



## INVESTMENT PLAN ANALYSIS TO INCREASE COAL PRODUCTION IN PT. BUKIT ASAM TBK, KABUPATEN MUARA ENIM, SUMATRA SELATAN

ICHSAN WAHYUDI\*<sup>1</sup>, MAHMUD HASJIM<sup>1</sup>, MAULANA YUSUF<sup>1</sup>

<sup>1</sup>Department of Magister Mining Engineering, Faculty of Engineering, Sriwijaya University, Indonesia

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### Abstract

Along with increasing economic growth, population, and growing industry, the demand for energy continues to increase. One of the alternative energy sources that increasingly exist with higher prices is coal. The area of Muara Enim Regency has the prospect of coal mining commodities which are widespread. In this case, PT. Bukit Asam, Tbk will increase coal production by conducting a comprehensive investment planning analysis. Cost Present Value (CPV) and Benefit Cost Ratio (BCR) are the methods that will be used in this research. This study will also compare between investment and equipment rental to see the costs incurred. The data used is divided into two, namely primary data consisting of cashflow data, annual operational cost plans, prices of main and supporting equipment, bank interest rates, and effective working hours. While the secondary data consists of the condition and situation of the mining location. Based on the calculation results show that investment planning has a lower cost calculation than equipment rental. Benefit Cost Ratio (BCR) generated in this study is 1.935743906.

### INTRODUCTION

The prospect of mining commodities in the South Sumatra region is classified as abundant with a wide distribution of mineral resources. One area that has high prospects for coal mining is Muara Enim Regency, South Sumatra. The mining prospect is managed by one of the mining industries in Indonesia, namely PT. Bukit Asam Tbk. PT. Bukit Asam Tbk is an Indonesia State Owned Enterprise which is engaged in the coal mining industry. Total coal production of PT. Bukit Asam Tbk in 2019 amounted to 21.6 million tons and targets 30.3 million tons in 2020 (Corporate Presentation Q1 2020 PT. Bukit Asam Tbk), in increasing coal production in PT. Bukit Asam investment plan is needed to increase mining production. Some of

them are general in nature and apply to all companies operating in a market economy (Bijańska & Wodarski, 2014). According to Romansyah (2016), he explained that investment in the mining sector generally requires the use of large funds, and carries a large risk as well. Therefore, before making an investment, you must take a careful decision in terms of technical and economic aspects. Mining operational activities of PT. Bukit Asam, Tbk uses loading equipment and transportation equipment that have important values to achieve coal production targets. However, with a coal production target of 1,400,000 per six months, it requires quite a lot of equipment at a large cost. The use of these tools needs to be considered between buying new

tools or renting tools that can provide benefits or not for the company. Benefit Cost Ratio (BCR) analysis will be used to ensure that the plan is feasible to propose. Therefore, this investment planning analysis is expected to be able to assist companies in making decisions.

**METHODOLOGY**

The research was conducted at the unit site Tanjung Enim PT. Bukit Asam Tbk, Muara Enim Regency, South Sumatra. In the early stages of the study, a review of the feasibility report documents owned by PT. Bukit Asam Tbk. This review aims to see the Company's strategic plans in the future. The next step is to make a calculation simulation with various mining optimization scenarios and economic analysis. Thus, planning analysis can be made.

The use of data in this study is divided into two, namely primary data consisting of data on coal mining planning activities for the period 2021-2026 (coal production targets, and planned material transport distances) and data coal mining project cost and budget plan PT. Bukit Asam, Tbk from the long-term planning work unit and the budget work unit. Meanwhile, secondary data consists of mining site conditions, risks that occur and are recorded in the research area, map of the location of coal mining areas, correction factors for each calculation of equipment productivity to be used in coal mining projects, the average dollar exchange rate against the rupiah for the last 5 years and the reference coal price for the last 1 year, material characteristics, and effective working hours. Based on the data that has been obtained, the data processing and analysis were carried out manually. There are two (2) planning analyzes used in this study, namely investment planning (purchasing equipment) and equipment rental using the Cost Present Value (CPV) method. The

Cost Present Value (CPV) method will show plans that have fewer total costs. After one is selected between the two (2) plans, the analysis is continued by using the Benefit Cost Ratio (BCR) method. The analysis aims to assess the profit (worth) or not in making an investment (Marcell et al., 2021).

