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Analisis Capital Budgeting untuk Proyek Angkutan KA Petikemas Door-to-Port dari Terminal Petikemas Gedebage menuju Pelabuhan JICT

Capital Budgeting Analysis of Door-to-Port Container Train Transport from Gedebage Container Terminal to JICT Port Project

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Abstrak

Penelitian ini bertujuan untuk menganalisis kelayakan dari proyek bagi KAI. Dalam penelitian ini, peneliti menggunakan capital budgeting analysis dan risk analysis. Untuk capital budgeting analysis, terdapat beberapa parameter yang digunakan yaitu Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period dan Profitability Index berdasarkan perhitungan free cash flow project. Untuk risk analysis, penulis menggunakan sensitivity analysis dan monte carlo simulation. Dalam penelitian ini, peneliti menggunakan 3 skenario berdasarkan beberapa komponen antara lain: (1) persentase IMO BMN Non-Contract, (2) Track Access Charge, dan (3) Tarif Angkutan KA. Dari tiga scenario, scenario ketiga merupakan skenario terbaik dimana persentase IMO BMN Non-Contract sebesar 0%, track access charge sebesar IDR 1/GT-Km dan Tarif Angkutan KA sebesar IDR 4,700,000. Berdasarkan perhitungan discounted cash flow, NPV sebesar IDR 690 juta, IRR sebesar 55%, Payback Period selama 2.94 tahun dan Profitability Index sebesar 2.29. Berdasarkan parameter, Proyek dapat dianggap layak hanya jika kondisi pada scenario tiga terpenuhi. Terdapat beberapa variable yang berpengaruh terhadap kelayakan proyek, yaitu Tarif Angkutan KA, persentase IMO BMN Non-Contract, pertumbuhan pasar dan inflasi.
Kata Kunci: Capital Budgeting; Kelayakan; Kereta Api; Kereta Barang; Terminal Barang.

Abstract

This research aims to analyze the feasibility of the project for KAI. In this research, researchers used capital budgeting analysis and risk analysis. For the capital budgeting analysis, there are several parameters to be considered, namely Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period and Profitability Index based on the calculation of free cash flow to the project. For the risk analysis, the author used sensitivity analysis and monte carlo simulation. In this research, researchers develops three scenarios based on different components such as: (1) percentage of Non-Contract IMO BMN, (2) Track Access Charge and (3) Price of Train Transport. Out of the three scenarios, the third scenario was the best scenario with the percentage of Non-Contract IMO BMN was 0%, track access charge was IDR 1/GT-Km and Price of Train Transport was IDR 4,700,000. Based on the calculation of discounted cash flow, the NPV was IDR 690 million, the IRR was 55%, Payback Period in 2.94 years and Profitability Index was 2.29. Based on the parameters, the project was defined feasible only if the condition in the third scenario met. There are several variables that influence the feasibility for the project, namely Price of Train Transport, percentage of Non-Contract IMO BMN, market growth and inflation rate.
Keywords: *Capital Budgeting; Feasibility; Freight Terminal; Rail Freight; Train.*

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INTRODUCTION

The Indonesian government issued Presidential Instruction No. 5 of 2020 regarding the National Logistics Ecosystem (NLE) arrangement. The initial activity target is to extend the railway line to Pasoso Port or JICT Port but it will interfere with the existing truck operations. So, the party involved decide a quick win for the implementation of Presidential Instruction No. 5 of 2020: Door-to-Port Container Train Transport from Gedebage container terminal to JICT Port Project.

The aim of this research is (1) to obtain an overview whether the Door-to-Port Container Train Transport from Gedebage container terminal to JICT Port Project is feasible for KAI, (2) To identify the factors that need to be considered to ensure the program operates feasibly, and (3) to determine the probability of the project NPV.

Some of the theories that will be used in this research such as: Capital Budgeting analysis using Discounted Cash Flow (DCF) calculation, Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, Profitability Index (PI), Sensitivity Risk Analysis and Monte Carlo Simulation.

