

Study of Final Business Case Sensitivity Analysis in the Government and Business Entity Cooperation (KPBU) Project in the Drinking Water Sector

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ABSTRACT

The purpose of this study is to analyze sensitivity of the final business case in public private partnership (PPP) projects. The outcome of this study will provide an overview and limits on changes in the parameters forming the investment. Therefore, a sensitivity analysis was carried out to changes in price, initial cost and interest. The results of the study shows the three changes show that the most sensitive parameter is price changes. Meanwhile, due to the decrease in absorption volume at the offtaker in Jakarta, two efforts were made, namely by increasing the minimum tariff to Rp. 3,846, - or by increasing the concession period to 45 years, this project can be said to be investment worthy.

Keywords: Sensitivity Analysis; PPP Project; Final Business Case.

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INTRODUCTION

In exploring the dynamics of Public-Private Partnerships (PPP) in projects like the Jatiluhur I Regional SPAM project, it's essential to anchor the discussion in relevant theoretical frameworks. The definition provided by the Public-Private Partnership (PPP) Reference Guide by IIGF aligns with key theories of public administration and economic development. Specifically, it emphasizes the role of long-term contracts between government and private entities, highlighting the shared responsibilities and risks involved, as articulated by scholars like Akintoye et al. (2023), who underscore that successful PPPs require a balance between public interest and private profit motives.

The importance of feasibility studies in the PPP context is further emphasized by the work of Grimsey and Lewis (2019), who argue that comprehensive feasibility assessments—encompassing pre-feasibility and final business cases—are critical for understanding the viability and potential success of PPP projects. These assessments provide valuable insights into the financial, technical, and operational aspects of projects, ensuring informed decision-making among stakeholders.

Additionally, the analysis of the project's feasibility using indicators such as Internal Rate of Return (IRR), Net Present Value (NPV), and Payback Period (PBP) aligns with the principles outlined in project finance literature. According to Yescombe (2019), these metrics are fundamental in assessing a project's ability to generate returns and are essential in attracting private investment in PPP schemes.

The necessity of sensitivity analysis, as highlighted in the research objectives, resonates with the theories of risk management in project finance, where identifying how sensitive financial projections are to changes in assumptions is crucial. This is echoed by M. J. C. van der Meer-Kooistra and J. M. H. J. Haan (2021), who emphasize that understanding the risks involved, particularly in high-risk sectors like drinking water supply, is vital for ensuring the project's sustainability.

The Jatiluhur I Regional SPAM project serves as a pertinent case study for analyzing these theoretical frameworks in practice. Given the project's context, where water uptake has declined due to downstream unpreparedness, a sensitivity analysis can reveal how fluctuations in tariff parameters, initial costs, and interest rates impact the project's financial viability. This reflects the insights of Zhang et al. (2019), who argue that continuous risk assessment and adjustment strategies are imperative in PPP projects to mitigate unforeseen challenges and ensure long-term success.

Overall, by integrating these theoretical perspectives, the research aims to provide a robust foundation for understanding the complexities of PPP projects, particularly in the context of the Jatiluhur I Regional SPAM project, and to offer actionable insights for stakeholders navigating these challenges.

METHOD

This chapter elaborates on the processes of data collection and processing conducted to generate estimates for Capex, Opex, and revenue schemes, as well as to determine the sensitivity of investments to cost changes within the construction project of the Jatiluhur I Regional Water Supply System (SPAM). The research design employs a descriptive method, encompassing surveys and document analysis, without comparing other variables. The research location pertains to a project aimed at enhancing clean water services in the DKI Jakarta and West Java regions.

The research methodology consists of systematic steps that begin with the determination of the topic, literature review, identification of necessary data, and culminate in the preparation of financial projections. The investment feasibility analysis is conducted using the IRR, NPV, and payback period methods, followed by a sensitivity analysis to evaluate the impact of investment cost changes. Both primary and secondary data are gathered to support the analysis, and the results provide insights into the investment's feasibility and the steps to take should the investment be deemed unfeasible.

In the context of the project, the Water Treatment Plant (WTP) plays a crucial role in meeting the demand for clean water from various sources, aiming to achieve water quality that meets established standards. This study not only provides cost estimates but also serves as a reference for decision-making regarding the feasibility and management of investments in the SPAM project.



