

## INVESTMENT SENSITIVITY AND SERVICE LEVY TARIFF SCHEME: CASE STUDY OF EAST SURABAYA HOSPITAL

Arianti Widi Astasari<sup>1\*</sup>, Wateno Oetomo<sup>2</sup>, Sajiyo<sup>3</sup>

<sup>1-3</sup> Master of Civil Engineering Study Program, Faculty of Engineering,  
Universitas 17 Agustus 1945 Surabaya  
E-mail: <sup>1)</sup> [ariantiwidi@gmail.com](mailto:ariantiwidi@gmail.com), <sup>2)</sup> [wateno@untag-sby.ac.id](mailto:wateno@untag-sby.ac.id)

### Abstract

*As one of the largest cities in Indonesia, the City of Surabaya has an obligation to provide excellent health services for its residents. Consequently, the Surabaya City Government is required to provide a general hospital that can receive referrals from the government-owned Community Health Centers. To fulfill this obligation, the Surabaya City Government built the East Surabaya Hospital, located in the Rungkut Sub-District. East Surabaya Hospital is a strategic project that necessitates an investment feasibility analysis. This analysis was conducted using the Net Present Value (NPV), Internal Rate of Return (IRR), Payback Period (PP), and Benefit-Cost Ratio (BCR) parameters. Following the feasibility analysis, a sensitivity analysis was performed to examine changes in management costs and the health service levy rates for each tariff alternative. Based on the investment feasibility analysis of four tariff alternatives, two alternatives—alternative 1 and alternative 3—were deemed worthy investments. In contrast, alternatives 2 and 4 were found to be unfeasible, as the NPV parameter showed negative values and the IRR value was lower than the Minimum Acceptable Rate of Return (MARR). However, the sensitivity analysis indicated that alternatives 2 and 4 could become feasible if alternative 2's management cost is reduced by 14.4% and alternative 4's management cost is reduced by 2.8%. Conversely, alternative 1 might become unfeasible if the management cost increases by 7%, and alternative 3 might become unfeasible if the management cost increases by 3.1%.*

**Keywords:** Health Services, Investment Feasibility Analysis, Sensitivity Analysis, Tariff Alternatives, Management Costs

### 1. INTRODUCTION

Surabaya, the capital city of East Java Province, is strategically positioned to support urban development and growth. As stipulated in the Minister of Home Affairs Decree No. 100.1.1-6117 of 2022 concerning the Granting and Updating of Codes, Administrative Region Data, and Islands, the city spans an area of 335.925 km<sup>2</sup>. The northern boundary of Surabaya is bordered by the Java Sea and the Madura Strait, while its southern boundary borders Sidoarjo Regency. The western boundary adjoins Gresik Regency, and the eastern boundary is the Madura Strait. Topographically, most of Surabaya consists of lowland areas, with a small portion featuring hilly contours with relatively gentle slopes. These conditions make Surabaya an ideal city as one of the trade and service hubs on Java Island, particularly in East Java Province.

According to the Surabaya City Population and Civil Registry Office, the population registered as residents of Surabaya totals 3,009,286 people. However, not only the registered residents require attention; there are also individuals who reside in Surabaya both permanently and temporarily, outside the recorded population. This

contributes significantly to the city's population density, leading to various complex issues requiring special attention from stakeholders, particularly the local government.

In addition to the population density problem, the distribution of residents across Surabaya's 31 districts is also noteworthy. Not all areas have evenly distributed populations. Typically, these areas possess unique development potential and attractions, causing residents to prefer living and engaging in activities there. Consequently, the local government has made efforts to stimulate economic and social activities in areas with relatively low populations by developing supporting infrastructure and fostering community-based business initiatives, aiming to leverage the potential of these regions. Conversely, in densely populated areas, the local government prioritizes programs related to education, healthcare, environment, infrastructure, community empowerment, sanitation, and clean water. This is to ensure the quality of environmental, social, and economic services, which are basic services provided by the local government to the community in these areas.

