



THE INFLUENCE OF OPERATING COSTS ON THE SENSITIVITY OF FINANCIAL VIABILITY CASE STUDY: CONSTRUCTION OF SOUTH SURABAYA REGIONAL GENERAL HOSPITAL

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ABSTRACT

This study evaluates the financial feasibility of constructing the South Surabaya Regional General Hospital using key investment evaluation methods, including Net Present Value (NPV), Internal Rate of Return (IRR), benefit-cost ratio (BCR), and Payback Period (PP). The study also examines how changes in management costs affect the project's financial viability. Data collected includes both initial investment costs and ongoing operational expenses. The findings indicate that the project is financially viable, with a positive NPV, an IRR higher than the required rate of return, and a payback period shorter than planned. Sensitivity analysis highlights that management costs significantly influence the project's feasibility. These insights can help the Surabaya City Government optimize hospital management costs and ensure the sustainability of healthcare projects.

Keywords: hospital investment feasibility, investment evaluation, management cost sensitivity

INTRODUCTION

Surabaya, the capital of East Java, has a strategic location that supports its growth and development. With a population exceeding 3 million, including both permanent and non-permanent residents, the city's high density leads to crucial challenges in infrastructure, environment, and sanitation (Mulya et al., 2023). The Surabaya City Government strongly emphasizes improving the quality of life, particularly for those in densely populated areas who are more vulnerable to health-related issues. To address this, the government prioritizes accessible and comprehensive healthcare services through preventive, curative, and rehabilitative approaches (Kewirausahaan & 2021, 2021; Putri et al., 2022; Saleh et al., 2022; Zhafira et al., 2022).

South Surabaya, particularly around the Mastrip and Karang Pilang highways, holds significant potential for health infrastructure development. This region is strategically located near key access roads and surrounded by residential and industrial areas, making adequate healthcare services essential. However, most major hospitals are concentrated in the city center and eastern parts of Surabaya, leaving South Surabaya, especially Karang Pilang and nearby areas, underserved in terms of quality healthcare, particularly during emergencies (Avila et al., 2021; Nurwatik et al., 2022; R. F. Pratiwi & Handoyo, 2021).

On the other hand, the Surabaya City Government is working to develop a holistically integrated medical tourism concept or Surabaya Medical Tourism. The program is designed to incorporate quality health services with the city's leading tourist destinations so that visitors from within and outside the country can enjoy professional medical care and explore the beauty and rich culture of Surabaya. Thus, Surabaya is a health center and a viable health

tourism destination that offers a complete and comfortable experience for medical tourists. This potential can attract tourists so that it can become a potential income for the city of Surabaya, and can encourage economic progress for Surabaya citizens (Asa et al., 2024; B. I. Pratiwi & Pamungkas, 2022; Ratnasari et al., 2022; Sutono et al., 2023; Vovk et al., 2021).

A previous study by Prasetyo et al. (2021) identified six key factors that make Surabaya an attractive destination for medical tourism. These factors include high-quality and professional healthcare services, competitive treatment costs with BPJS insurance options, and modern medical facilities equipped with advanced technology. Additionally, Surabaya's strong infrastructure and accessibility make it easier for patients and their families to seek medical care while enjoying comfortable accommodations. The city also offers a unique combination of healthcare and tourism, allowing patients to experience local attractions during their recovery. Lastly, a safe and conducive environment enhances Surabaya's appeal as a medical tourism hub.

Meanwhile, Agni (2022) conducted a financial feasibility analysis of hospital investment using the discounted cash flow method, focusing on Net Present Value (NPV), Internal Rate of Return (IRR), and Payback Period (PP). The study confirmed that investing in hospital inpatient and outpatient services was financially viable, as indicated by a positive NPV, a high IRR, and a shorter-than-planned PP. However, it did not account for external cost fluctuations that could impact investment success. The study recommended a sensitivity analysis to assess how cost variations influence investment feasibility, especially in hospital management and service rates.

The introduction provides a strong foundation for understanding the need for this study. To strengthen it further, we emphasize that this study uniquely contributes to the field by providing a practical, data-driven analysis of how management costs influence the financial viability of the South Surabaya Regional General Hospital. The findings offer actionable recommendations for the Surabaya City Government and other stakeholders to optimize resource allocation, improve hospital efficiency, and ensure the community's sustainable delivery of quality healthcare services.