Figure 1. Intake – IPA – Reservoir Scheme

Intake is the initial structure for sourcing water, typically equipped with a bar screen to filter debris from the water. The water is then pumped to the Water Treatment Plant (WTP) or Instalasi Pengolahan Air (IPA). After treatment, clean water is stored in a reservoir, which temporarily holds the treated water before distribution. WTPs are vital globally, as they process contaminated raw water (influent) to meet quality standards for consumption. Figure 1.2 illustrates the clean water treatment process in an IPA.

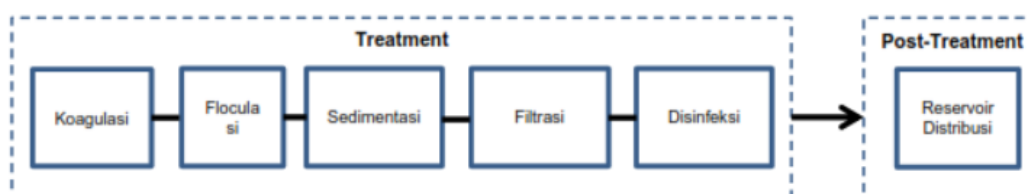


Figure 2. Water Treatment Scheme in a Water Treatment Plant (IPA)

The Jatiluhur I Drinking Water Supply System project is a National Strategic Project using a Government-Business Partnership (KPB) scheme aimed at increasing piped drinking water service coverage in DKI Jakarta, Bekasi City, Bekasi Regency, and Karawang Regency by 4,750 liters per second. The project involves constructing a Water Treatment Plant (IPA) and four pipeline transmission routes: Jatibening, Tarumajaya, Sentra Timur, and Teluk Buyung, as well as the Cibet route.

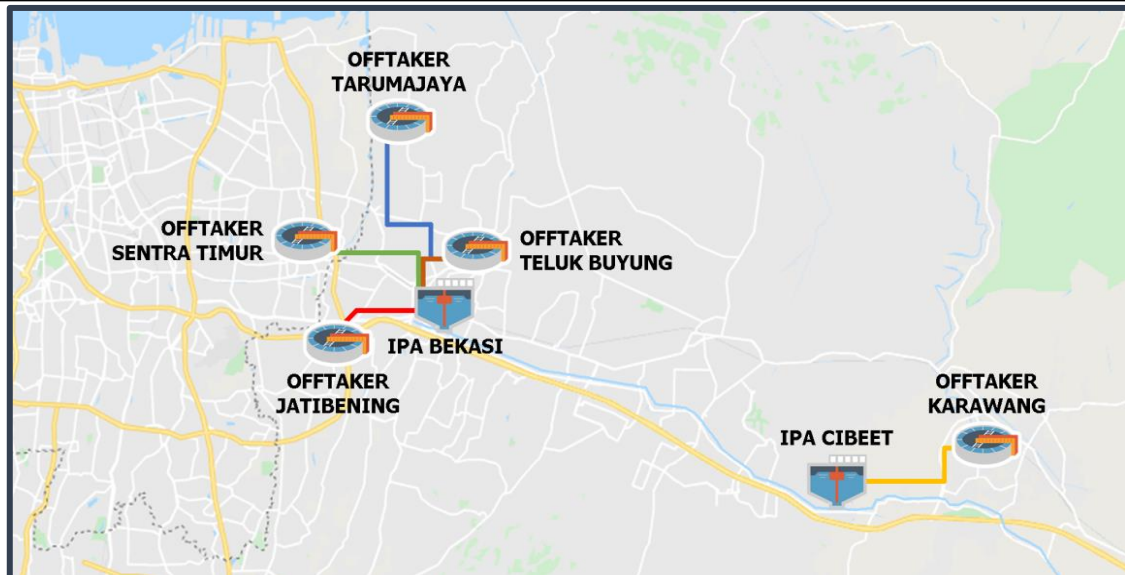


Figure 3. Bekasi and Cibeeet Transmission Pipelines

The bulk drinking water produced from the Bekasi and Cibeeet Water Treatment Plants (IPA) will be distributed to the PDAM Offtaker through a transmission pipeline totaling approximately 37.84 km in length, with diameters ranging from 400 to 1,800 mm. The transmission pipeline from Bekasi IPA will reach four PDAM Offtaker locations: Sentra Timur DKI Jakarta (8,150 m), Jatibening Bekasi City (5,150 m), Teluk Buyung Bekasi City (3,700 m), and Taruma Jaya Bekasi Regency (12,900 m). Additionally, a transmission pipeline from Cibeeet IPA will be constructed to the PDAM Offtaker in Karawang Regency, measuring 6,170 m, as illustrated in the following diagram.

