



INVESTMENT FEASIBILITY ANALYSIS OF PT. WASKITA KARYA TBK USING NPV, IRR, AND PAYBACK PERIOD METHODS

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Abstract. This study aims to assess the investment feasibility of PT Waskita Karya Tbk for the 2025–2029 period using three main financial evaluation methods, namely Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP). The research employs secondary data obtained from financial statements, annual reports, and projected cash flows of the company's infrastructure projects. The results show that the investment is financially feasible, indicated by a positive NPV of Rp 29.078 billion, an IRR of 19.76 percent which exceeds the discount rate of 10 percent, and a Payback Period of 3.25 years, shorter than the project duration of five years. Sensitivity analysis reveals that the project remains viable even when the discount rate increases to 14 percent or when cash flows fluctuate by ± 10 percent. These findings imply that the planned investment has the potential to generate added value for the company and contribute to improving financial performance. However, to ensure long-term feasibility, the company must implement effective risk mitigation strategies, particularly regarding cost overruns, delays in project execution, fluctuations in cash flows, and uncertainties in macroeconomic conditions. Proper financial planning, monitoring, and evaluation are essential to maintain project sustainability and protect the company from potential financial instability. This research is expected to be a useful reference for companies, investors, and academics in evaluating infrastructure investment decisions in the construction sector.

Keywords: NPV; IRR; payback period; financial feasibility.

1. Introduction

The increasingly dynamic global economic development requires every company to be able to manage its finances and investments appropriately in order to maintain business continuity and increase company value. One important factor in supporting company growth is effective, measurable investment decisions that are in line with the company's financial condition. In the business world, particularly in the construction and infrastructure sectors, investment is a crucial aspect because the projects undertaken are generally large-scale, require high capital, and carry significant risks.

Investment is one of the fundamental aspects of modern corporate management. Through investment, companies can expand their business, increase productivity, and strengthen their competitiveness in the market. However, every investment carries risks that must be carefully considered. Therefore, before a company decides to invest in a project, a comprehensive investment feasibility analysis must be conducted so that the decision made can provide optimal profits and minimize losses.

In the construction industry, especially companies that handle large-scale infrastructure projects, investment feasibility analysis is becoming increasingly important. This is due to the large amount of capital that must be spent, the length of the return period, and the uncertainty of macroeconomic conditions that can affect cash flow. In the world of business and construction, a company's success is greatly influenced by

its ability to manage investments. Before investing, companies need to ensure that the projects they undertake provide optimal returns and are able to recoup their capital within a certain period of time. Therefore, companies need to conduct investment feasibility analyses using appropriate methods.

According to Kasmir (2019:254) in his book *Financial Statement Analysis*, the right investment decision can be made if the company conducts an evaluation using investment feasibility indicators. NPV is used to assess the difference between the present value of cash inflows and initial investment, IRR measures the internal rate of return of a project, while Payback Period assesses how long it will take for the initial capital to be returned.

One of the major companies engaged in construction services is PT. Waskita Karya (Persero) Tbk. As a state-owned enterprise (BUMN), PT. Waskita Karya Tbk plays an important role in national infrastructure development, ranging from toll roads, bridges, high-rise buildings, to energy and transportation projects.

Along with the company's aggressiveness in undertaking various projects, PT. Waskita Karya Tbk faces serious challenges related to investment financing. Based on financial reports from recent years, Waskita Karya has experienced considerable liquidity pressure due to high debt burdens and long payback periods for infrastructure projects. This situation indicates that the company's investment decisions carry considerable risk, requiring appropriate analysis methods to assess whether a project is feasible or not.

Some investment analysis methods commonly used in the business and academic world include Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period.

- a. Net Present Value (NPV) is a method that calculates the difference between the present value of cash inflows and the present value of cash outflows. If the NPV is positive, it means that the project provides added value to the company and is feasible to implement.
- b. Internal Rate of Return (IRR) is used to calculate the internal rate of return generated by an investment. If the IRR is greater than the cost of capital, the investment is considered profitable.
- c. The Payback Period focuses on how quickly the invested capital can be recovered. The shorter the payback period, the lower the liquidity risk borne by the company.

These three methods have complementary characteristics. NPV emphasizes the amount of added value, IRR emphasizes the percentage rate of return, while Payback Period emphasizes the aspect of capital return time. By combining these three methods, companies can obtain a more comprehensive picture of a project's feasibility.

