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Financial Analysis for Land Reinforcement Project to Optimize Dump Capacity INL Pit Case: Coal Mining Company PT. XYZ East Kalimantan

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ABSTRACT: PT XYZ, a leading coal mining company in Indonesia located in East Kalimantan, boasts a production capacity of 55 million tonnes annually. Engaging in coal mining and sales for domestic and international clients across diverse industrial sectors, PT XYZ's INL Area plays a pivotal role in its production for the next eight years, producing low-quality coal with an average calorific value of 4200 Kcal/kg GAR. As a cost leadership business, the company prioritizes cost efficiency, particularly in fuel consumption, notably for overburden movement. To enhance efficiency, PT XYZ explores the optimization of the distance from the mining front of the INL pit to the waste dump. A financial analysis case study compares two scenarios using a financial model: Scenario A, utilizing the recent waste dump with a cycle time of approximately 6.7 km, and Scenario B, proposing a new waste dump design with an investment in borepile reinforcement to accommodate overburden removal for the INL pit, resulting in a reduced cycle time of around 5 km. The financial model assesses feasibility parameters such as NPV, IRR, PI, and PBP between the scenarios, conducting scenario analysis to measure project success probability and identify significant variables affecting project feasibility. A Rsik Analysis on the project considers coal price realization and fuel consumption as key variables influencing the project's value. The recommended option is Scenario B, presenting higher value for PT XYZ, with an investment in borepile reinforcement yielding a potential NPV of around $144.24 million, an IRR of 33%, and a PBV of 4.2 years.

KEYWORDS: Coal Mining, reinforcement project, NPV, IRR, Risk Analysis

INTRODUCTION

In the last three years, Indonesia's coal production has experienced a significant boost, with the Ministry of Energy and Mineral Resources (ESDM) setting an ambitious target of 694.5 million tons for 2023, surpassing the levels of 2022. This surge in production is attributed to the rising coal prices in 2022, prompting Indonesian coal producers to reevaluate their mining operations for increased efficiency and output. Figure 1.1 illustrates the upward trend in Australian Thermal Coal Prices. The post-pandemic economic recovery in 2021 has positively impacted the coal market, driven by heightened energy demand, particularly from China and India. The Indonesian Coal Mining Association (APBI) anticipates a further increase in coal production in 2023, driven by growing demand abroad and domestic, presenting an opportunity for PT. XYZ to exceed its annual production capacity of 55 million tons in 2024.

However, despite these opportunities, the global demand for coal has been on a decline due to the emergence of cheaper and cleaner alternatives such as natural gas and renewable energy sources. Environmental concerns and regulations aiming to reduce carbon emissions have led to challenges for coal businesses. PT. XYZ, located in Sangatta, faces the need to strategically plan its mining operations, with a focus on the INL pit, known for producing low-quality coal with an average calorific value of 4200 Kcal/kg GAR. The company must carefully manage its resources to meet the annual production target and navigate the complexities of environmental considerations and permitting issues associated with the swampy northern side of the Sangatta site.

In the quest for increased profitability, coal companies, including PT. XYZ, are urged to invest in new technologies, equipment, and operational processes to enhance production efficiency. With high competition in the coal mining market, optimizing dumping and haulage distance becomes crucial. PT. XYZ's Mine Planning Department, specifically the 5 Years Planning Section, plays a vital role in coordinating the planning of various pits, including the INL pit, where the company seeks to balance production goals, environmental concerns, and regulatory compliance over the next eight years.

BUSINESS ISSUE

PT XYZ's INL pit plays a crucial role in the company's pit coal production, boasting a substantial reserve exceeding 130 million tons with a quality ranging from 4200 to 4400 GAR. The company strategically blends INL coal products with other quality types

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to enhance their market viability and profitability, aligning with its cost leadership approach in an industry marked by fluctuating coal prices.

The mining business, being highly impacted by fuel costs, faces challenges as global oil prices rise due to production constraints in Russia, the third-largest oil producer globally. This, coupled with falling coal prices, compels PT XYZ to prioritize efficiency. The annual unit net cash margin from the INL pit is notably thin, standing at just 1.37 $/ton with a price of 113 $/ton and increased fuel usage of 1.2. Considering INL pit contributes 12% to the total production, the company must optimize its profitability.