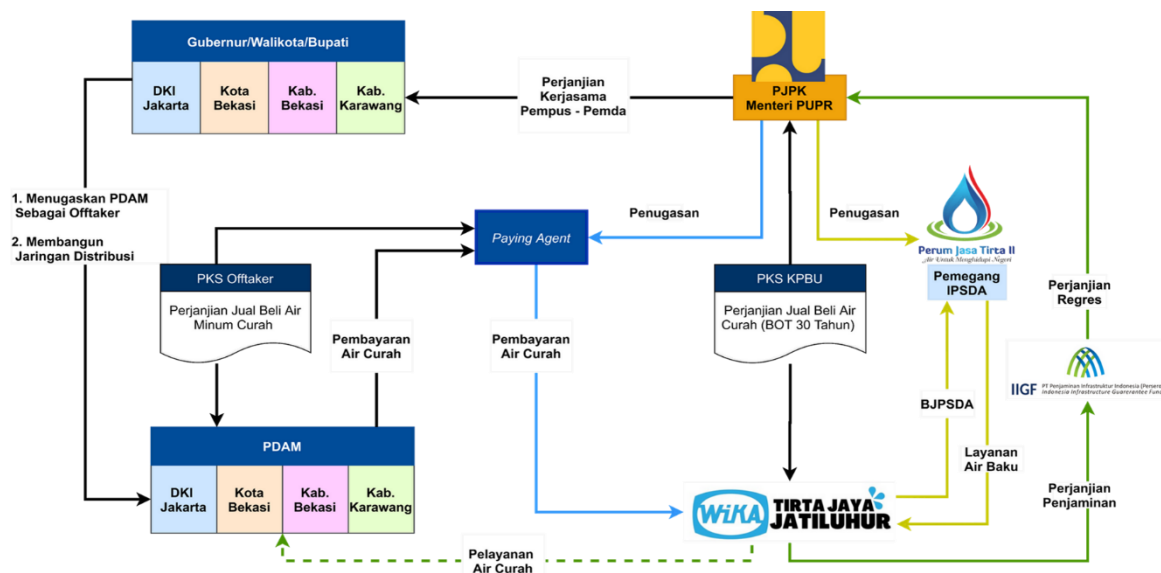


Figure 4. General Scheme of Jatiluhur I Regional SPAM PPP PKS

The development of the Jatiluhur Regional Drinking Water Supply System (SPAM) encompasses various critical aspects designed to ensure an efficient and high-quality bulk drinking water supply. This project involves multiple phases, including financing, design, engineering, procurement, construction, operation, and maintenance of the facilities.

The details of the work specified in the winner's decree include:

1. Raw Water Intake: The total maximum capacity reaches 5,000 liters per second, divided between the Bekasi Water Treatment Plant (4,620 liters per second) and the Cibeeet Water Treatment Plant (368 liters per second).
2. Water Treatment Installation: The total production capacity is 4,750 liters per second, with the Bekasi and Cibeeet plants producing 4,400 liters per second and 350 liters per second, respectively, along with supporting facilities.
3. Transmission Pipes: Approximately 700 meters of raw water pipes and 37.84 kilometers of pipes for bulk drinking water.
4. Reservoir: The total reservoir capacity reaches 18,500 cubic meters, allocated for the Bekasi and Cibeeet systems.
5. Other Facilities: This includes distribution pump houses, sludge drying systems, and a SCADA system for operations and monitoring.

The work at the Bekasi and Cibeeet SPAM involves the construction of intake buildings, water treatment installations, reservoirs, as well as transmission pipes and pumps. The project also includes provisions concerning product absorption, bulk drinking water tariffs, and the minimum volume to be met by the Water Supply Management Agency (PJKP).

