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ECONOMIC FEASIBILITY ANALYSIS OF MINING BUSINESS PLAN CV. XYZ, GOLOPONGKOR VILLAGE, KOMODO DISTRICT, WEST MANGGARAI REGENCY

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Abstract:
This research aims to evaluate the economic feasibility of the mining business plan proposed by CV. XYZ is located in Golopongkor Village, Komodo District, West Manggarai Regency, with an operational production area of 4.27 Ha. The analysis was conducted using three main indicators, namely Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PBP), to assess the profitability and feasibility of the investment. The research results show that the positive NPV value of Rp1,130,299,085.00 indicates that the project is capable of providing economic benefits that exceed the initial investment value. The IRR value of 39% and the PBP of 0.7 years reflect a relatively quick capital recovery period. These values indicate that the mining project is economically feasible and provides significant financial benefits. The expected future cash flows exceed the initial investment, and the quick payback period reinforces the recommendation that this project is feasible. With high profit potential and controlled financial risks, this project is deemed capable of contributing to business growth and the operational sustainability of the company.
Keywords: Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PBP).

INTRODUCTION

The construction growth in the Manggarai Barat region and its vicinity has generated a need for building material resources, particularly natural sand and gravel (sirtu), which are obtained through mining operations. CV. XYZ is an industrial company involved in the mining industry, specializing in the extraction of natural sand and gravel (sirtu), situated in Golopongkor Village, Komodo District, West Manggarai Regency, including an operating production area of 4.27 hectares. An investment analysis is essential to evaluate the economic viability of mining business plans for the government in the context of feasibility assessments of mining enterprises. The feasibility study document functions as a directive in oversight, particularly with the management of environmental factors. The results of this feasibility study are advantageous for shareholders and creditors, including banks and non-bank financial organizations.

An economic feasibility study assesses the viability of a mining project by identifying the optimal means to deliver economic and social benefits, despite encountering intricate risks such as resource uncertainty, market conditions, and operational challenges (Mahapatro, 2015; Mohnot et al., 2001). Key financial indicators, including Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PBP), are typically employed in the analysis, alongside methodologies such as Discounted Cash Flow (DCF) for cash flow estimation and project attractiveness evaluation across diverse scenarios (Noerman & Faturohman, 2024; Utami et al., 2024; Rocha et al., 2023).

The feasibility study encompasses sensitivity and risk analysis to assess the effects of variable fluctuations, including commodity prices, capital expenditures, and operating expenses. This methodology is progressively vital for informed decision-making and risk management (Utami et al., 2024; Rocha et al., 2021; Cisternas et al., 2021). Recent advancements underscore the importance

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of incorporating risk management frameworks and scenario planning that address investment uncertainties in the mining sector, especially for projects involving deep mineral resources or novel technologies (Rodríguez et al., 2024; Cisternas et al., 2021). This study was undertaken to assess the viability of the sand and gravel mining enterprise proposed by CV. XYZ in Golopongkor Village, Komodo District, Manggarai Regency.

METHODS

This feasibility study necessitates research procedures to provide systematic and appropriate data collecting and processing. This study employs a research method to evaluate economic feasibility based on three parameters, specifically:

Net Present Value (NPV). It is a crucial financial indicator employed to evaluate the economic feasibility of mining projects by determining the present value of all future cash flows, encompassing both inflows and outflows, discounted over the investment's duration (Shou, 2022; Drozdowski & Dziekański, 2022). It offers a thorough assessment of value generation, clearly indicating the time value of money, which is essential for long-term mining operations typically marked by capital intensity and deferred revenue streams.

Net Present Value (NPV) is a technique employed to ascertain the net profit of CV. XYZ will be obtained upon the conclusion of the mining era.

The equation utilized is derived from the works of Shou (2022), Shou (2021), and Dziekański & Drozdowski (2022), which is as follows: $NPV = (B_1 - C_1) / (1 + r)^1 + (B_2 - C_2 / (1 + r))^2 + (B_3 - C_3 / (1 + r))^3 + \ldots\ldots + (Bt - Ct / (1 + r)n) - C_o$.(1)

Explanation:

NPV: Net Present Value (in Indonesian rupiah)
Bt: Annual revenue during period t
Ct: Annual cash flow in period t
C_o: The original investment amount in year 0 (in rupiah)
r: Interest rate or discount rate (expressed as a percentage)
t: Year of mining activity

Assessment of economic feasibility utilizing the NPV approach to ascertain the potential profitability of the investment, predicated on the following criteria:

- A positive Net Present Value (NPV>0) indicates that the investment yields profit, rendering the rock mining strategy viable.
- When NPV=0, the investment yields no profit or loss.