**Benefit Cost Ratio (BCR)**

*Benefit Cost Ratio* is the comparison between the present value of future inflows (revenue) and the investment value (Honesti, 2012 in Lolok, 2019).

$$BCR = \frac{\text{The present value of future inflows}}{\text{Investment value (cost)}}$$

The results from the BCR will provide the following instructions:

1. BCR > 1, the project proposal accepted (worth working on)
2. BCR < 1, the project proposal was rejected (not feasible to work on), considering the cost was greater than the revenue
3. BCR = 1, neutral

**RESULT AND DISCUSSION**

The flow of funding for coal production carried out by PT. Bukit Asam, Tbk uses personal funds. The average five (5) years interest rate used based on Bank Indonesia's reference is 3%. For benchmark coal prices over the last 1 year, the average is \$108.29.

**Productivity and Equipment Needs to Achieve Coal Production**

In the mining process, heavy equipment is needed to pick up and move mining products to achieve the targeted production. The coal production target of PT. Bukit Asam Tbk is 1,400,000 per six (6) months or equal to 233,333 for each month. Coal productivity can be seen in Table 1.

**Table 1.** Coal production in PT. Bukit Asam Tbk

		Production Coal					
		Month 1	Month 2	Month 3	Month 4	Month 5	Month 6
Production	bcm/month	233.333	233.333	233.333	233.333	233.333	233.333

Productivity Excavator CAT 340 DL	bcm/hours	253	253	253	253	253	253
Productivity Dumptruck 30 Ton	bcm/hours	56,50	56,50	56,50	56,50	56,50	56,50
Fleet	fleet/month	2	2	2	2	2	2
Dumptruck equipment needs	unit	5	5	5	5	5	5
Working hours	hours/month	425	425	425	425	425	425

Meanwhile, the equipment operational has a different time estimate to achieve the working hours in one (1) year is 5,100 hours or production target. Estimated time for each equal to 425 hours/month. Each equipment used equipment used can be seen in Table 2.

**Table 2.** Equipment operating hours

Monthly target Dumptruck/Fleet	233.333	ton
Total Fleet	2	fleet
Total Dumptruck	10	unit
Estimated walking hours Dumptruck	425	hours/month
Total Excavator	2	unit
Estimated walking hours Excavator	925	hours/month

The actual productivity of each equipment can be used to achieve the coal production target for the Excavator CAT 340 DL and Dumptruck of 233.333/month requires two (2) units of 30 Ton is 253 bcm/hour and 56.5 bcm/hour. In meeting the production target, two (2) Fleets are loading equipment for excavators CAT 340 DL dismantled every month and each Fleet requires and 10 units of transport equipment for five (5) units of transportation equipment. Based on these considerations, the need for tools that Dumptrucks 30 tons. The needs and productivity of these tools can be seen in Table 3.

**Table 3.** Productivity and equipment needs

Equipment	Equipment Productivity	Equipment Needs (unit)
<i>Excavator</i> CAT 340 DL	253 bcm/hours	2
<i>Dumptruck</i> 30 Ton	56,50 bcm/hours	10

**Investment Planning and Equipment Rental**

Planning analysis in this study aims to achieve the production target of PT Bukit Asam Tbk. This is calculated using investment planning and equipment rental. In planning for equipment rental, the company is charged a rental fee that has been agreed with the lessee. The rental price

for one (1) Excavator CAT 340 DL is Rp797,504 (per hour) and one (1) Dumptruck 30 Ton is Rp138,415,008 (per hour). Meanwhile, PT Bukit Asam Tbk's investment plan will incur costs to purchase operational equipment in new conditions as needed (Table 3). The costs

required by the company to purchase these tools can be seen in Table 4.

**Table 4.** The price of each equipment and the total costs incurred

No.	Unit Specification RKS	Offer Unit Specifications	Unit Price (Exclude PPN) (Rupiah)	Number of Units (Unit)	Total Cost (Rupiah)
1	Excavator 279-378 HP/Setara	Excavator Caterpillar 340 DL	4.155.000.000	2	8.310.000.000
2	Dumptruck Kap 30Ton	Dumptruck 30 Ton	1.350.000.000	10	13.500.000.000
<b>Investment Total Cost</b>					21.810.000.000 <i>(Exclude PPN)</i>
					23.991.000.000 <i>(Include PPN)</i>

Based on the calculations in Table 4, with this plan, the company must spend as much as Rp8,310,000,000 to buy a Excavator Caterpillar 340 DL and Rp13,500,000,000, to buy a Dumptruck 30 Ton. So that the total cost to be

incurred by the company is Rp23,991,000,000. In addition to purchasing equipment, the company will incur owning costs and operating costs for each tool purchased. Details of ownership costs and operating costs can be seen in Table 5.