The project implementation timeline is established within a specific timeframe, with the construction phase planned from November 2021 to May 2024. The investment in this project encompasses capital expenditure, construction costs, and design fees aimed at ensuring the success and feasibility of the project. Consequently, the Jatiluhur Regional SPAM 1 is expected to fulfill the need for safe and quality bulk drinking water for the communities in the Bekasi region and its surroundings.

RESULTS AND DISCUSSION

Dashboard

In conclusion, the preparation of a financial analysis for the company, particularly through the creation of a cash flow statement, necessitates the development of a dashboard for reporting and forecasting financial analysis processes. This dashboard includes valuation metrics and comparisons between total revenue and net income. Additionally, it features a summary of the income statement, balance sheet, cash flow statement, financial ratios, and the company's valuation, with forecasts extending from the beginning of the construction phase in 2021 to 2051. The valuation data presented in the dashboard indicates that, based on the Net Present Value (NPV) and Internal Rate of Return (IRR), the company is well-positioned to operate its business effectively and generate profits.

Table 1. Dashboard Valuation Results

Valuation Result	
NPV	907.055
IRR	13,54%
WACC	11%
Payback Period	11,54 th

The following graph illustrates the comparison between total revenue and net income, with forecasts extending from 2022 to 2050. Notably, the graph indicates that net income is projected to remain negative from 2022 to 2024. This decline is attributed to the absence of income beyond the funding received from shareholders and banks for project financing.

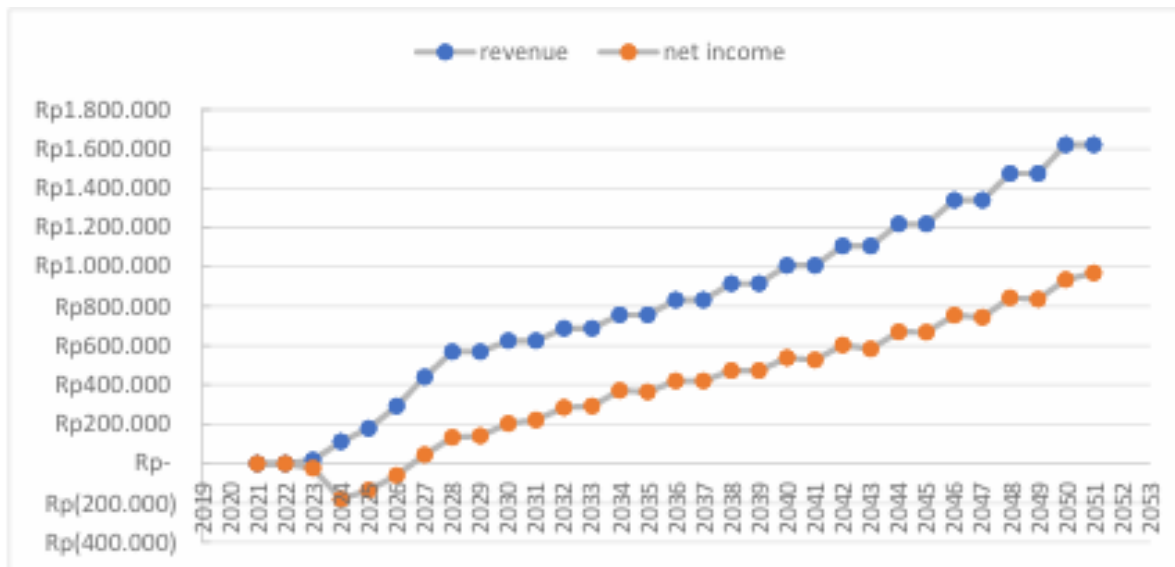


Figure 5. Comparison results of Revenue and Net Income

Main Assumption

In the initial phase of the project, the assumptions are defined based on applicable regulations and standards. Table 4.1 outlines the Project Profile and the scope of work for the Jatiluhur I Regional Drinking Water Supply System (SPAM). Key details include:

1. Project Responsibility: The project is managed by the Ministry of Public Works and Public Housing, specifically the Directorate General of Water Resources.
2. Contractors: The project is executed by PT WIKA Tirta Jaya Jatiluhur in collaboration with WIKA – Jaya Konstruksi KSO.
3. Timeline: The design phase is scheduled for 180 calendar days, while construction and commissioning will take 900 calendar days. The total concession period is 30 years, which includes 2.5 years of construction.
4. Investment Value: The project has a total investment value of IDR 1,675,127,000,000 (including VAT).
5. Project Objective: The goal is to enhance the piped drinking water service coverage in DKI Jakarta, Kota Bekasi, Kabupaten Bekasi, and Kabupaten Karawang by 4,750 liters per second.

The project location includes the Bekasi Water Treatment Plant (WTP) at the Bekasi Weir and the Cibebet Water Treatment Plant (WTP) at the Cibebet River Inspection Site. The scope of work encompasses the construction of the Bekasi WTP (4,400 liters per second), the Cibebet WTP (350 liters per second), and various transmission pipelines.

Investment cost details include preparation and land acquisition, detailed engineering design, construction costs for the intake, WTP, reservoir, pump station, transmission pipeline, engineering supervision, construction escalation, as well as Environmental Impact Analysis (AMDAL) costs. Additionally, the assumptions used in the project are defined, such as a 30-year projection period, a capital structure comprising 70% debt and 30% equity, and various financial metrics, including an 11.5% investment loan rate and a dividend payout ratio of 30%. These assumptions establish a comprehensive framework for the project's financial analysis and feasibility.

Operating Budget

The operating budget refers to the expenses incurred by a company to conduct its operational activities, categorized into two types: fixed costs and variable costs. Fixed costs encompass personnel salaries, building maintenance, and management expenditures, while variable costs include expenses related to raw materials, chemicals, and electricity. Personnel salaries are determined based on the Provincial Minimum Wage (UMP) of DKI Jakarta and are updated annually in accordance with the percentage increase in the UMP.

Operational calculations indicate a trend of rising costs year over year. From 2021 to 2026, total operating expenses have significantly increased, with projected expenditures expected to reach Rp 302,656 million by the year 2050. The graphs generated from these calculations provide a clear depiction of the growth and projections of the company's operating costs, reflecting the ongoing investment needs required to support operational activities and maintenance in the long term.

Construction Budget

The construction budget represents the expenses incurred for the development of the Drinking Water Supply System (SPAM) Jatiluhur I. The budget allocation details are outlined in the provided data, illustrating how funds will be utilized throughout the construction process. Additionally, various graphs derived from this budget depict the percentage of budget utilization for the project, along with the S-curve representing the project's progression over time. These visual representations facilitate a clearer understanding of budget distribution and the timeline of expenditures during the construction phase.

Depreciation Expense

In the analysis of depreciation expenses and the financing plan for the project from 2021 to 2036, several key points can be derived. Firstly, concerning depreciation expenses, the table illustrates the depreciation for Capex and IDC assets during this period. In 2021, the total asset value was Rp 1,969,191, which gradually decreased to Rp 1,176,543 by 2036, reflecting a reasonable decline in asset value over time. During the period from 2028 to 2031, the value of Capex assets remained stable, while the value of IDC exhibited greater fluctuations, indicating that IDC assets may have a shorter useful life or depreciate more rapidly than Capex assets.

Secondly, regarding the project financing plan, the funding consists of 30% equity and 70% debt. The equity amounting to Rp 502,538,058,487 comes from three companies, with the largest contribution from PT Jaya Konstruksi. The total loan required amounts to Rp 1,172,588,803,136, which is fully funded through bank syndication. This planned financing demonstrates a balanced risk composition between equity and debt.

Furthermore, the production capacity projections indicate that PAM JAYA DKI Jakarta has a significantly larger capacity compared to other regional water supply companies (PDAMs), showing consistent growth throughout the projection period. The initial tariffs set for each offtaker reflect a pricing strategy that varies based on location, with a 10% increase every two years, which may help maintain the financial equilibrium of the project.