The diverse urban development of Surabaya brings not only positive impacts but also some negative consequences. One significant negative impact is the emergence of densely populated residential areas with inadequate infrastructure, environmental, and sanitation conditions. To address this, the local government pays special attention to ensuring the quality of life, especially in densely populated areas prone to such issues. Achieving a decent quality of life is a fundamental need for everyone, not only for individuals but also for families, groups, and the general community. To attain this quality of life, the local government focuses on improving public health services through promotive, preventive, curative, and rehabilitative approaches, implemented comprehensively, integratively, and sustainably.

Given the aforementioned issues, the Surabaya City Government must prioritize the quality and quantity of essential public services, one of which is healthcare. To enhance healthcare access for Surabaya residents, the local government has facilitated 63 community health centers providing primary care and two general hospitals providing tertiary care: Dr. M. Soewandhie Hospital in central Surabaya and Bhakti Dharma Husada Hospital in west Surabaya.

Currently, Surabaya lacks secondary healthcare facilities provided by Class C and Class D hospitals. To ensure optimal basic healthcare services for residents, it is necessary to establish a tiered referral system in Surabaya, including the construction of a Class C General Hospital that can receive referrals from community health centers. Considering the need to improve service quality and equity in healthcare access, the local government is undertaking the construction of East Surabaya Hospital.

The construction of East Surabaya Hospital in the Rungkut Sub-District is a strategic project for the Surabaya City Government. Therefore, it is essential to conduct an investment feasibility analysis for the construction of East Surabaya Hospital, taking into account hospital management costs and service levy tariffs as stipulated by the local government.

Previous research by Agni (2022) on the financial feasibility of investment in hospital inpatient and outpatient service development analyzed cash flows considering all cost components, including investment costs, operational costs, and revenue from inpatient and outpatient services. This analysis employed the discounted cash flow

method with parameters such as Payback Period (PP), Net Present Value (NPV), and Internal Rate of Return (IRR). The research concluded that the investment was feasible based on the determined parameters. However, the study did not account for components that significantly influence the success or failure of the investment process. Therefore, this study includes a sensitivity analysis to evaluate the impact of various components on investment feasibility. This analysis, known as sensitivity analysis, assesses the influence of predetermined variables on overall investment feasibility.

The objective of this study is to analyze the sensitivity level of the East Surabaya Hospital investment in Rungkut Sub-District, Surabaya, concerning operational costs and to evaluate alternative tariff increase schemes for East Surabaya Hospital services considering feasibility aspects.

## 2. LITERATURE REVIEW

In this research, investment evaluation analysis will be carried out through conventional methods using the Payback Period (PP) indicator, while the Discounted Cash Flow (DCF) method will use 3 (three) parameters, namely Net Present Value (NPV), Internal Rate of Return (IRR) and Benefit Cost Ratio (BCR). The following will describe the explanation of the calculation method that will be used.

### 2.1. Net Present Value (NPV)

Net Present Value (NPV) is the comparison between the present value of net cash flows and the present value of investments over the investment's lifespan. NPV is a financial analysis used to determine the feasibility of investments by considering the present value of net cash flows expected to be received throughout the investment's life, compared to the present value of the initial investment outlay at a specific interest rate (Djuhatmoko et al., 2019). The formula for calculating Net Present Value (NPV) is as follows (Abdurrabby, 2019) :

$$NPV = \sum_{t=0}^n \left( \frac{(C)t}{(1+i)^t} \right) - \sum_{t=0}^n \left( \frac{(Co)t}{(1+i)^t} \right)$$

Indicators from NPV calculations are as follows:

- a) Positive NPV (+) indicates the investment is favorable and acceptable.
- b) Negative NPV (-) indicates the investment should be rejected.
- c) NPV equal to zero (0) is neutral, indicating it may be accepted or rejected.