Fuel consumption, especially for overburden movement, represents a significant cost, prompting the consideration of optimizing the distance from the mining front to the waste dump. However, proposing the INL waste dump area to lie in an area underlain by unconsolidated alluvial sediments, that we can see in the Figure 1. Including sensitive clays, poses challenges. Soft material in the area may lead to waste pile movement resembling a landslide, causing extreme land subsidence and horizontal shifts that could impact surrounding infrastructure.

Figure 1. waste dump INL map situation (Source: Internal Company Data)

LITERATURE VIEW

Capital Budgeting Analysis.

Capital budgeting refers to the evaluation and selection of enduring investments that align with the company's objective of optimizing owner value. This systematic approach is formulated to accomplish the company's overarching goal of enhancing shareholder wealth (Gitman & Zutter, 2015). To assess investment projects and select the one with the greatest profit potential, the cash flows from each must be calculated, followed by an assessment of the uncertainty associated with all of the cash flows. There is main six techniques for evaluating long-term asset investments that are commonly used (Peterson & Fabozzi, 2002): calculate Payback period, Discounted payback period, Net present value (NPV), Profitability index (PI), Internal rate of return (IRR), Modified internal rate of return (MIRR).A capital expenditure is a monetary outlay made by a firm that is intended to provide advantages over a period of more than a year. An operating cost is a one-year outlay that yields benefits. Although capital expenditures on fixed assets are capital expenditures, they are not all fixed assets. (Gitman & Zutter, 2015)

1. Net Present Value (NPV).

The most commonly used analysis tool in capital budgeting situations is net present value or other discounted cash flow techniques. (Graham and Harvey, 2001)

The NPV is the net present value (NPV) of future cash inflows and outflows that an investment project generates. It is employed to assess an investment project's viability. (Gitman & Zutter, 2015). When assessing investment projects, most large corporations employ the net present value (NPV) method. Using the company's cost of capital as a discount, the NPV method calculates the company's cash flows. It is the lowest rate of return necessary to appease the company's investors in a project and serves as a

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representation of the capital cost of the business. If the project has a positive net present value, it should be approved; if it has a negative net present value, it should be rejected. Higher-return projects add value to the company while lower-return projects fall short of investors' expectations (Gitman & Zutter, 2015).

2. Internal Rate of Return (IRR)

In accordance with Gitman and Zutter (2015), the discount rate at which the NPV of an investment opportunity becomes zero (as the present value of cash inflows aligns with the initial investment); this represents the rate of return that the company would achieve upon investing in the project and receiving the designated cash inflows.

The formula of IRR is:

$0=\Sigma CFt\ (1+lRR)tnt = 1-CF0 \quad (1)$

Where: CFt = C IRR = Internal rate of return

Cash inflow present value in year t

CF0 = Initial investment or cash flow

The following decision criteria apply IRR when:

- if the IRR exceeds the cost of capital, Accept the project
- if the IRR is less than the cost of capital. Reject the project
- If the IRR equals the capital cost, the investment should generate the required rate of return. It does not distinguish between accepting and rejecting a proposal.

3. **The Payback periode**

The payback period is the length of time, measured in cash inflows, that a business needs to recover its initial project investment. To determine the Payback Period, utilize the following formula:

Payback Period Initial Investment Periodic Cash Flow/ average annual net cash flow (2)

When deciding whether to accept or reject a proposal using the payback period, the following criteria are applicable:

- If the project's payback period is shorter than the longest time that can be tolerated, accept it.
- If the project's payback period is longer than the longest period that is permitted, reject it

RESEARCH DESIGN

The framework of this research was developed to illustrate the process that will be followed in this study, beginning with the analysis of the business issue, and concluding with the development and implementation of the strategic solution. The data for this study were gathered through two methods: Primary and secondary data collecting. Primary data are those gathered directly, whereas secondary data are those gathered indirectly (Kumar et al., 2018).