A sensitivity analysis of investment feasibility was conducted by considering two main cost variables: hospital management costs and revenue derived from health service levy rates. This analysis process is performed by increasing or decreasing the value of each variable to assess the extent to which the change affects the feasibility of the investment. In this analysis, only one variable is changed at a time, while the other variables remain unchanged to ensure specific analysis results. Each variable was then analyzed separately to evaluate its impact on the different variables. In the study's final stage, the analysis results were used to draw conclusions and provide recommendations to the project owner regarding service tariff setting and management cost control. In addition, this study also produces evaluations and suggestions for future researchers to develop further studies based on the survey that has been conducted.

METHOD

This study examines various costs influencing the feasibility of investment at South Surabaya Hospital. These costs include investment expenses, operational and management costs, and revenue from health services provided by the hospital. Additionally, the study assesses the sensitivity of key factors affecting investment feasibility, such as health service tariffs and operational costs. This analysis is critical for understanding the economic viability and sustainability of the hospital's operations.

The study was conducted at South Surabaya Hospital, located on Jl. Mastrip in Karangpilang Sub-district, Surabaya. This sub-district spans an area of 9.23 km² and consists of four urban villages: Kedurus, Kebraon, Warugunung, and Karang Pilang. Primary data for the study were collected through interviews and direct observations at the hospital. In contrast, secondary data included information on project investment values, health service details, and operational and maintenance costs. Interviewees were selected using a purposive sampling method, targeting key personnel directly involved in hospital financial management and operations. This included representatives from the hospital's economic department, operational management, and procurement divisions, ensuring a comprehensive understanding of cost drivers—the sample size comprised [Insert number] individuals who possessed relevant expertise and insights.

A sensitivity analysis employed both deterministic and probabilistic methods. The deterministic sensitivity analysis adjusted specific cost variables (e.g., salaries, medical supplies) within a range of $\pm 1\%$ to $\pm 10\%$ while holding others constant. Scenario analysis assessed both optimistic and pessimistic operational cost scenarios. The impact on key financial indicators, including Net Present Value (NPV), Internal Rate of Return (IRR), Benefit-Cost Ratio (BCR), and Payback Period (PP), was evaluated. Data was processed using Specify Statistical Software, e.g., Microsoft Excel and SPSS, to quantify the project's sensitivity of financial viability to cost changes.

The analysis of project investment costs entails identifying and evaluating the expenses linked to the preconstruction, construction, and operational phases. Major areas of expenditure include environmental and traffic impact assessments, construction and management costs, procurement of medical equipment and other assets, and hospital IT systems. Likewise, the expenditure analysis centers on operational costs throughout the investment life cycle, such as medical device procurement, personnel salaries, operational and maintenance expenses, and facility development. This comprehensive approach guarantees a thorough understanding of the financial requirements and implications for the hospital's investment project.

RESULTS AND DISCUSSION

Project Investment Cost Data

Investments incurred for East Surabaya Hospital are sourced from the Surabaya City Government Health Office Budget Work Plan (RKA), which has been planned for one year.

The details of the investment cost allocation are as follows:

1. Pre-construction costs include:
 - a. Environmental impact and analysis (EIA) fees;
 - b. Traffic impact and analysis (Andalalin) fee
2. Construction costs include:
 - a. Structure cost;
 - b. Architectural fees;
 - c. Infrastructure and utility costs;
 - d. Construction OHS costs.
3. Construction supervision/management fee
4. Medical equipment procurement costs
5. Equipment and machinery procurement costs
6. Hospital management information system cost
 - a. Server
 - b. Furniture, computers, and other office equipment
 - c. Ambulance emergency;

The following is a breakdown of investment costs for the South Surabaya Hospital, Karangpilang District, presented in the table below:

Table 1. Investment Cost of South Surabaya Hospital

No.	Investment Costs	Allocation (Rp)
1.	Pre-Construction Cost	677.155.500
2.	Construction Cost	349.365.609.832
3.	Construction Management Fee	2.366.276.739
4.	Procurement cost of medical equipment	70.000.000.000
5.	Equipment and machinery procurement costs	10.218.709.909
6.	Management information system costs hospital operations (IT)	1.000.000.000
Total		433.627.751.980

Source: Section Procurement Goods/ Services and Administration

As shown in table 1, the investment cost for South Surabaya Hospital consists of several main components: pre-construction cost, co, construction management cost, me equipment procurement cost, eqnt and machinery procurement cost, anpital management information system cost. The cost reached Rp 433,627,751,980, of which the biggest component came from the construction cost, which reached Rp 349,365,609,832.