### 2.2. Internal Rate of Return (IRR)

Internal Rate of Return (IRR) is a method used to measure the rate of return of an investment. Unlike the evaluation methods of Net Present Value (NPV) and Benefit Cost Ratio (BCR), which incorporate an interest rate as a factor in investment feasibility calculations, IRR aims to find the interest rate at which the NPV equals zero. This method can be employed to assess how effectively cash flows can recover investments and determine the magnitude of obligations that must be fulfilled (Isya et al., 2021). The

ability of cash flows to recover investments is referred to as the Internal Rate of Return (IRR) (Giatman, 2011). The formula for calculating IRR is as follows (Yan & Zhang, 2022) :

$$NPV = \sum \frac{B_t}{(1+r)^n} - \sum \frac{C_t}{(1+r)^n} = 0$$

Based on the above formula, where  $IRR=r$ , the benchmark that can be used to evaluate the feasibility of an investment using the IRR calculation is the Minimum Acceptable Rate of Return (MARR), where an investment is acceptable if the IRR exceeds the MARR value. The formula to determine MARR is as follows (Hidayat et al., 2021).

$$MAAR = (1 + i)(1 + f) - 1$$

### 2.3. Benefit Cost Ratio (BCR)

Benefit Cost Ratio (BCR) is a method that is often used in the initial evaluation stage of investment planning or as an additional analysis in order to validate the results of evaluations that have been carried out by other methods. In addition, this method is very good for evaluating government projects that have a direct impact on many people, both positive and negative impacts. The BCR calculation formula is as follows (Khairani et al., 2023) :

$$BCR = \frac{\text{Benefit}}{\text{Cost}} \quad \text{or} \quad \frac{\sum \text{Benefit}}{\sum \text{Cost}}$$

Based on the BCR method, the decision criteria used are as follows:

- 1)  $BCR \geq 1$ , then the investment project is feasible.
- 2)  $BCR < 1$ , then the investment project is not feasible.

The BCR method emphasizes the value of the comparison between the aspects of the benefits that will be obtained with the aspects of the costs and losses that will be borne (cost) with the investment.

### 2.4. Payback Period (PP)

Payback Period (PP) basically aims to determine how long the investment period will be returned when the break even point (BEP) condition occurs (Nathanael & Indryani, 2023). Based on the results of the payback period (PP) calculation, it can be assessed whether an investment is feasible or not by paying attention to the resulting payback period (PP) value. If the payback period (PP) value is smaller than the investment life, then the investment is declared feasible to run. The opposite applies, that if the payback period (PP) value is greater than the investment life, the investment is declared not feasible to run (Tenawaheng et al., 2021). To calculate the value of the payback period (PP), we can first look at the existing cash flow situation and use the following equation (Khairani et al., 2023):

$$PBP = n + \frac{a-b}{c-b} \times 1 \text{ year}$$

Where:

n : The last year in which the cash flow still does not cover the initial investment

a : Total initial investment

b : Cumulative amount of cash flow in the nth year

c : Cumulative amount of cash flow in year (n+1)

### 3. RESEARCH METHODS

#### 3.1. Research Subjects

The subject of this research is East Surabaya Hospital which is located on Jl. Medokan Asri Tengah, Medokan Ayu Village, Rungkut District, Surabaya. East Surabaya Hospital was built by the Surabaya City Government Health Office where the construction allocation was carried out through multi-year budgeting (multiyears) which was carried out in fiscal year 2023 and fiscal year 2024.

#### 3.2. Object

The object of the research is various kinds of costs that can affect the feasibility of investment, including investment costs, operational / management costs and income from health services at East Surabaya Hospital.

#### 3.3. Data Collection Procedure

In this study, data collection was obtained from interviews with parties involved in the construction of the East Surabaya Hospital, then documented as data that could be used in the research implementation process later. The observation method was also carried out in data collection with the aim of obtaining an overview of the implementation of the activities carried out.

The data collected in this study is categorized into primary and secondary types. Primary data includes interviews conducted with stakeholders such as the Surabaya City Government Budget Team and the Health Office, focusing on operational costs, service tariffs, and investment expenditures related to the Surabaya City Regional General Hospital. Observations cover the planned hospital site and comparisons with operational regional hospitals. Secondary data sources include documents from Surabaya's Regional Development Planning Agency on development plans and government work plans, financial data from the Financial and Asset Management Agency, spatial planning details from the Housing and Settlements Agency, and specific operational and tariff data from the Health Office.