Overall, this analysis indicates that the project has a well-structured financing plan and realistic depreciation projections for its assets. With careful monitoring of costs and revenues, as well as effective risk management through diversified funding sources, the project is expected to yield positive results both financially and operationally. The projected initial tariffs for each offtaker are as follows:

Table 2. Initial Rate Projections

DKI Jakarta	3.297
Kabupaten Bekasi	2.519
Kota Bekasi	2.519
Karawang	2.491

Based on the calculations performed, the funding requirement for this project amounts to Rp 1,675,127,000,000. The SPAM Regional Jatiluhur I project anticipates funding through three aspects: equity from the implementing business entity, debt from various lenders, and the determination of appropriate financing schemes for this project. The financing scheme for the Water Supply System (SPAM) can be observed in the investment cost detail table and cash flow graphs, which present both negative and positive cash flows.

Analysis Sensitivity Test

In the context of financial analysis, the development of a dashboard serves as a vital tool for effective reporting and forecasting, enhancing decision-making capabilities within a company. As emphasized by Hoyer and Hoyer (2019), dashboards facilitate real-time monitoring of key performance indicators (KPIs) and provide an integrated view of financial data, which is crucial for managers seeking to make informed strategic decisions. The company's dashboard encompasses a comprehensive overview, including the valuation, total revenue, net income, and summaries of critical financial statements—namely the income statement, balance sheet, and cash flow statement. Such a structured approach aligns with the principles of financial management articulated by Brigham and Ehrhardt (2020), who argue that utilizing financial ratios and performance metrics is essential for assessing a company's operational efficiency and profitability.

Moreover, the inclusion of forecasts from 2022 to 2050 reflects a proactive stance in strategic planning, allowing stakeholders to gauge the long-term viability of the SPAM Jatiluhur project. By employing Net Present Value (NPV) and Internal Rate of Return (IRR) as evaluative metrics, the dashboard underscores the potential profitability and sustainability of the business venture, aligning with the investment appraisal techniques outlined by Ross et al. (2021). The use of Excel for data analysis, complemented by visual representations through tables and graphs, further enhances the interpretability of complex financial data, making it accessible for various stakeholders and supporting the overarching goal of effective financial management. Thus, this comprehensive financial analysis framework not only aids in tracking current performance but also in anticipating future financial outcomes, reinforcing the organization's capacity to thrive in a competitive landscape.

Under normal conditions, the values for NPV, IRR, and Payback Period for the company and equity can be observed in Table 4.3 as follows:

Table 3. Nilai Investasi Project

NPV (FCFF) (Rp)	907.055
IRR	13.54%
PB	11,54 year

Tabel 4. Nilai Investasi Equity

NPV (FCFE) (Rp)	138.217
IRR	16,95%
PB	13,9

To test the sensitivity of changes in cost parameters for the investment, it was agreed that the reference for the sensitivity analysis would be the Internal Rate of Return (IRR) and the company's minimum IRR standard. The project's IRR is 13.54%, while the company's minimum standard requires that the project's IRR exceeds the Weighted Average Cost of Capital (WACC) and that the Net Present Value (NPV) is greater than zero.

1. Sensitivity Test to Tariff Changes

The findings from the sensitivity analysis of tariff changes in the Jatiluhur I Regional SPAM project resonate with several established theories in project finance. One prominent theory is Capital Budgeting Theory, which emphasizes the critical role of the Internal Rate of Return (IRR) as a vital metric for evaluating investment decisions. Brealey, Myers, and Allen (2019) assert that the IRR is an effective gauge of a project's feasibility, particularly when compared to the Cost of Capital or a company's established minimum standard. If a project's IRR exceeds the minimum threshold, it indicates that the project is capable of generating returns that surpass its cost of capital, marking it as viable for investment.

In the context of tariff changes, the Financial Sensitivity Theory articulated by Ross, Westerfield, and Jaffe (2021) further elaborates on how projects sensitive to key variables, such as tariffs, can experience substantial fluctuations in profitability indicators, including IRR. A decrease in tariffs, such as the 35% reduction noted in this analysis, can lead to a dramatic fall in IRR, dropping it to 8.17%, which is below the company's standard of 11%. This underscores the importance of monitoring tariff levels to ensure financial sustainability.