**Table 5.** Equipment purchase price, cost of ownership, and equipment operational costs (per unit, in Rupiah)

Description	Excavator	Dumptruck
<b>Owning Cost</b>		
Purchase price	4.155.000.000	1.355.000.000
Depreciation/hours	146.647	45.706
Interest, tax & insurance/hour	54.748	17.854
<b>Sub Total Owning Cost</b>	201.395	63.560
<b>Operating Cost (per hours)</b>		
Fuel (per hours)	297.500	127.500
Engine (Rp/hours)	2.679	3.684
Tranmission (Rp/hours)	1.148	689
Final drive oil (Rp/hours)	766	612
Hydraulic oil (Rp/hours)	2.750	495
Grease (Rp/hours)	500	33
Filters (Rp/hours)	3.672	2.757
Tyres (Rp/hours)	-	30.000
Operator Wages (Rp/hours)	21.356	21.356
Repairing Cost (Rp/hours)	193.238	28.196
<b>Sub Total Operating Cost</b>	523.609	228.148
Total OOC	725.004	291.708
Profit Margin & GEA (10%)	72.500	29.171
<b>TOTAL</b>	797.504	320.879

**Comparison of Investment Costs and Equipment Rental**

At this comparison stage, it discusses the calculation of investment planning or equipment rental that is profitable for the company. Cost Present Value (CPV) is a method that compares all cost components of an activity with the same reference so that it can be compared with others, using rates, all expenses, and considering time. In this study, CPV is divided into two (2), namely CPV of investment and CPV of equipment rental

CPV. CPV of investment has a big responsibility because there are direct costs, indirect costs, and other costs (Table 6). Meanwhile, equipment rental only takes into account CPV of equipment rental costs and overtime costs for operators (Table 7). Based on the results obtained, Cost Present Value (CPV) for investment is Rp78,270,854,762 and CPV of equipment rental is Rp115,021,686,734. Therefore, the investment costs incurred are much lower, so the authors decided to analyze the planning based on these investments.

**Table 6.** CPV of investment

<b>Total Investment</b>	23.991.000.000					
<b>Purchase Price</b>						
Excavator CAT 340 DL (2 unit)	8.310.000.000					
Dumptruck 30 Ton (10 unit)	13.500.000.000					
<b>Periode</b>	2021	2022	2023	2024	2025	2026
<b>RM Factor</b>	0,9	0,9	0,9	1,00	1,10	1,20
<b>Total Cost (per Year)</b>	5.692.386.227	11.384.772.453	11.384.772.453	11.725.674.813	12.066.577.173	6.203.739.767
<b>CPV of Investment</b>	102.261.854.762					

**Tabel 7.** CPV of equipment rental

Periode	2021	2022	2023	2024	2025	2026
<b>Walking Hours</b>						
Excavator CAT 340 DL (2 unit)	5.100	10.200	10.200	10.200	10.200	5.100
Dumptruck 30 Ton (10 unit)	6	12	12	12	12	6
<b>Rental Fee</b>						
Excavator CAT 340 DL (2 unit)	797.504					
Dumptruck 30 Ton (10 unit)	138.415.008					
<b>CPV of Investment</b>	115.021.686.734					

**Benefit Cost Ratio (BCR)**

As previously explained, the analysis using the Benefit Cost Ratio (BCR) compares revenue from coal production with investment costs. The profit margin assumption is also

included in the cost calculation, see Table 8. The company will issue a cost based on the investment planning calculation of Rp82,448,922,886. Meanwhile, the revenue from coal production is Rp159,600,000,000.

$$BCR = \frac{Rp159.600.000.000}{Rp82.448.922.886}$$

the resulting BCR meets the requirements that BCR > 1 is a feasible planning proposal.

Based on the above calculation, the BCR in this study was 1.935743906. This indicates that

**Tabel 8.** Coal sales revenue

Total production volume of coal sales	1.400.000
Assumed profit margin	Rp114.000
Revenue	Rp159.600.000.000

**CONCLUSION**

Calculations of investment planning analysis and equipment rental have different values. It was found that the cost of investment planning was much lower, which is Rp78,270,854,762. Thus, the investment plan selected for further analysis. Based on the results of the comparison of income and costs incurred by the company, the BCR value is 1.936. This means that the BCR value in this study meets the BCR > 1 requirements, which is a feasible planning proposal.

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