#### 3.4. Data Analysis Technique

Data analysis is the process of systematically searching and compiling data obtained from interviews, field observations, information documentation and literature studies, then sorting it according to what the research will do.

### 3.5. Investment Evaluation Analysis

From the collected primary and secondary data concerning the feasibility factors of the East Surabaya Hospital investment, sensitivity analysis was conducted to assess the impact of varying factors on the success or failure during its implementation. Sensitivity analysis evaluates how changes in each factor affect the investment's performance, measured by indicators such as Net Present Value (NPV), Internal Rate of Return (IRR), Benefit Cost Ratio (BCR), and Payback Period (PP).

## 4. RESULTS AND DISCUSSION

### 4.1. Research Results

#### 4.1.1 Project Investment Costs Data

The investment costs for the East Surabaya Hospital are sourced as secondary data from the Budget Work Plan (RKA) of the Surabaya City Health Department allocated through multi-year budgeting for 2023 and 2024. However, construction payments were initiated in 2014 due to design adjustments, which impacted the project commencement. The detailed breakdown of investment costs for East Surabaya Hospital in Rungkut District is presented in the table below:

**Table 1. Investment Costs of East Surabaya Hospital**

| No.                               | Investment Cost Breakdown                                                                                                           | Total Cost (Rp.)             |
|-----------------------------------|-------------------------------------------------------------------------------------------------------------------------------------|------------------------------|
| 1                                 | Pre-construction costs<br>Licensing and AMDAL fees<br>Planning fee (DED)                                                            | 604.850.100<br>1.501.100.000 |
| 2                                 | Construction Costs<br>Cost of structure, architecture, infrastructure<br>and utilities<br>OHS cost<br>Parking lot construction cost | 302.144.400.000              |
| 3                                 | Supervision costs (construction management)                                                                                         | 4.749.980.000                |
| 4                                 | Management information system cost                                                                                                  | 1.515.800.000                |
| 5                                 | Medical device procurement cost                                                                                                     | 126.663.197.089              |
| 6                                 | Vehicle procurement cost                                                                                                            | 6.750.000.000                |
| <b>Total investment cost (Rp)</b> |                                                                                                                                     | <b>443.929.327.189</b>       |

Source: Surabaya City Health Office, processed by the author (2024)

Based on the description in table 1, the components that make up the investment cost of East Surabaya Hospital are pre-construction costs, construction costs, supervision costs, hospital management information system costs, medical equipment procurement costs and vehicle procurement costs. The component with the largest value in this investment is the cost of building a hospital, which is Rp. 302,144,400,000, where this value includes the cost of construction work, architectural fees, utility installation costs, K3 costs and parking lot development costs.

#### 4.4.2 Expenditure Data

The expenditure data for East Surabaya Hospital is secondary information obtained from projections by the Surabaya City Health Office based on the Budget Work Plan (RKA) of the operational Regional General Hospital (RSUD). This data is processed to provide detailed expenditure breakdowns for one year, as presented in the table below:

**Table 2. Expenditure Data for East Surabaya Hospital**

| No.                                | Details of Expenses                                                                                | Total Cost (Rp.)           |
|------------------------------------|----------------------------------------------------------------------------------------------------|----------------------------|
| 1                                  | Medical personnel salary expenditure                                                               | 83.944.761.788             |
| 2                                  | Medical operational expenditure<br>Inpatient<br>Outpatient<br>Laboratory<br>Pharmacy, etc.         | 60.049.509.863             |
| 3                                  | Non-medical employee salary expenditure<br>Directors and staff<br>Administrative & technical staff | 32.721.196.875             |
| 4                                  | Hospital support operational expenditure                                                           | 8.284.390.795              |
| 5                                  | Waste operational expenditure                                                                      | 807.646.089                |
| 6                                  | Vehicle maintenance expenditure                                                                    | 2.137.401.849              |
| 7                                  | Utility maintenance expenditure                                                                    | 4.037.044.366              |
| 8                                  | Medical equipment maintenance expenditure                                                          | 5.512.512.367              |
| 9                                  | Building maintenance expenditure                                                                   | 2.160.680.214              |
| 10                                 | Other expenditures<br>Licensing expenses (PBB, accreditation)<br>Training expenses                 | 109.789.636<br>876.644.508 |
| <b>Total cost of expenses (Rp)</b> |                                                                                                    | <b>200.641.578.350</b>     |