Expense Data

Expenditure data at South Surabaya Hospital is secondary data obtained from Surabaya City Health Office projections based on the Budget Work Plan (RKA) of the operating RSUD, which is processed to obtain a detailed value of expenditure data for one year as follows:

1. Medical Devices
2. Salary expenditure for medical and non-medical personnel
3. Office operations
4. Medical operations
5. Spending on furniture, equipment, and machinery
6. Office maintenance
7. Medical Device Depreciation Cost

From each component of these expenses, the total cost value is obtained as listed in the following table:

Table 2. Expenses of South Surabaya Hospital

No.	Details of Expenses	Total Cost (Rp.)
1	Medical devices	50.320.163.699
	Salary expenditure for medical and non-medical personnel	
2	medical	80.507.713.308
3	Office operations	45.910.981.587
4	Medical operations	50.068.638.308
	Shop furniture, equipment and	
5	machine	5.242.166.760
6	Office maintenance	8.508.471.657
	Depreciation cost / tool depreciation	
7	Health	7.000.000.000
	Total	247.558.135.319

Source: Section Procurement Goods /Services and Surabaya City Development Administration, Processed by the Author (2024)

The most significant expenditure at East Surabaya Hospital is attributed to the salaries of medical personnel, amounting to Rp. 80,507,713,308, alongside the operational medical expenses totaling Rp. 50,068,638,308. These two components are fundamental to the services provided by South Surabaya Hospital. The specifics outlined in Table 2 represent the anticipated expenditure costs incurred during the inaugural year of investment.

Sensitivity Analysis of Hospital Management Costs

In the optimistic scenario where expenditure is reduced by 1%-10%, the project will have significant potential cost savings. The reduction in spending can occur through efficiency in the use of resources, better contract negotiations, or optimization of

consumables. All categories in this scenario were found to be viable, indicating that the reduction in operating costs positively impacted the project's financial viability. The decrease in expenditure improves the profit margin, increases the NPV, and makes the IRR more competitive relative to the discount rate. Hence, this reflects the importance of expenditure optimization in civil engineering projects to improve profitability and sustainability, as outlined in the following table.

Table 3. Sensitivity Analysis with Spending Reduction Scenario

Alternative 1 (Decreased Expenditure)					
Changes	Investment Parameters				Conclusion
	NPV (Rp)	IRR %	PP (Year)	BCR	
1%	302,577,670,353	13.55%	6.26	1.22	Worth
2%	308,529,903,183	13.67%	6.24	1.23	Worth
3%	314,482,136,013	13.80%	6.22	1.23	Worth
4%	320,434,368,843	13.93%	6.19	1.24	Worth
5%	326,386,601,673	14.06%	6.17	1.24	Worth
6%	332,338,834,504	14.06%	6.17	1.24	Worth
7%	338,291,067,334	14.31%	6.12	1.25	Worth
8%	344,243,300,164	14.44%	6.10	1.26	Worth
9%	350,195,532,994	14.56%	6.08	1.26	Worth
10%	356,147,765,824	14.69%	6.06	1.27	Worth

Source: Author's Preparation

Under this pessimistic condition, expenditures are expected to increase between 1%-5%, reflecting potential cost increases due to inflation, rising raw material prices, or inefficiencies in project management. The project is declared unviable when expenditures increase to 3.5% because operating and investment costs exceed the revenue generated. This can cause the IRR to fall below the expected discount rate, making the project no longer financially attractive. This situation demonstrates the project's sensitivity to rising costs, which requires risk mitigation planning such as close monitoring of costs and application of technology for operational efficiency. Therefore, cost management becomes crucial in maintaining project viability in the face of pessimistic scenarios, as presented in the following table.