Additionally, the concept of Marginal Cost Pricing provides further insight into how market-set prices influence project cash flows and, consequently, the IRR. According to this theory, when tariffs increase, they can enhance project profitability, leading to a higher IRR. This aligns with the principle that revenue growth directly contributes to improved returns on investment, reinforcing the notion that pricing strategies must be carefully calibrated to optimize financial outcomes.

These theoretical frameworks collectively suggest that tariffs are a critical component of project finance, particularly in PPP contexts. They indicate that project managers should meticulously adjust tariff structures to keep the IRR above the established minimum standard, thereby ensuring the project's financial viability over its lifespan. This proactive approach not only supports investment decision-making but also enhances the overall sustainability of infrastructure projects, such as the Jatiluhur I Regional SPAM, which are vital for public service delivery.

2. Sensitivity Test to Changes in Initial Cost

The findings from the sensitivity analysis regarding changes in initial costs align closely with established theories in project finance, particularly the Capital Budgeting Theory. This theory emphasizes the necessity of evaluating project feasibility through critical financial metrics, notably the Internal Rate of Return (IRR). Brealey, Myers, and Allen (2019) assert that the IRR is an essential tool for assessing a project's viability as it enables

comparisons between the anticipated returns of the project and the company's Cost of Capital or minimum required rate of return. A project is deemed viable when its IRR surpasses the Cost of Capital, indicating that it generates returns exceeding its financing costs.

The results of the sensitivity analysis corroborate this theory, as they reveal that an increase in initial costs corresponds to a decrease in IRR. This observation is consistent with the perspectives shared by Ross, Westerfield, and Jaffe (2021), who highlight that fluctuations in initial investment costs are pivotal factors affecting a project's overall feasibility. As investment costs escalate, the net cash flows generated from the project diminish, directly impacting the IRR. This relationship suggests that projects characterized by higher initial costs inherently carry more risk and are particularly sensitive to variations in other financial parameters, such as revenue generation or operational expenses.

Furthermore, the concept of sensitivity within the realm of Capital Budgeting underscores the necessity for stringent management and comprehensive risk assessments for projects that display high sensitivity to investment costs. The analysis demonstrating that a 169.1% increase in initial costs can result in the IRR falling below the company's minimum threshold exemplifies how uncontrolled cost escalations can transition a project from feasible to infeasible. This aligns with Project Sensitivity Theory, which posits that projects with significant sensitivity to investment variables require vigilant oversight to mitigate the risks associated with cost overruns.

In summary, the insights derived from the sensitivity analysis not only reinforce the principles of Capital Budgeting but also emphasize the critical need for careful management of initial costs to ensure the financial viability of projects. This is particularly important in public-private partnerships, where the interplay between costs, revenues, and project feasibility directly influences investment decisions and long-term project success.

3. Sensitivity Test to Changes in Interest

The findings from the sensitivity analysis concerning interest rate changes closely align with well-established financial theories, particularly within Capital Budgeting and risk management frameworks. One fundamental theory relevant to this analysis is the Time Value of Money, which posits that the cost of capital, including interest rates, significantly impacts a project's viability. As noted by Brealey, Myers, and Allen (2019), the Internal Rate of Return (IRR) serves as a critical instrument for evaluating investment projects. When interest rates increase, the cost of borrowing rises correspondingly, leading to a reduction in net cash flows and, consequently, a decline in the IRR.

This relationship aligns with the principles articulated by Ross, Westerfield, and Jaffe (2021), who emphasize that projects exhibiting high sensitivity to financial variables, such as interest rates, necessitate vigilant monitoring and robust risk management strategies. For instance, the analysis reveals that a 5% increase in interest rates results in a 0.60% decrease in IRR, indicating that even minor fluctuations can significantly impact project returns. Moreover, a substantial rise in interest rates—specifically 30%—can cause the IRR to fall below the company's minimum acceptable threshold (11%), thereby rendering the project unviable. This finding underscores the critical emphasis of Capital Budgeting Theory on maintaining an IRR above the cost of capital to ensure project feasibility.