Source: Surabaya City Health Office, processed by the author (2024)

The components with the largest value in East Surabaya Hospital expenditure are medical personnel salary expenditure of Rp. 83,944,761,788 and medical operational expenditure of Rp. 60,049,509,863. Both of these are core components of East Surabaya Hospital services. The component details in table 2 are the projected expenditure costs incurred in the first year of investment.

#### 4.4.3 Revenue Source Data

Based on Government Regulation No. 47 of 2021 concerning the Implementation of Hospital Services and considering the projected patient visits from participants of the Health Insurance Benefit Receivers (PBI), it is necessary to differentiate revenue sources derived from the National Health Insurance (JKN) and general tariffs.

**Table 3. Hospital Revenue Projection**

| No.                           | Revenue Description              | Total (Rp)             |
|-------------------------------|----------------------------------|------------------------|
| <b>Health Service Revenue</b> |                                  |                        |
| 1                             | BPJS Emergency Room              | 3.992.901.952          |
| 2                             | General Emergency Room           | 1.108.800.000          |
| 3                             | Doctor Visite Services           | 628.320.000            |
| 4                             | BPJS Surgery                     | 11.673.772.488         |
| 5                             | General Surgery                  | 5.011.521.274          |
| 6                             | Medical Support Services         |                        |
|                               | Laboratory                       | 11.310.062.400         |
|                               | Radiology                        | 16.012.926.720         |
|                               | Blood Bank                       | 2.359.375.200          |
|                               | Hemodialysis                     | 2.065.585.560          |
|                               | Pharmacy                         | 20.454.408.000         |
| 7                             | BPJS Hospitalization             | 12.965.662.918         |
| 8                             | General Hospitalization          | 10.608.269.660         |
| 9                             | BPJS Outpatient                  | 52.944.845.654         |
| 10                            | General Outpatient               | 14.311.879.875         |
| <b>Other Income</b>           |                                  |                        |
| 1                             | Room Rental                      | 21.600.000             |
| 2                             | Education, Training and Research | 120.000.000            |
| 3                             | Medical Resume                   | 9.000.000              |
| 4                             | Parking                          | 281.543.500            |
| <b>Total (Rp)</b>             |                                  | <b>165.880.475.203</b> |

Source: Surabaya City Health Office, processed by the author (2024)

The source of revenue with the largest value in the overall revenue of East Surabaya Hospital is revenue sourced from outpatient and inpatient services, followed by revenue from the medical support service sector. Both components are core services in East Surabaya Hospital services. The component details in table 3 are projections of hospital revenue in the first year of service operation.

#### 4.4.4 Sensitivity Analysis of Hospital Management Costs

Sensitivity analysis of hospital management costs is presented in the following table:

**Table 4. Sensitivity Analysis to Management Fees**

| Changes | Investment Parameters    |        |      |      | Conclusion |
|---------|--------------------------|--------|------|------|------------|
|         | NPV                      | IRR    | PP   | BCR  |            |
|         | Alternative 1 (Increase) |        |      |      |            |
| 0.066   | 291,787,689,986          | 13.13% | 7.23 | 1.25 | Feasible   |
| 0.067   | 290,128,236,624          | 13.09% | 7.23 | 1.25 | Feasible   |
| 0.068   | 288,468,783,263          | 13.05% | 7.24 | 1.25 | Feasible   |
| 0.069   | 286,809,329,902          | 13.01% | 7.25 | 1.25 | Feasible   |