If the NPV is negative (NPV<0), the investor incurs losses, rendering the rock mining strategy unfeasible.

The Internal Rate of Return (IRR). It is the percentage rate of return on capital that the company is expected to get. The IRR is calculated using the following equation, as referenced in (Mathews, 2023; Lai, 2024; Liu, 2024): $IRR = (i1) + (NPV1 / (NPV1 - NPV2)). (i2 - i1)$ ……(2)

Explanation:

IRR: Internal Rate of Return
NPV1: Net Present Value Discount Rate
NPV2: Net Present Value Discount Rate
i2 i1: Initial experimental discount rate
i2: Discount rate for the second trial

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A project is deemed acceptable if its Internal Rate of Return (IRR) exceeds the needed return (or cost of capital); conversely, if the IRR is inferior, the project is rejected (Mathews, 2023; Lai, 2024; Liu, 2024). The Internal Rate of Return (IRR) facilitates the comparison of various projects through percentage metrics; nonetheless, it is most effective when utilized alongside Net Present Value (NPV) and additional methodologies for a more thorough evaluation, particularly when projects exhibit differing scales or cash flow patterns (Lai, 2024; Liu, 2024; Sheng, 2023).

The Payback Period (PBP). Is the duration required for a corporation to repay its capital investment? The equation utilized according to Yard (2000) is:

Payback Period = n + ((a-b) / (c-b)) x 1 year …….. (3)

Clarification: The final year in which the cash flow was insufficient to offset the initial investment.

- a: Initial investment sum
- b: Cumulative cash flow in year n
- c: Cumulative cash flow in year n+1

The Payback Period (PBP) serves as a supplementary criterion that enhances primary investment assessment techniques like Net Present Value (NPV) and Internal Rate of Return (IRR), owing to its capacity to succinctly illustrate the duration needed to recoup the initial investment (Narayanan, 1985). Nonetheless, PBP has constraints as it neglects the time value of money and fails to assess the project's overall profitability; thus, it cannot supplant more thorough evaluation methods like NPV and IRR, but should rather serve as a supplementary tool to offer further insights into short-term capital return risks (Narayanan, 1985).

RESULT AND DISCUSSION

The investment required for this sand and gravel mining activity is Rp135,000,000.00, with the funding sourced from CV. XYZ itself, detailed in the fixed capital.

Fixed capital. The sand and gravel mining business includes the costs of exploration, road construction, and the preparation of environmental documents. The amount of fixed capital investment for CV. XYZ can be seen in Table 1.

Table 1. Fixed Capital

No	Description	Fixed Cost Year of-				
		1	2	3	4	5
	Exploration					
1	Exploration Implementation Cost	15,000,000,00	0	0	0	0
2	Road Construction Cost	20,000,000,00	0	0	0	0
3	Environmental Document Preparation Costs	100,000,000,00	0	0	0	0
	Total	**135,000,000,00**	0	0	0	0

Working Capital. CV. XYZ calculates the estimated working capital expended each year. These costs include employee salaries, administrative expenses, environmental management costs, reclamation costs, Occupational Health and Safety costs, and community empowerment costs. The details of the CV. XYZ's working capital can be seen in Table 2.

Table 2. Working Capital

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No	Working Capital	Cost (Rp)
1	Employee Salary and Annual Benefits	136.000.000,00
2	Administrative Fee per year	15.000.000,00
3	Environmental Management Costs	10.000.000,00
4	Reclamation Cost	25.342.500,00
5	Occupational Safety and Health (procurement of PPE)	15.000.000,00
6	Community Development	37.500.000,00
	Total	**238.842.500,00**

Production Costs. Production costs are the expenses incurred by CV. XYZ to produce sand and gravel. These costs include fuel usage, with details available in Table 3.