In the context of PT. Waskita Karya Tbk, the application of NPV, IRR, and Payback Period analysis is highly relevant given that the company is currently facing various financial challenges due to project cost overruns, late payments from the government and private sector, and significant debt burdens. Some toll road projects, for example, require large investments and only generate profits after a considerable period of time. Therefore, company management must be careful in selecting which projects are truly feasible.

Through investment feasibility analysis using the NPV, IRR, and Payback Period methods, PT. Waskita Karya Tbk can:

1. Determining whether an infrastructure project will add value or burden the company's finances.
2. Measuring the realistic level of profit from the project being implemented.
3. Knowing how quickly the invested capital can be recovered, so that risks can be controlled.

Therefore, the study of NPV, IRR, and Payback Period analysis at PT. Waskita Karya Tbk is important, not only for the company in making investment decisions, but also for academics, investors, and stakeholders who want to understand the financial feasibility of the infrastructure projects undertaken by the company.

Based on the above description, the author feels it is necessary to conduct research entitled "Feasibility Analysis of PT. Waskita Karya Tbk Investment Using NPV, IRR, and Payback Period Methods".

2. Research Method

The research method used in this study is the case study method at PT. Waskita Karya Tbk. According to Moehar Daniel (2003), a case study is a type of research that is more focused on specific characteristics that are not generally applicable, usually limited by a particular case, location, place, and time.

This study uses a quantitative descriptive approach. This approach was chosen because the study focuses on financial data analysis to assess investment feasibility using the NPV, IRR, and Payback Period methods. The study was conducted at PT. Waskita Karya (Persero) Tbk, a state-owned company engaged in construction and infrastructure services. The object of the study was the company's investment data in relevant infrastructure projects.

Research data obtained through intermediaries or indirectly in the form of books, notes, existing evidence, or archives, both published and unpublished (Achmad Maulidi, 2016). In this study, the author used secondary data from several sources, including:

- a. Financial reports of PT. Waskita Karya Tbk.
- b. Annual reports.
- c. Official publications from the Indonesia Stock Exchange (IDX).
- d. Literature in the form of books, journals, and previous studies that support investment feasibility analysis.

According to Abdul Choliq et al. (1999) and Gittinger (1986), the following investment criteria are used for the financial analysis of a project:

1. Net Present Value (NPV)
2. Internal Rate of Return (IRR)
3. Payback Period

The NPV of a project is the present value of the difference between the benefits and costs at a certain discount rate. NPV shows the excess of benefits over costs. The formula for calculating NPV is as follows:

$$NPV = \sum_{t=n}^{i=0} \frac{B_t - C_t}{(1+i)^t}$$

or

$$NPV = \sum_{t=n}^{i=0} (B_1 - C_1)(CF)$$

Explanation:

B_t = Benefit in year t

C_t = Cost in year t

CF = Compounding factor (applicable interest)

N = Project life

Criteria:

- If the NPV value is greater than 0, then the project is feasible (profitable).
- If $NPV < 0$, then the project is not feasible.
- If $NPV = 0$, then the project is at *the break-even point*.

The internal rate of return (IRR) is used to determine the percentage of profit from a project each year, and IRR is also a measure of a project's ability to repay interest on loans.

IRR essentially indicates the Compounding Factor (CF) where $NPV = 0$. Thus, to find the IRR, we must increase the Compounding Factor (CF) until $NPV = 0$ is achieved. The IRR can be obtained using the following formula:

$$IRR = i_1 + \frac{NPV_1}{NPV_1 - NPV_2} (i_2 - i_1)$$

Explanation:

i_1 = First Compounding Factor (CF) where a positive NPV is obtained

i_2 = The second Compounding Factor (CF) where a negative NPV is obtained

NPV_1 = NPV at i_1

NPV_2 = NPV at i_2

If the IRR value is greater than the applicable interest rate (social discount rate, which in this study is the bank interest rate), then the project is feasible and vice versa. If the IRR is less than the applicable interest rate, then the project is not feasible.

The payback period (PP) is the time or period required for a company to repay all costs incurred for investing through its business. The payback period can be determined using the following equation:

$$Payback\ Periods = T + \frac{NBK^-}{NB^+} \times 12\ month$$

Explanation:

T = Production year in which the smallest cumulative net benefit is obtained.

NBK- = Smallest negative cumulative net benefit.

NBK+ = Positive Net Benefit where the first positive Net is obtained.

3. Results and Discussion

The investment feasibility assessment of PT. Waskita Karya Tbk was conducted using cash flow data for the 5-year project period (2025–2029). The initial investment was set at IDR 100 billion in 2025, while net cash flow was projected to increase gradually each year in line with operational performance. The discount rate used as the baseline cost of capital is 10%.