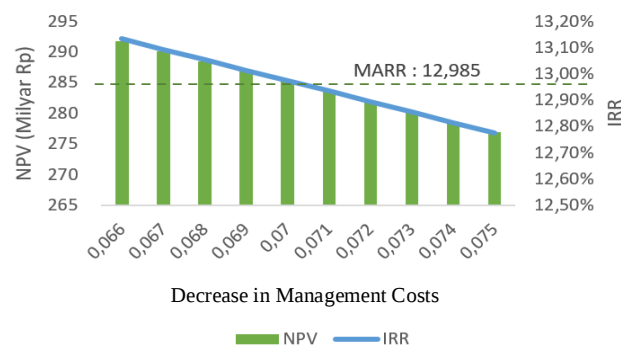
| Changes                         | Investment Parameters |        |      |      | Conclusion   |
|---------------------------------|-----------------------|--------|------|------|--------------|
|                                 | NPV                   | IRR    | PP   | BCR  |              |
| 0.070                           | 285,149,876,541       | 12.97% | 7.26 | 1.25 | Not Feasible |
| 0.071                           | 283,490,423,180       | 12.93% | 7.27 | 1.25 | Not Feasible |
| 0.072                           | 281,830,969,819       | 12.89% | 7.27 | 1.25 | Not Feasible |
| 0.073                           | 280,171,516,457       | 12.85% | 7.28 | 1.25 | Not Feasible |
| 0.074                           | 278,512,063,096       | 12.81% | 7.29 | 1.24 | Not Feasible |
| 0.075                           | 276,852,609,735       | 12.77% | 7.30 | 1.24 | Not Feasible |
| <b>Alternative 2 (Decline)</b>  |                       |        |      |      |              |
| 0.141                           | 218,301,212,790       | 12.84% | 6.68 | 1.23 | Not Feasible |
| 0.142                           | 219,960,666,151       | 12.89% | 6.67 | 1.23 | Not Feasible |
| 0.143                           | 221,620,119,512       | 12.94% | 6.65 | 1.23 | Not Feasible |
| 0.144                           | 223,279,572,874       | 12.99% | 6.64 | 1.23 | Feasible     |
| 0.145                           | 224,939,026,235       | 13.04% | 6.63 | 1.23 | Feasible     |
| 0.146                           | 226,598,479,596       | 13.09% | 6.62 | 1.23 | Feasible     |
| 0.147                           | 228,257,932,957       | 13.14% | 6.60 | 1.23 | Feasible     |
| 0.148                           | 229,917,386,318       | 13.19% | 6.59 | 1.23 | Feasible     |
| 0.149                           | 231,576,839,679       | 13.24% | 6.58 | 1.23 | Feasible     |
| 0.150                           | 233,236,293,041       | 13.29% | 6.57 | 1.24 | Feasible     |
| <b>Alternative 3 (Increase)</b> |                       |        |      |      |              |
| 0.026                           | 281,782,744,807       | 13.17% | 7.14 | 1.25 | Feasible     |
| 0.027                           | 280,123,291,446       | 13.13% | 7.15 | 1.25 | Feasible     |
| 0.028                           | 278,463,838,085       | 13.09% | 7.15 | 1.25 | Feasible     |
| 0.029                           | 276,804,384,724       | 13.05% | 7.16 | 1.25 | Feasible     |
| 0.030                           | 275,144,931,363       | 13.01% | 7.17 | 1.25 | Feasible     |
| 0.031                           | 273,485,478,002       | 12.97% | 7.18 | 1.24 | Not Feasible |
| 0.032                           | 271,826,024,640       | 12.93% | 7.19 | 1.24 | Not Feasible |
| 0.033                           | 270,166,571,279       | 12.88% | 7.20 | 1.24 | Not Feasible |
| 0.034                           | 268,507,117,918       | 12.84% | 7.20 | 1.24 | Not Feasible |
| 0.035                           | 266,847,664,557       | 12.80% | 7.21 | 1.24 | Not Feasible |
| <b>Alternative 4 (Decline)</b>  |                       |        |      |      |              |
| 0.022                           | 249,190,345,887       | 12.73% | 7.11 | 1.24 | Not Feasible |
| 0.023                           | 250,849,799,248       | 12.78% | 7.10 | 1.24 | Not Feasible |
| 0.024                           | 252,509,252,610       | 12.82% | 7.28 | 1.24 | Not Feasible |
| 0.025                           | 254,168,705,971       | 12.86% | 7.08 | 1.24 | Not Feasible |
| 0.026                           | 255,828,159,332       | 12.91% | 7.07 | 1.24 | Not Feasible |
| 0.028                           | 259,147,066,054       | 12.99% | 7.05 | 1.24 | Feasible     |
| 0.029                           | 260,806,519,415       | 13.04% | 7.04 | 1.24 | Feasible     |
| 0.030                           | 262,465,972,777       | 13.08% | 7.04 | 1.24 | Feasible     |
| 0.031                           | 264,125,426,138       | 13.13% | 7.03 | 1.25 | Feasible     |
| 0.032                           | 265,784,879,499       | 13.17% | 7.02 | 1.25 | Feasible     |