Table 3. Production Cost

Description	Production Cost				
	Year 1	Year 2	Year 3	Year 4	Year 5
Fixed Cost					
Fuel Cost	749.228.480,00	749.228.480,00	749.228.480,00	749.228.480,00	749.228.480,00

Sales Revenue. The sales revenue of CV. XYZ is obtained from the sale of mineral products with estimated sales revenue and costs as shown in Table 4.

Table 4. Marketing Plan

Uraian	Sales Plan				
	Year 1	Year 2	Year 3	Year 4	Year 5
Product					
Sand	3.024	3.024	3.024	3.024	3.024
Gravel	7.056	7.056	7.056	7.056	7.056
Selling price					
Sand	198.000	198.000	198.000	198.000	198.000
Gravel	181.500	181.500	181.500	181.500	181.500
Total Revenue (Rp)	1.879.416.000	1.879.416.000	1.879.416.000	1.879.416.000	1.879.416.000

Table 5. Cash Flow CV. XYZ

	Marketing Plan					
Years	**Year 0**	**Year 1**	**Year 2**	**Year 3**	**Year 4**	**Year 5**
Investing Cost	135.000.000,00					
Production Cost + Fixed Capital	-	988.070.980,00	988.070.980,00	988.070.980,00	988.070.980,00	988.070.980,00
Tax+ PNBP	-	365.066.800,00	365.066.800,00	365.066.800,00	365.066.800,00	365.066.800,00
Revenue	-	526.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00
Cash Flow	**135.000.000,00**	**391.278.220,00**	**917.556.440,00**	**1.443.834.660,00**	**1.970.112.880,00**	**2.496.391.100,00**

The results of the economic parameter calculations are as follows: **Net Present Value (NPV)**, or the net cash flow that the company will obtain after the mining activities, can be calculated using equation 1.

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Table 6. Net Present Value (NPV)

Current interest rate		4,50%		
Initial Investment Value		1.000.000.000,00		
		Net Cash Flow (Rp)		
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
391.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00
NPV	**1.130.299.085,00**			

Based on the NPV calculation results, an amount of Rp1,130,299,085.00 was obtained. Moreover, from the positive NPV value, this mining business activity is economically feasible.

Internal Rate of Return (IRR). What is the rate of return on investment that will be obtained by CV? XYZ is using equation 2.

Table 7. Internal Rate of Return (IRR)

Current interest rate		4,50%		
Initial Investment Value		1,000,000,000,00		
		Net Cash Flow (Rp)		
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
391,278,220,00	526,278,220,00	526,278,220,00	526,278,220,00	526,278,220,00
IRR	**39%**			

Based on the IRR calculation, a value of 39% was obtained. This IRR value is greater than the interest rate, thus concluding that CV. XYZ's mining plan is economical and profitable, making it feasible. **Payback Period (PBP).** Can be calculated using equation 3, and the results are as follows.

Table 8. Payback Period (PBP)

Current interest rate		4,50%		
Initial Investment Value		1.000.000.000,00		
		Net Cash Flow (Rp)		
Year 1	**Year 2**	**Year 3**	**Year 4**	**Year 5**
391.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00	526.278.220,00
NPV	**1.130.299.085,00**			
PBP	**0.7**			

Based on calculations using the Payback Period method, a result of 0.7 years was obtained, which is the time required to recover the initial investment from the cash flow generated by mining and processing activities.

CONCLUSION

Based on the results of the economic feasibility analysis conducted, a Net Present Value (NPV) of Rp 1,130,299,085.00 was obtained with a positive value, indicating that the mining project proposed by CV. XYZ has significant financial profit potential. This positive NPV value indicates that the expected future cash flows from the project exceed the initial investment costs, making the project feasible to implement. Based on the IRR value obtained at 39% it indicates a competitive and profitable return on investment for the company. The Payback Period calculation yielded a result of 0.7 years, indicating a return on investment in the ninth month of mining operations, thus providing positive cash flow in the first year and generating profits throughout the 5-year duration of the

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Mining Business License. The positive NPV calculation, competitive IRR value, and efficient PBP with a duration of less than the total operational time consistently demonstrate that the CV. The XYZ sand mining project is economically and financially feasible to implement. This sand and gravel mining project not only promises optimal profits but also supports rational and sustainable investment decisions.

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