The research framework outlines the comprehensive process to be followed in this study, commencing with a business issue analysis and culminating in the development and implementation of a strategic solution. Data collection for this study employs two methods: primary and secondary data gathering. Primary data, obtained directly, involves in-depth interviews and observations with relevant departments of PT. XYZ, specifically the mine planning and Geotechnical departments. Secondary data collection includes historical benchmark data and public sources like books, journals, and statistics. Corporate processes, production schedules, estimated assets, cost rates, and expenses are provided by relevant departments. The study primarily focuses on financial analysis to address the company's problem, employing a research approach depicted in Figure 2.

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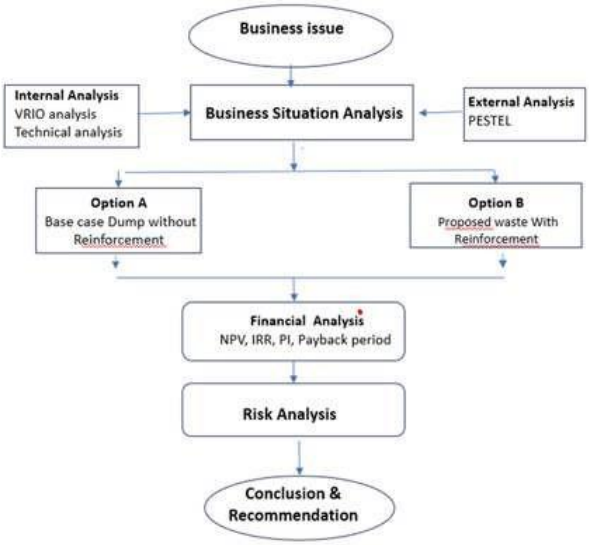

Figure 2. Research Design

The research methodology initiates with an internal and external analysis to gain a comprehensive understanding of the current business climate and its impact on the organization's competitive landscape. Internal analysis utilizes the VRIO (Valuable, Rare, Inimitable, and Organized) framework to identify company resources and capabilities, while external analysis adopts the PESTEL framework (Political, Economic, Sociocultural, Technological, Ecological, and Legal) to study external factors. The results of the business situation analysis inform the financial analysis, comparing two production scenarios: Scenario A, maintaining original project parameters without reinforcement, and Scenario B, projecting cash flow by implementing the reinforcement project.

Upon identifying a business challenge, the investigation's initial phase assesses the coal project by analyzing primary data related to projected production, coal quality, topsoil movement, and various production parameters. Secondary data includes historical coal prices used for future price forecasting through methods such as the GARCH (Generalized Autoregressive Conditional Heteroskedasticity) method using STATA software. The risk-free rate of Indonesia's 10-year government bond and total equity risk premium (Damodaran) are employed for calculating the WACC or discount rate. The production plan's primary and secondary data for each scenario are evaluated to build a capital budgeting analysis for the project's duration, utilizing discounted cash flow methods to determine its financial feasibility, incremental value, internal rate of return (IRR), payback period (PBP), and profitability index (PI). Subsequently, risk analysis is performed using scenario analysis to assess the project's random chances based on randomized parameters and assumptions. Finally, the financial and risk analysis results are utilized to develop the project's execution strategy across all divisions within PT. XYZ.

RESULT AND DISCUSSIONS

Technical Analysis for Bore pile Reinforcement

Problems began to emerge related to the type of swampy material, that was of soft material which is difficult to form, this caused several problems including the difficulty of keeping the dump haul road to remain in accordance with standard conditions, landslides in the overburden dump area, low land bearing capacity means higher deformation of land subsidence and horizontal movement and many others. From the planning side, the Mine Planning Department is demanded for a solution especially related to mine planning which includes production capacity, availability of overburden dump area, and others. The main goal is coal target achievement, at least through control of mining planning, it will create a match condition between planning and field operations. The location of INL pit is on the north side of the Sangatta site area problem found at northern side of Sanggata site is facing a swampy area, we can see in the Figure 3. So it must give special handling of both excavated and backfilled material in that area. In addition, this area is approaching the working area boundaries of the CCoW (Coal Contract of Work) permit owned by PT. XYZ, so everything must be ensured to control disturbed area does not exceed the owned permit.