Source: Author's Processed Data (2024)

Based on the above Table 4, the following conclusions can be drawn:

1. Alternative Tariff 1 is deemed not feasible and quite sensitive if hospital management costs increase above 7%.
2. Alternative Tariff 2 is considered feasible and quite sensitive if hospital management costs decrease by at least 14.4%.
3. Alternative Tariff 3 is deemed not feasible and quite sensitive if hospital management costs increase above 3.1%.
4. Alternative Tariff 4 is considered feasible and quite sensitive if hospital management costs decrease by at least 2.8%.

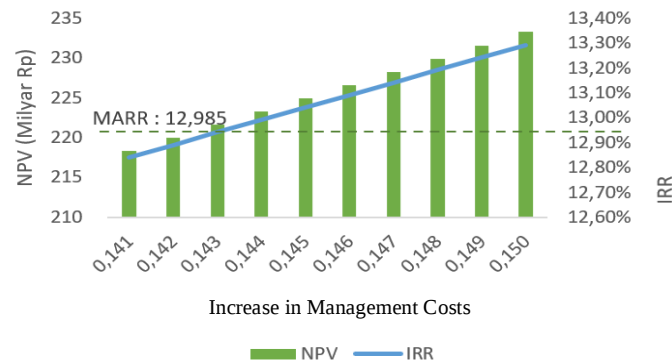
The following can be illustrated the sensitivity of the NPV and IRR values to changes in the amount of hospital management costs can be presented in the following graph:



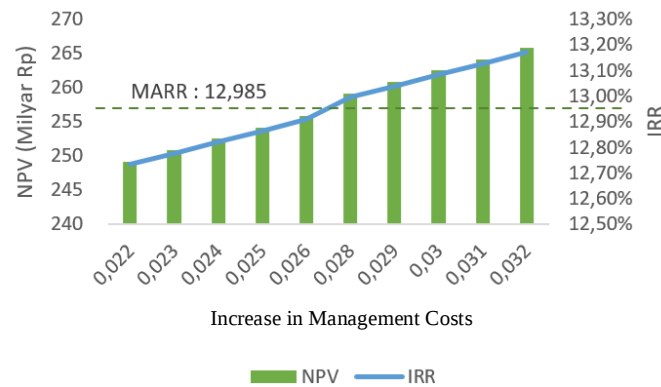
**Figure 1. Sensitivity graph of the amount of hospital management costs to NPV and IRR in the Alternative 1 scheme**  
Source: Author's Processed Data, 2024



**Figure 2. Sensitivity graph of the amount of hospital management costs to NPV and IRR in the Alternative 2 scheme**  
Source: Author's Processed Data, 2024



**Figure 3. Sensitivity graph of the amount of hospital management costs to NPV and IRR in the Alternative 3 scheme**  
Source: Author's Processed Data, 2024



**Figure 4. Sensitivity graph of the amount of hospital management costs to NPV and IRR in the Alternative 4 scheme**  
Source: Author's Processed Data, 2024