Additionally, the analysis reflects the theory of Interest Rate Sensitivity in financial projects, which posits that projects more susceptible to interest rate fluctuations face heightened exposure to risk. This is exemplified by the scenario where a 121% increase in interest rates causes the IRR to near the company's minimum requirement, highlighting the importance of proactive financial planning and risk assessment in project management. As uncontrolled interest rate increases can swiftly diminish project profitability, transforming potentially viable projects into unfeasible ones, it becomes clear that effective risk management strategies are essential for sustaining project viability in the face of financial volatility.

In summary, the insights gained from the sensitivity analysis emphasize the crucial interplay between interest rates, project feasibility, and the necessity for diligent financial oversight. These principles are vital for decision-makers in public-private partnerships, where fluctuations in financial variables can have significant implications for project success and stakeholder investments.

Decreased Absorption Volume

The integration of Agency Theory Jensen and Meckling, (2021) and Real Options Theory Black and Scholes, (2020) provides a comprehensive framework for understanding the dynamics of public-private partnerships (PPPs) and their strategic financial decisions. Agency Theory emphasizes the relationship between principals (owners) and agents (managers), focusing on potential conflicts arising from differing interests. In the context of PPP projects, aligning the interests of public and private partners is crucial for mitigating execution risks. The project's strategy of adjusting tariffs and extending concession periods is designed to align incentives, ensuring that both parties work towards shared financial goals and reducing the likelihood of conflicts.

Conversely, Real Options Theory highlights the value of flexibility in investment decisions, particularly in uncertain environments. The ability to adjust tariffs and extend concession periods serves as a real option that enables management to respond dynamically to changing market conditions. By preserving this flexibility, the project enhances its adaptability and strategic positioning, which is essential for navigating financial volatility. This adaptability is reinforced by the insights from Modigliani and Miller's (2022) capital structure theory, which posits that decisions regarding pricing and concession terms can significantly influence the cost of capital and the overall value of the company. Specifically, adjusting tariffs is intended to boost the project's expected cash flow, positively affecting the Net Present Value (NPV) and Internal Rate of Return (IRR).

1. **Tariff Adjustment:** In line with the Price and Demand Theory, increasing tariffs is expected to counteract the decline in absorption volume. According to Kotler and Keller (2020), price is a critical element in marketing strategy that influences demand and profitability. By raising the tariff from Rp. 3,297/m³ to Rp. 3,846/m³, the company seeks to mitigate the adverse effects of decreased absorption volume on the project's profitability.
2. **Concession Extension:** The Weighted Average Cost of Capital (WACC) theory posits that a lower cost of capital enhances the value of investments. By extending the concession period, the company gains additional time to generate higher revenues, while simultaneously alleviating the burden of fixed costs associated with a shorter time frame. Brealey and Myers, in "Principles of Corporate Finance," emphasize that

effective time management in projects can significantly influence investment decisions and long-term outcomes.

Overall, the strategic combination of tariff adjustments and concession extensions represents proactive measures to mitigate risks and restore the project's investment value to a viable level. These actions reflect a thorough understanding of financial management principles, highlighting the importance of risk management and strategic decision-making to ensure the long-term sustainability of investments. By implementing these steps, the project demonstrates an awareness of market dynamics and the necessity to adapt to evolving economic conditions, ultimately fostering a collaborative environment between public and private partners.

CONCLUSION

This study aims to analyze the final business case of the SPAM Regional Jatiluhur I project, which experienced a decline in water uptake in the DKI Jakarta region, contrary to the Public-Private Partnership (PPP) agreement. The analysis revealed that the reduction in uptake from 22% in the first year to 4% rendered the project financially unfeasible, resulting in a negative Net Present Value (NPV) of Rp. -1.654, significantly affecting the project's profitability. Sensitivity tests on changes in tariff rates, interest rates, and capital expenditure (CAPEX) indicate that tariff adjustments have the greatest impact on the Internal Rate of Return (IRR), making it the most sensitive factor. A 5% change in tariff leads to a substantial alteration in IRR, highlighting that tariff adjustment is the key strategy to restore the project's investment viability. The first measure taken to recover financial feasibility was increasing the tariff from Rp. 3.287/m³ to Rp. 3.846/m³ in the Offtake Jakarta area, without extending the concession period. The second measure involved extending the concession period from 30 years to 45 years, with the tariff remaining at the original rate, allowing more time to maximize the project's revenue.

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