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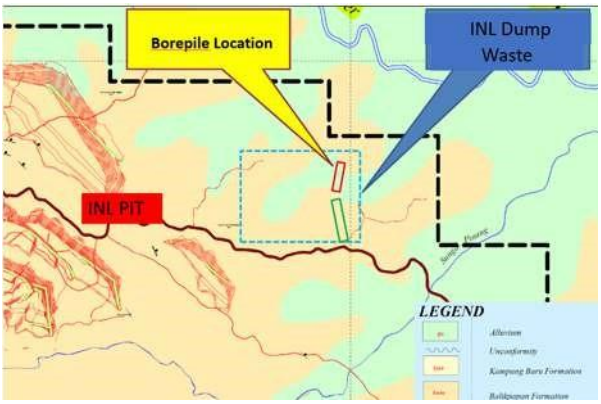

Figure 3. Location INL dump waste and pad Borepile
(Source: Author 2024)

The planned use borepile reinforcement for waste dump area in INL area is proposed to help optimize the capacity of waste dump. after re-assess and re-analysis of the geotechnical team whit implementing borepile reinforcement had a capacity of 77 MBcm.

Coal Price Forecasting

The forecasting of prices plays a pivotal role in guiding mining investment decisions. According to Keputusan Menteri Energi dan Sumber Daya Mineral number 41.K/MB.01/MEM.B/2023, the coal industry can use the Harga Batubara Acuan (HBA) as a standard for coal prices. The coal price index used in this research is the global Newcastle index with a calorific value of 6300 kcal/kg. The HBA can be adjusted based on the coal's actual calorific value if it is below 6000 kcal/kg. This project using Coal price projection GARCH (Generalized Autoregressive conditional Heteroskedasticity) Method using STATA software. The step of GARCH model we can see in the Figure 4 and result of Forecasting coal prices, we can see in the figure 5.

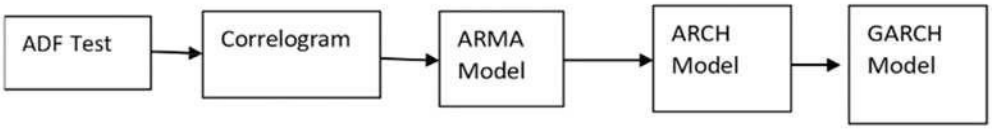

Figure 4. Step of GARCH Model
(Source: Author 2024)

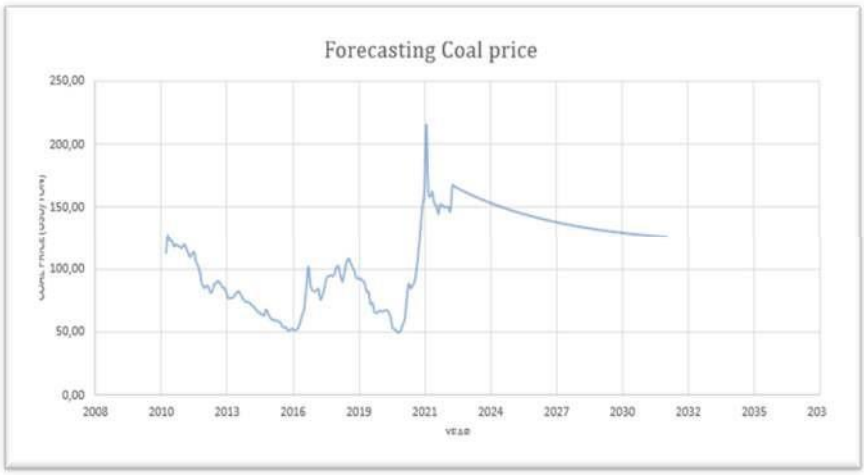

Figure 5. Forecasting GCNEWC Coal Price
(Source: Author 2024)

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Capital Budget Analysis

Net Present Value

When making an investment decision based on the NPV provided by economic research, such as a DCF model, management considers the following factors:

Approve the project if the NPV exceeds zero; a positive NPV indicates profitability and reject the project if the NPV is less than zero; a negative NPV implies a financial loss.

Upon computing the cash flow for each period, it is discounted at a periodic rate of return to derive its present value (PV). The Net Present Value (NPV) is the summation of discounted future cash flows. Due to its simplicity, NPV serves as a powerful tool for assessing whether a project or investment will result in a net profit or loss. To assess the investment's viability, future cash flows must be discounted to their present value. In this discounting process, the Weighted Average Cost of Capital (WACC) serves as the discount rate. Both scenarios will be discounted to the year 2023 using a WACC of 14.8%.