## 5. CONCLUSION

Based on the analysis conducted, the four alternative tariff schemes can be implemented as long as the hospital management cost constraints derived from the sensitivity analysis are considered. The alternative schemes are as follows:

5. Alternative 1: An 8% annual tariff increase for all hospital services, both general and BPJS services, becomes unfeasible if hospital management costs rise above 7%.
6. Alternative 2: A 10% tariff increase for general services every two years is feasible if there is a minimum 14.4% reduction in hospital management costs.
7. Alternative 3: An 8% annual tariff increase for general services and a 6% annual increase for BPJS services becomes unfeasible if hospital management costs rise above 3.1%.
8. Alternative 4: An 8% annual tariff increase for general services and a 6% increase for BPJS services every two years is feasible if there is a minimum 2.8% reduction in hospital management costs.

## REFERENCES

- Abdurabby, J. (2019). Prosiding Teknik Pertambangan Analisis Sensitivitas Net Present Value (NPV) terhadap Perubahan Parameter Harga Jual dan Biaya Produksi pada Penambangan Tras di CV An-Nakhl Desa Cupang Kecamatan Gempol Kabupaten Cirebon Provinsi Jawa Barat. <https://doi.org/10.29313/pertambangan.v6i2.23826>
- Agni, M. K. (2022). Analisis Investasi Studi KeFeasiblean Rencana Pengembangan Layanan Rawat Inap Dan Rawat Jalan Rumah Sakit. *Jurnal Formil (Forum Ilmiah) Kesmas Respati*, 7(3). <https://doi.org/10.35842/formil.v7i3.448>
- Djuhatmoko, N., Purwanto, W., & Tjahjono, A. (2019). Analisis Investasi Pengadaan Alat Radioterapi (Linear Accelerator) Dengan Metoda Net Present Value, Payback Period Dan Internal Rate Of Return Di Rumah Sakit Umum Pusat Dr. Sardjito Yogyakarta. *STIE Widya Wiwaha*.
- Giatman, D. M. (2011). *Ekonomi Teknik*. Rajagrafindo.
- Hidayat, A. F., Kurniawan, H., & Widyasari, R. (2021). Analisis KeFeasiblean Finansial Agroindustri Kerupuk Kulit Menggunakan Mesin Peniris di Kecamatan Selong, Kabupaten Lombok Timur. *Agroteknika*, 4(1), 11–19. <https://doi.org/10.32530/agroteknika.v4i1.75>
- Isya, M., Sugiarto, S., & Harja, J. (2021). Sensitivitas KeFeasiblean Ekonomi Pada Rencana Pembangunan Jembatan Lawe Alas–Pedesi Kabupaten Aceh Tenggara Provinsi Aceh. *Teras Jurnal: Jurnal Teknik Sipil*, 11(1), 140–148.
- Khairani, D. U., Andreas, A., & Nur Arini, R. (2023). Analisis KeFeasiblean Investasi Pengembangan Bisnis Konstruksi Dengan Pendekatan Life Cycle Construction. *Jurnal ARTESIS*, 3(1). <https://doi.org/10.35814/artesis.v3i1.5032>
- Nathanael, R. A., & Indryani, R. (2023). Analisis Sensitivitas KeFeasiblean Finansial The Bay Apartment Bandar Lampung. *Jurnal Teknik ITS*, 12(1), C21–C28.
- Tenawaheng, P. P. R., Utomo, C., & Wiguna, I. P. A. (2021). Analisis sensitivitas investasi apartemen begawan. *Jurnal Teknik ITS*, 10(1), D25–D30.
- Yan, R., & Zhang, Y. (2022). The Introduction of NPV and IRR. *Proceedings of the 2022 7th International Conference on Financial Innovation and Economic Development (ICFIED 2022)*, 648. <https://doi.org/10.2991/aebmr.k.220307.241>

## Copyrights

Copyright for this article is retained by the author(s), with first publication rights granted to the journal.

This is an open-access article distributed under the terms and conditions of the Creative Commons Attribution license (<http://creativecommons.org/licenses/by/4.0/>).