According to Gitman & Zutter (2015) Capital Budgeting is the process of evaluating and selecting long term investment that contribute to the firm's goal of maximizing owner's wealth. When undertaking large investment, the firm has to answer some following question, like is the investment good enough, or will it be profitable for the company? Then how the company should pay for the investment, up-front with debt, equity or mix of both?

According to Gitman & Zutter (2015) the weighted average cost of capital (WACC) reflects the expected average cost of the different forms of capital used by a company.

The primary discounted cash flow technique is the net present value. The net present value (NPV) method discounts the investment's cash flows at a rate that reflects the investment risk. The decision criteria for the NPV is if the NPV is equal to or greater than zero, the company should pursue the project, if the NPV is less than zero, the company should not pursue the project.

According to Gitman & Zutter (2015) the internal rate of return (IRR) is the discount rate that makes the NPV of and investment opportunity equal to zero. The decision criteria for the IRR is if the IRR is greater than the cost of capital, the company should pursue the project, if the IRR is less than the cost of capital, the company should not pursue the project.

Payback period is the time it takes an investment to generate cash inflows sufficient to recoup the initial outlay required to make the investment by Gitman & Zutter (2015). The decision criteria for the Payback Period is if the Payback Period is less than the maximum acceptable payback period, the company should pursue the project, if the Payback Period is greater than the maximum acceptable payback period, the company should not pursue the project.

According to Gitman & Zutter (2015) for a project that has an initial cash outflow followed by cash inflows, the Profitability Index (PI) is equal to the present value of cash inflows divided by the absolute value of the initial cash outflow. The decision criteria for PI is if the PI is greater than 1.0 the company should pursue the project, if

the PI is less than 1.0, the company should not pursue the project.

According to Sullivan, G. William, Elin M. Wicks, & James T. Luxhoj (2006), in general, sensitivity refers to the relative magnitude of change in the measure of merit (such as NPV or IRR) resulting from one or more alterations in estimated study factor values. In more specific terms, sensitivity is defined as the relative magnitude of the change in one or more factors that will reverse a decision among the project.

Monte Carlo simulation approach is used to examine all possible investment outcomes and analyze the repercusiions of continuous risks, allowing for improved decision-making in the face of uncertainty.

METHOD

The first step of the research process is the identification of business issues. This research considers using Capital Budgeting analysis to assist the company in making decision whether it should pursue the project or not. Data collection is the process of collecting data from company or other resource materials that related to the proposed business solution. The data collection consists of market data, renovation cost of Gedebage Terminal, resources and capabilities of the company for train transport operation, revenue projection, cost projection of train operation and data to measure the WACC, namely beta, risk free rate and risk premium.

In this research, capital budgeting analysis is conducted using Discounted Cash Flow (DCF) to obtain perspective on the go-not go criteria for the project namely Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period, and Profitability Index (PI). Furthermore, sensitivity analysis is conducted to obtain perspective on which variables that affect the Capital Budgeting analysis. The last Monte Carlo Simulation is conducted to obtain perspective about the probability of project NPV.

Business solution are a set of ideas designed to assist the company in obtaining objective solution based on the data analysis calculation. The implementtation plan is a series of action taken to assist the company to achieve its goals from business solution along with its timeline. The recommendation obtained from this research are expected to assist the company in determining objective goals. The recommendation could be obtained from the combination of the business solution and the implementation plan.

RESULTS AND DISCUSSION

This project will use Gedepriuk Cargo Train to deliver goods from Gedebage Station to JICT Station. The train will use 1 locomotive CC 206 with 15 wagons. The service procedure will take 1.440 minutes per delivery, so 1 train will only serve 1 delivery per day.

Table 1. SOP of the Service

Activity	Duration (min)
Transport from the Empty Container Depot in Jakarta to JICT Station	105
Loading and Unloading Service from Truck to Train at JICT	105
Train Transport from JICT Station to Gedebage Station	291
Loading and Unloading Service from Train to Truck at Gedebage	135
Empty Container Dooring to Factory	60
Container Stuffing at Factory	30
Dooring from Factory to Gedebage	105
Loading and Unloading Service from Truck to Train at Gedebage	135
Train Transport from Gedebage Station to JICT Station	249
Loading and Unloading Service from Train to Truck at JICT	105
Dooring from JICT Station to JICT CY	60
Total	1440

In this research, the author used three alternative scenarios to conduct Capital Budegting analysis based on (1) the percentage of Non-Contract IMO BMN, Track Access Charge and Price of Train Transport.