Table 4. Sensitivity Analysis with Spending Increase Scenario

Alternative 4 (Increase in Expenditure)					
Change	Investment Parameters				Conclusion
	NPV (Rp)	IRR %	PP (Year)	BCR	

1,00%	290,673,204,693	13.28%	6.31	1.21	Worth
1,50%	287,697,088,278	13.22%	6.32	1.21	Worth
1,75%	286,209,030,070	13.19%	6.33	1.21	Worth
2,00%	284,720,971,863	13.15%	6.34	1.21	Worth
2,50%	281,744,855,448	13.09%	6.35	1.21	Worth
3,00%	278,768,739,033	13.02%	6.36	1.21	Worth
3,50%	275,792,622,618	12.96%	6.37	1.20	Not Feasible
4,00%	272,816,506,202	12.89%	6.39	1.20	Not Feasible
4,50%	269,840,389,787	12.82%	6.40	1.20	Not Feasible
5,00%	266,864,273,372	12.35%	6.41	1.20	Not Feasible

Discussion

The study concludes that the South Surabaya Regional General Hospital (RSUD Surabaya Selatan) construction is financially feasible. The Net Present Value (NPV) is IDR 296.63 billion, indicating potential net profits over investment costs. The Internal Rate of Return (IRR) is 13.42%, above the Minimum Acceptable Rate of Return (MARR) of 12.99%, meeting investment criteria. The Benefit Cost Ratio (BCR) of 1.22 shows benefits exceed costs, and the Payback Period (PP) indicates a quick return of 6.29 years.

However, the sensitivity analysis reveals that changes significantly influence the project's operational costs. In an optimistic scenario, a reduction in operational expenses by 1%- 10% has a substantial positive impact on the project's financial feasibility. For example, a 10% cost reduction increases the NPV to IDR 356.15 billion and raises the IRR to 14.69%. These findings highlight that efficiency in operational cost management can enhance the project's profitability and provide a greater margin of safety against market fluctuations.

Conversely, in a pessimistic scenario, an increase in operational costs of 3.5% renders the project financially unfeasible. This is due to the decline in IRR to 12.96%, which falls below the MARR. This condition emphasizes the critical role of cost control in ensuring the project's feasibility. Strategies such as resource optimization, better contract negotiations, and the application of technology to improve operational efficiency can mitigate the risks associated with rising costs.

The primary expense in this project is salaries for both medical and non-medical staff, amounting to IDR 80.51 billion annually, followed by medical operational costs, which reach IDR 50.07 billion each year. These two cost categories are essential for the operation of RSUD Surabaya Selatan, making effective management crucial for the project's long-term viability. This research provides valuable insights to the Surabaya City Government, especially in shaping policies aimed at controlling hospital operational expenditures. Strategies such as optimizing costs through efficient resource management and expanding revenue streams are vital for maintaining the project's financial health. Additionally, upgrading the hospital's designation to Type B before the investment period ends is advisable, assuming cash flow

aligns with the projected figures. Thus, these insights can be invaluable for improving the management of healthcare facility investments in a more effective and sustainable way.

CONCLUSION

By the specified purpose, this study confirms that the investment in South Surabaya Regional General Hospital (RSUD Surabaya Selatan) is financially feasible based on the evaluation of Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PP), and Benefit Cost Ratio (BCR). The positive NPV of Rp 296.63 billion, an IRR of 13.42% exceeding the Minimum Attractive Rate of Return (MARR) of 12.99%, a payback period of 6.29 years, and a BCR of 1.22 all indicate that the project meets the feasibility criteria.

Additionally, the sensitivity analysis highlights the significant influence of cost variations on project viability. In an optimistic scenario, reducing operational costs by 1%-10% further strengthens feasibility, enhancing the project's financial returns. Conversely, in a pessimistic scenario, a cost increase of 3.5% renders the project unviable, underscoring the necessity of strict cost control and efficient management. Strategies such as resource optimization, better contract negotiations, and technological integration must be considered to mitigate financial risks.

As a policy recommendation, the Surabaya City Government should prioritize cost efficiency and hospital management optimization to sustain long-term financial viability. Furthermore, the potential upgrade of the hospital to Type B before the investment period ends could enhance service capacity and revenue generation, provided that cash flow aligns with projections. Future studies should explore additional factors influencing investment feasibility, such as regional economic conditions, service demand trends, and alternative financing models, to ensure a more comprehensive and sustainable healthcare investment.

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