Table 1. Project Cash Flow Projections (2025-2029)

Year	Cash Flow (Rp billion)
2025 (Initial investment)	-100,0
2026	25,0
2027	30,0
2028	35,0
2029	40,0

Year	Cash Flow (Rp billion)
2030	45,0

Source: PT. Waskita Karya Annual Report, processed (2025)

The NPV calculation with a discount rate of 10% resulted in a value of Rp.29.06 billion. Since the NPV is positive, this project is considered to provide added value (value creation) for the company.

Formula:

$$NPV = \sum_{t=1}^n \frac{CF_t}{(1+r)^t} - I_0$$

Explanation:

CF_t = Cash flow in year t

r = Discount rate (10% = 0.1)

I_0 = Initial investment (Rp 100 billion)

Calculation:

- 2025: $\frac{25}{(1+0,1)^1} = \frac{25}{1,1} = 22,727$
- 2026: $\frac{25}{(1+0,1)^2} = \frac{25}{1,21} = 24,793$
- 2027: $\frac{25}{(1+0,1)^3} = \frac{25}{1,331} = 26,296$
- 2028: $\frac{25}{(1+0,1)^4} = \frac{25}{1,4641} = 27,321$
- 2029: $\frac{25}{(1+0,1)^5} = \frac{25}{1,61051} = 27,941$

Total Present Value (NPV) = 22,727 + 24,793 + 26,296 + 27,321 + 27,941 = 129,078 billion. So, NPV = 129,078 – 100 = 29,078 billion.

The project's IRR is calculated at 19.76%. This value is higher than the cost of capital (10%), so the project can be categorized as feasible.

$$IRR = r_1 + \frac{NPV_1}{NPV_1 - NPV_2} \times (r_2 - r_1)$$

with:

- r_1 = First discount rate (NPV > 0)
- r_2 = Second discount rate (NPV > 0)
- NPV_1 = NPV value at r_1
- NPV_2 = NPV value at r_2

- NPV 20%

$$NPV = \frac{25}{1,2^1} + \frac{30}{1,2^2} + \frac{35}{1,2^3} + \frac{40}{1,2^4} + \frac{45}{1,2^5} - 100$$

- $25/1,2 = 20,833$
- $30/1,44 = 20,833$
- $35/1,728 = 20,254$
- $40/2,0736 = 19,290$
- $45/2,4883 = 18,084$
- Total = 99,294
- $NPV = 99,294 - 100 = -0,706$

$$NPV_{20\%} \approx -0,706 < 0$$

- Therefore,

$$IRR = 0,10 + \frac{29,078}{29,078 - (-0,706)} \times (0,20 - 0,10)$$

$$IRR = 0,10 + \frac{29,078}{29,078 + 0,706} \times 0,10$$

$$IRR = 0,10 + \frac{29,078}{29,784} \times 0,10$$

$$IRR = 0,10 + 0,976 \times 0,10$$

$$IRR = 0,10 + 0,0976$$

$$IRR = 0,1976 \text{ atau } 19,76\%$$

The calculation results show that the initial investment of IDR 100 billion will be recovered in 3.25 years, which is in the first quarter of 2029. This indicates that the capital will be recovered before the end of the project's lifespan, thus keeping liquidity risk under control.

1. After 2028 = accumulation is still -10 billion
2. In 2029, there is an inflow of 40 billion
3. Therefore, the remaining amount to be covered = 10 billion

Annual fraction =

$$\frac{10}{40} = 0,25$$

Formula:

$$PP = \text{Last year's negative cash flow} + \frac{\text{Remaining Investment}}{\text{Current Year Cash Flow}}$$

$PP = 3 \text{ full years (2026, 2027, 2028)} + 0.25 (2029) = 3.25 \text{ years} \approx 3 \text{ years } 3 \text{ months}$.
Therefore, if $PP = 3 \text{ years } 3 \text{ months} \gg$ faster than the project duration (5 years), then the project is feasible.

Table 2. NPV Sensitivity to Discount Rate

Discount Rate	NPV (Rp billion)
8%	36,69
10%	29,07
12%	22,13
14%	15,70

Source: PT. Waskita Karya Annual Report, processed (2025)

The results show that an increase in the discount rate reduces the NPV value. However, up to 14%, the NPV remains positive, so the project is still feasible.

A sensitivity test was also conducted by decreasing and increasing cash flow by $\pm 10\%$.

- Optimistic scenario (+10%): The NPV value increases to around IDR 40 billion, the IRR rises to 20%, and the Payback Period (PP) becomes faster, at around 3 years.
- Pessimistic scenario (-10%): NPV value decreases to around Rp18 billion, IRR drops to 14%, and PP shifts to around 3.6 years.