Table 2. Alternative Scenario

Component	Scenario 1	Scenario 2	Scenario 3
Percentage of Non Contract IMO BMN	100%	0%	0%
Track Access Charge	57.70	1.00	1.00
Price of Train Transport	2,950,000	2,950,000	4,700,000

(Source: Author, 2024)

The project used operational cost to fund the renovation cost, so the weighted average cost of capital (WACC) will be determined from the cost of equity. Some of the assumption used to determine the Cost of Equity are described below.

Table 3. Assumption for Cost Equity

Cost of Equity	Value	Source
Beta	0.93	Using beta value of Transportation (Raiload) Industry in emerging market (Damodaran)
Risk Premium	7.38%	Equity Risk Premium Indonesia (Damodaran)
Risk-Free Rate	6.92%	10 Years Government Bond yield (source; PHEI)

(Source: Author, 2024)

The calculation for cost of equity:

Cost of Equity = 6,92% + (0.93 x 7,38%) = 13,78%

The calculation of WACC:

WACC = 13,78% + 0 = 13,78%

Based on the three alternatives, the author analyzed the project using discounted cash flow.

Table 4. Discounted Cash Flow for scenario 1

Component	2023	2024	2025	2026	2027	2028
Earnings Before Interest and Taxes (EBIT)	(532.74)	(6,447.67)	(13,613.16)	(14,380.38)	(14,737.04)	(15,668.41)
Tax of EBIT	-	-	-	-	-	-
Net Operating Profit After Tax	(533)	(6,448)	(13,613)	(14,380)	(14,737)	(15,668)
Depreciation & Amortization	-	743	1,486	1,486	1,486	1,486
Operating Cash Flow	(533)	(5,705)	(12,127)	(12,895)	(13,251)	(14,183)
Investment Cost and CAPEX	-	-				
Free Cash Flow to Project	(533)	(5,705)	(12,127)	(12,895)	(13,251)	(14,183)
Accumulated Free Cash Flow to Project	(533)	(5,705)	(12,127)	(12,895)	(13,251)	(14,183)
Discounted Free Cash Flow to Project	(532.74)	(5,013.63)	(9,366.90)	(8,752.90)	(7,905.27)	(7,435.87)
Cumulative Discounted Cash Flow to Project	(533)	(5,546)	(14,913)	(23,666)	(31,571)	(39,007)

WACC	13.78%
Payback Period	-
Discounted Payback Period	-
Net Preset Value	(39,007)
Profitability Index	-72.22
IRR	-100%

(Source: Author, 2024)

Table 5. Discounted Cash Flow for scenario 2

Component	2023	2024	2025	2026	2027	2028
Earnings Before Interest and Taxes (EBIT)	(532.74)	(3,452.92)	(6,986.79)	(7,059.31)	(6,631.94)	(6,683.91)
Tax of EBIT	-	-	-	-	-	-
Net Operating Profit After Tax	(533)	(3,453)	(6,987)	(7,059)	(6,632)	(6,684)
Depreciation & Amortization	-	743	1,486	1,486	1,486	1,486
Operating Cash Flow	(533)	(2,710)	(5,501)	(5,573)	(5,146)	(5,198)
Investment Cost and CAPEX	-	-				
Free Cash Flow to Project	(533)	(2,710)	(5,501)	(5,573)	(5,146)	(5,198)
Accumulated Free Cash Flow to Project	(533)	(2,710)	(5,501)	(5,573)	(5,146)	(5,198)
Discounted Free Cash Flow to Project	(532.74)	(2,381.69)	(4,248.82)	(3,783.31)	(3,070.01)	(2,725.33)
Cumulative Discounted Cash Flow to Project	(533)	(2,914)	(7,163)	(10,947)	(14,017)	(16,742)

WACC	13.78%
Payback Period	-
Discounted Payback Period	-
Net Preset Value	(16,742)
Profitability Index	-30.43
IRR	-100%