Internal Rate of Return (IRR)

The internal rate of return on an investment project is the rate of return during its useful life. The internal rate of return is calculated by establishing the discount rate that equals the present value of a project's cash disbursements to the present value of its cash inflows. The IRR is used to decide whether to accept or reject the project, and the decision criteria are as follows:

Accept the project if the IRR exceeds the cost of capital and reject it if the IRR is less than the cost of capital.

And for this scenario A, IRR is around 17 % and for scenario B (with reinforcement project) the IRR is 33 %, both of those scenarios have IRR greater than its cost capital.

Payback Periode

The payback period is the amount of time required to recover investment costs. Simply explained, the payback period is how long it takes for an investment to break even. An investment's desirability is proportionate to its payback duration. A shorter payback term indicates a more appealing investment than a longer payback year. According to the calculations in the table, the investment's payback period can see in the Table 1.

Profitability Index (PI)

The PI is calculated by dividing the project's initial investment amount by the present value of future expected cash flows. The profitability index (PI) assesses the attractiveness of a project or investment.

Table 1. Comparison capital Budget Analysis both of scenarios

	Scenario A	Scenario B
	no borepile	project borepile
NPV (M$)	77.78	142.24
IRR	17%	33%
Payback Periode (years)	5.26	4.2
PI	2.04	2.67

(Source: Author 2024**)**

As seen clearly, it is obtained that reinforcement is project the most profitable option to take since it gave the highest NPV, NPV calculation is quite common for mining industry to assess the possibility of implemented project.

Risk Analysis

Scenario Analysis

Scenario analysis is used to determine the impact of various independent variable values on a single dependent variable. A common scenario approach in capital budgeting is the evaluation of the NPVs associated with pessimistic (worst case), most likely (expected), and optimistic (best case) cash inflow predictions. The three crucial variables affecting the feasibility of Coal mining INL project are as follows:

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- Coal price realization
- Operating cost
- Coal mine realization

These parameters are then further analyzed by determining their minimum and maximum value based on coal mine production INL historical data, actual data compared to budget from 2016 to 2022, minimum and maximum coal price realization from 2010 – 2022 and then operational cost budget compared to actual from 2010 - 2022 which is then used for this project's worst- and best-case scenarios.

Table 2. Scenario Analysis for NPV of Reinforcement project

PT XYZ
RISK ANALYSIS
In k$

	Choose	Worst Case	Base Case	Best Case	Monte Carlo Simulation
Scenario Selector	2	1	2	3	4
Coal Price Realization	100.00%	72.45%	100.00%	133.81%	83.52%
Operational Cost	100.00%	106%	100.00%	89.68%	101.48%
coal mine realization	100.00%	98.91%	100.00%	112.23%	91.99%
NPV	$135.186	(162.67)		421.57	
		Range	584.24		

(Source: Author 2024)

Scenario analysis reveals that the worst case of all factors occurring concurrently is the NPV becoming minus at M$ 162.67 and the best case of all factors occurring concurrently is the NPV at M$ 421.57 with a wide range from best to worst case at M$ 584.24.

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

In accordance with the research objective, several analyses have been conducted through this research, including an initial analysis of internal and external factors that can affect the coal mining industry today. The coal company, which is a cost leadership business, always strives for cost efficiency so that the company can make more profits. The largest cost that requires fuel consumption, notably the movement of overburden to dump waste, thus one option to improve efficiency is to optimize the distance from the mining front of the INL pit to the dump waste.

The current distance from INL pit to current waste dump is around 6.7 km, and the distance from the INL pit to the inl waste dump in the Belawan area that we proposed using bore pile reinforcement with a distance around 4. 5 km, which is around 2 km shorter, and we are optimistic that this can significantly reduce operational costs and fuel consumption.

Unfortunately proposed new INL waste dump is lying at area underlain by unconsolidated alluvial sediments including soft compressible sensitive clays which necessitates special treatment, specifically borepile reinforcement project.