This analysis shows that the feasibility results are quite sensitive to changes in operating cash flow. However, under both pessimistic and optimistic conditions, the project still generates a positive NPV and an IRR greater than the 10% discount rate, so the project is still considered feasible.

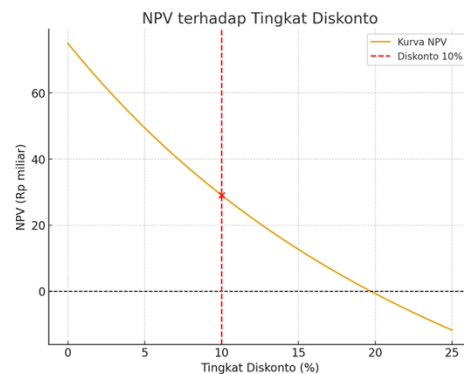


Figure 1. NPV vs. Discount Rate Graph

The graph shows that the NPV value decreases as the discount rate increases. When the discount rate is low (e.g., 5%–8%), the NPV is quite large, even reaching more than Rp30 billion. When the discount rate is increased to 10%, the NPV value is still positive at around Rp29 billion. Furthermore, at discount rates of 12% and 14%, the NPV decreases to around Rp22 billion and Rp15 billion, respectively. The graph shows that the intersection point of the NPV curve with the zero axis is around 19.7%, which is the calculated IRR value. This confirms that the project is quite sensitive to changes in the discount rate. However, as long as the discount rate remains within a reasonable range ($<19.7\%$), the project will continue to generate a positive NPV and is therefore considered feasible.

Table 3. Cumulative Payback Period Calculation

Year	Cash Flow (Rp billion)	Cumulative (Rp billion)
2025	-100,0	-100,0
2026	25,0	-75,0
2027	30,0	-45,0
2028	35,0	-10,0
2029	40,0	30,0

Source: PT. Waskita Karya Annual Report, processed (2025)

The table shows that the capital has not been recovered by the end of 2028 (cumulative still -10 billion). However, in 2029, the cumulative changes to a positive Rp30 billion. With linear interpolation, the capital is recovered in the first quarter of 2029 (3.25 years).

Based on the results of the analysis using the NPV, IRR, and Payback Period methods, PT. Waskita Karya Tbk's investment project for the 2025–2029 period is deemed feasible. All three methods show consistent results:

1. A positive NPV of Rp 29.078 billion, meaning the project adds value to the company.
2. The IRR of 19.76% is greater than the cost of capital of 10%.
3. The payback period is only 3.25 years, which is faster than the project's 5-year lifespan.

Sensitivity analysis shows that the project is relatively resistant to increases in the discount rate, but is quite sensitive to changes in cash flow. Therefore, management needs to anticipate external risks such as increases in construction costs, project delays, and regulatory changes that could affect cash flow.

Therefore, financially, this project is feasible, provided that the company remains mindful of non-financial risks and closely monitors cash flow realization.

4. Conclusion and Recommendations

Based on the results of the Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP) analysis of PT. Waskita Karya Tbk's investment simulation for the 2025–2029 period, the following conclusions were obtained:

1. An NPV of IDR 29.078 billion (positive) indicates that this project provides added value (value creation) for the company.
2. The IRR of 19.76% is higher than the discount rate (10%), so the project meets the investment feasibility criteria.
3. The payback period is 3.25 years, which is shorter than the project life (5 years), meaning that the capital will be recovered before the project ends and liquidity risk can be controlled.
4. Sensitivity analysis shows that the project is relatively resistant to discount rate variations of up to 14%, but is quite sensitive to changes in net cash flow. Therefore, control over factors that affect cash flow is a crucial aspect.

Overall, this investment project can be declared financially feasible based on the data from PT. Waskita Karya's Annual Report. Based on the above conclusions, several recommendations can be made:

1. Cost and project schedule control needs to be improved so that cash flow is in line with projections. Delays or cost overruns can reduce financial viability.

2. External risk management, such as fluctuations in raw material prices, changes in government regulations, and macroeconomic conditions, must be taken into account to maintain cash flow stability.
3. Diversification of financing sources may be considered, for example by utilizing a mixed financing scheme (equity and debt), so that the risk burden is not borne entirely by the company.
4. For future research, it is recommended to use probabilistic risk analysis (e.g., Monte Carlo Simulation) or optimistic–moderate–pessimistic scenarios to obtain a more comprehensive picture of project uncertainty.

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