(Source: Author, 2024)

Table 6. Discounted Cash Flow for scenario 3

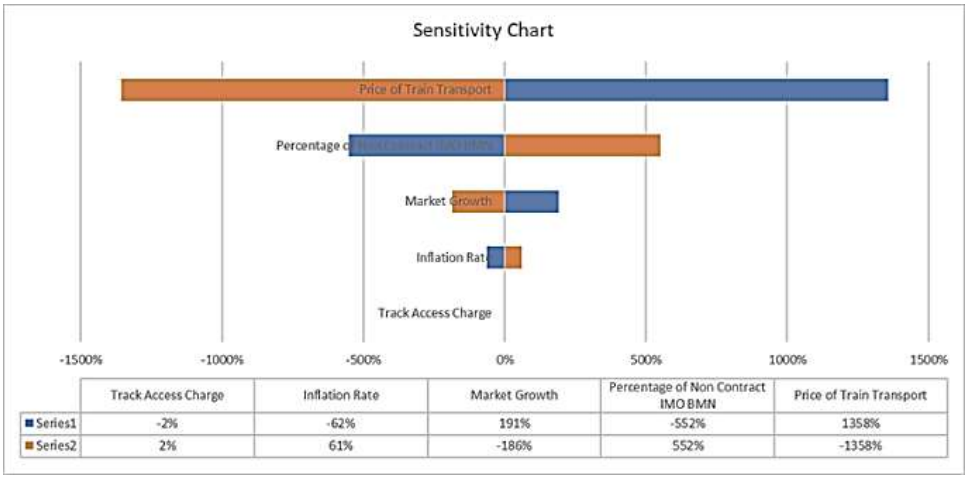
Component	2023	2024	2025	2026	2027	2028
Earnings Before Interest and Taxes (EBIT)	(532.74)	(1,029.17)	(1,756.04)	(1,415.56)	(239.27)	214.07
Tax of EBIT	-	-	-	-	-	-
Net Operating Profit After Tax	(533)	(1,029)	(1,756)	(1,416)	(239)	214
Depreciation & Amortization	-	743	1,486	1,486	1,486	1,486
Operating Cash Flow	(533)	(286)	(270)	70	1,247	1,700
Investment Cost and CAPEX	-	-				
Free Cash Flow to Project	(533)	(286)	(270)	70	1,247	1,700
Accumulated Free Cash Flow to Project	(533)	(286)	(270)	70	1,247	1,700
Discounted Free Cash Flow to Project	(532.74)	(251.58)	(208.70)	47.71	743.66	891.25
Cumulative Discounted Cash Flow to Project	(533)	(784)	(993)	(945)	(202)	690

WACC	13.78%
Payback Period	2.94
Discounted Payback Period	5.00
Net Preset Value	690
Profitability Index	2.29
IRR	55%

(Source: Author, 2024)

Based on the discounted cash flow calculation, the result in scenario 1 and scenario 2 is not feasible for the company. In scenario 1 the NPV result is -IDR 39.007 million with IRR -100%, no Payback Period and PI of -72.22. In scenario 2 the NPV result is -IDR 16.742 million with IRR -100%, no Payback Period and PI of -30.43. The only feasible scenario for this project is scenario 3 with NPV of IDR 690 million, IRR 55%, Payback Period 2.94 years and PI of 2.29.

Sensitivity analysis is conducted to identify how sensitive the situation with some factors and concern to make proper consideration in the decision-making process. Tornado chart are employed in the context of sensitivity analysis with a view to identifying variables that affect the net present value (NPV). Some variables that being considerate to the sensitivity analysis are percentage of Non-Contract IMO BMN, Inflation Rate, Market Growth, Track Access Charge and The Price of Train Transport. By considering changes (±20%) in the variables above, the percentage in NPV from the base case can be seen in Figure 1 below.

