 10% | 9% |
| Expand Option | | | | |
| NPV | Million US\$ | 9.20 | 21.49 | 11.29 |
| IRR | % | 123% | 38% | 43% |

Five main parameters are identified contributed significantly to the uncertainty of project return achievements: the fluctuation of coal price, mine stripping ratio achievement factors, fuel purchase price fluctuation, mining service price changes, and OB hauling distance achievement. These parameters contribute around 95.8% of all identified financial risks, with the impact by changing US \$ 10.20 million NPV's value.



Figure 3 Identified Risk Map of Parapat Block mining

More broadly, with high uncertainty, the range of the NPV value becomes broader from US\$ -88.8 million to US\$ 71.3 million statically. The worst scenario gives a negative NPV for the company. Berau Coal should pay attention and simultaneously to the progress value of the determining factors.

6. Conclusion

To sum up, the need for Berau Coal to implement the expanding scenario of the Parapat mine project is expected to provide optimal values in maintaining production capacity and maintaining the stability of operational mining costs, a synergizing of various analyses has been conducted in this research to answer the research question regarding the project feasibility and the certainty of the project's return.

Where it is financially feasible by providing the positive value of NPV for all three technical scenario options, reviewed on DCF valuation methods. The Discounted Cash Flow analysis shows the NPV is at US\$ 10.62 million for base option, US\$ 10.10 million for option-1, and US\$ 8.30 million for option-2. Other than that, The real options analysis approach presents additional investment technical options related to increased production. It reveals that option-1 obtained the best average NPV value supported by the Expand Option scenario with a value of US\$21.48 million and an IRR of 38%.

In the high uncertainty scheme, the range of the NPV value becomes wider from US\$ -88.8 million to US\$ 71.3 million statically. And for the worst one, it can generate negative project value for the company. PT. Berau Coal should pay attention deeper to this issue to mitigate and prevent the risk happens and especially to the key factors that may influence the risk.

Due to the project is very dynamic financially and operationally, The market fluctuation, global price index, mine stripping ratio earned, fuel price fluctuation, changes of mining service rate, and hauling distance factor are the most crucial points to be well-handled by Berau Coal. These changes should be addressed with appropriate adjustments to the projected project's financial return. This study recommends a continuous and regular process of analysis and review on the assessment of the project's performance.

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