Before proposing capex for the project, a financial feasibility study is required to determine whether implementing this project is feasible for PT. XYZ. To establish whether the investment is worthwhile, future cashflows should be discounted to present value. In the discounting process, the WACC is used as the discount rate. both scenarios will be discounted to the year 2023 using WACC 14,8 %. And escalation rate around 3 % per year. Using capital budgeting technique analysis, scenarios A and B are financially feasible. According to the financial feasibility analysis, Scenario B will provide more value to the company than the current Scenario A., implementing the borepile reinforcement project will provide higher NPV than scenario B.

In this study chase, the best option that we proposed to management is scenario B, submission of investment for the borepile reinforcement project, with a potential value of NPV around 142 M$, 33 IRR %, and PBV 4.2 years. Scenario analysis reveals that the worst case of all factors occurring concurrently is the NPV becoming minus at M$ 162.67 and the best case of all factors occurring concurrently is the NPV at M$ 421.57 with a wide range from best to worst case at M$ 584.24

RECOMMENDATIONS

PT. XYZ is advised to propose and implement a reinforcement project aligning with the Production INL Area Strategic Plan, as outlined in the feasible financial analysis. For successful project execution, PT. XYZ's management must carefully weigh three

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critical parameters influencing project feasibility: coal prices, operating costs, and mined quantities. To ensure project viability, additional mitigation strategies are necessary.

The first parameter, coal prices, may fall below the planned level due to factors like global market oversupply or regulatory changes. To mitigate this risk, increasing the coal volume in long-term sales contracts is recommended, ensuring a fixed price and fostering better coordination with marketing agents. Addressing the second parameter, effective operational management becomes pivotal for cost control amid fluctuating coal prices during projects. The second focus should be on reducing fuel consumption, achievable through adjustments to road conditions, geometry, and operator behavior. Increasing equipment productivity is also crucial for enhancing mining production rates and achieving targeted unit costs for improved efficiency, managed through regular inspection, maintenance, and optimal production utilization. The third parameter pertains to mined quantities, with consistent adherence to planned quantities safeguarding the company's primary revenue source. Any reduction or inconsistency in coal mined realization compared to the plan can impact coal supply to ports, potentially leading to lower coal sales. Risk mitigation strategies include hiring additional mining contractors, improving equipment performance, rescheduling mining scenarios, addressing water management issues, coordinating with external divisions, and imposing penalties on contractors failing to meet requirements. Given the project's extensive scope, a thorough risk mitigation analysis is imperative.

Post-implementation, conducting a comprehensive review is recommended to monitor and strategize for new issues, especially those related to economic conditions such as fluctuations in coal and fuel prices, impacting operating costs and project value. Additionally, evaluating the contractor's performance during the construction of the dump INL area reinforcement project is crucial for synergizing with the coal production plan.

REFERENCES

1. Damodaran, A. (2006). *Damodaran on Valuation: Security Analysis for Investment and Corporate Finance*. Wiley. https://books.google.co.id/books?id=aU2dQgAACAAJ
2. Dayananda, D., Irons, R., Harrison, S., Herbohn, J., & Rowland, P. (2002). *Capital Budgeting: Financial Appraisal of Investment Projects*. Cambridge University Press. https://books.google.co.id/books?id=RkvEAgAAQBAJ
3. Gitman, L. J., & Zutter, C. J. (2015). *Principles of Managerial Finance*. Pearson Education. https://books.google.co.id/books?id=tx2-ngEACAAJ
4. Kumar, V., Lahiri, A., & Dogan, O. B. (2018). A strategic framework for a profitable business model in the sharing economy. *Industrial Marketing Management*, *69*, 147–160. https://doi.org/10.1016/j.indmarman.2017.08.021 [5] Maxwell, J. (2012). *Qualitative research design: An interactive approach*.
5. Rothaermel, F. T. (2017). *Strategic Management*. McGraw-Hill Education.
6. Peterson, P. P., & Fabozzi, F. J. (2002). Capital Budgeting: Theory and Practice. New York: www.kpc.co.id. (2023). *sustainability-report 2021*.
7. https://investasi.kontan.co.id/news/kenaikan-harga-minyak-dunia-diprediksi-terbatas-begini-penjelasannya. (2023, November 3). Kenaiakan Harga Minyak Dunia.

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