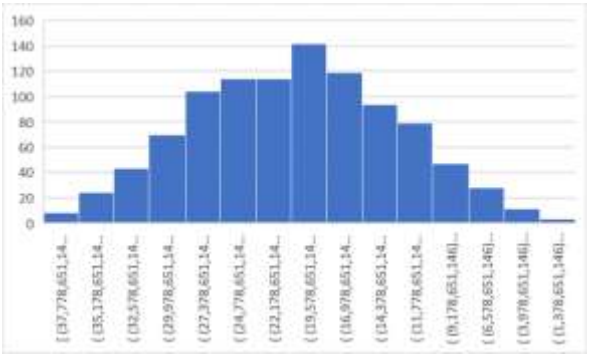


Variabels	Input			NPV			Percentage Changes	
	Base	Upside Case (+20%)	Downside Case (-20%)	Base	Upside Case (+20%)	Downside Case (-20%)	Upside Case (+20%)	Downside Case (-20%)
Inflation Rate	3.15%	3.78%	2.52%	689,609,926	263,048,650	1,111,210,121	-62%	61%
Market Growth	7.90%	9.38%	6.32%	689,609,926	2,006,649,031	(590,434,431)	191%	-186%
Percentage of Non Contract IMO BMN	0.00%	20.00%	020.00%	689,609,926	(3,118,564,523)	4,497,784,376	-552%	552%
Track Access Charge	1.00	1.20	0.80	689,609,926	678,235,902	700,983,9506	-2%	2%
Price of Train Transport	4,700,000	5,640	3,760,000	689,609,926	10,052,820,611	(8,673,600,758)	1358%	-1358%

Figure 1 Sensitivity analysis
(Source: Author, 2024)

Based on the sensitivity analysis, price of train transport is the most responsive variable on the project NPV, then followed by percentage of Non-Contract IMO BMN as the second most responsive one. To ensure the profitability of this project, mitigation measures can be implemented by keeping the prices of train transport and percentage of Non-Contract IMO BMN met the condition in scenario 3.

The Monte Carlo simulation approach is used to view all possible investment choice outcomes and to estimate the repercussions of extending risks in order to make the best judgement under uncertain condition. In Monte Carlo simulation, each variable is allocated a random number depending on its estimated range. The result of Monte Carlo simulation for this project can be shown in histogram chart as shown in figure 2.



Descriptive statistic	
Min	(37,778,651,146)
Max	224,311,056
Mean	(19,356,469.162)
Standard Deviation	7,353,020,301
Median	(19,234.612,945)
Kurtosis	(0.52)
Skewness	0.01
Prob NPV<0	99.6%

Figure 2. Monte Carlo Simulation
(Source: Author, 2024)

Based on the Monte Carlo simulation above, the average NPV of the project is -IDR 19,356,469,162 with low value of -IDR 37,778,651,146 and a high value of IDR 224,311,056. This project has a failure probability of 99.6% (NPV<0).

Based on the scenario analysis the only scenario that resulted financially feasible for the project is the scenario 3. The scenario 3 resulted the NPV of IDR 690 million with some factors, such as: (1) The percentage of Non-Contract IMO BMN is 0%, (2) The track access charge is IDR 1,00/GT-Km, and (3) The price of Train Transport should be at least IDR 4,700,000. The findings of the investment analysis suggest that the company should not pursue the project with the current condition. The company should pursue the project only with several condition that in the scenario 3 met.

CONCLUSION

Based on the calculation of capital budgeting analysis, it is indicated that the project is not financially feasible based on the current condition (scenario 1). The project will be feasible with some condition in the scenario 3, which several adjustments in the percentage of Non-Contract IMO BMN, track access charge and price of train transport.

Based on the scenario 3, there are several factors that should be considered for the company to pursue the project, namely (1) The price of Train Transport; (2) The percentage of Non-Contract IMO BMN; (3) Market growth; and (4) Inflation rate.

Based on Monte Carlo simulation, the probability of this project to be failure (NPV<0) is 99.6%.

There are several recommendations to the company and to the project for the next research, such as: (1) the company should consider the price of train transport because the price is very sensitive to the project feasibility, (2) before pursuing the project, the company should negotiate with the government about the payment of IMO BMN and the track access charge, and (3) researcher may calculate the Capital Budgeting analysis for the whole project, not only for the train transport .

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