International Journal of Mechanical, Electrical and Civil Engineering
Volume. 2 Number. 1, 2025
e-ISSN : 3047-4531, and p-ISSN : 3047-4523, Page. 55-66
DOI: https://doi.org/10.61132/ijmecie.v2i1.133
Available online at: https://international.aritekin.or.id/index.php/IJMECIE

Analysis of the Sensitivity Level of Investment in the Development of Regional Public Hospitals (RSUD) Bhakti Dharma Husada Surabaya City on the Components of Revenue Costs, Management Costs and Interest Rates

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Abstract. *Since its first operation in 2010, Bhakti Dharma Husada Regional Public Hospital (RSUD) has experienced an increase in patient demand for health services. Some services now require additional space. Moreover, there is a growing need for executive and VIP services. To address these needs, Bhakti Dharma Husada Regional Public Hospital is planning to enhance its services by constructing a new building. Based on the results of investment analysis obtained Net Present Value (NPV) of Rp. 1,373,606,103,022, Payback Period (PP) for 6.89 years, Internal Rate of Return (IRR) value of 17.39% is greater than the Minimum Attractive Rate of Return (MARR) value of 9.21% (IRR> MARR), Benefit Cost Ration (BCR) of 1.28, then the investment is declared feasible. In addition, based on the results of the sensitivity analysis, the investment feasibility limit is obtained, namely the development of the hospital becomes unfeasible if the service tariff is reduced by 15% or the operating costs are increased by 15% or the interest rate is increased by 13%.*

Keywords *Investment, Hospital, Feasibility, Construction*

1. INTRODUCTION

Surabaya, being the capital of East Java Province, is not only the hub of government and economy but also the largest city in the region. Following Jakarta, Surabaya is the second most populous city in Indonesia. Covering an area of 335.925 km2, Surabaya is home to a population of 3,009,286 people who identify themselves as residents of the city. Comprising of 31 sub-districts and 154 villages, Surabaya City's largest sub-district in terms of area is Benowo, covering approximately 23.73 km2. The high population density in Surabaya City leads to a range of complex issues that require the full attention of stakeholders, particularly the Local Government. One of the negative impacts of the development of Surabaya City that is currently being faced is the emergence of densely populated residential areas with inadequate infrastructure, environment and sanitation facilities. For this reason, the Local Government pays special attention in terms of ensuring the quality of life of the community, especially those in densely populated areas that are vulnerable to these problems. One of them is the provision of quality health services through promotive, preventive, curative and rehabilitative approaches that are carried out in a comprehensive, integrated and sustainablev (Aditrio & Oetomo, 2023; Sibuea et al., 2022). In the 1945 Constitution of the Republic of Indonesia (UUD 1945), it is mentioned that

Received Desember 05, 2024; Revised Desember 20, 2024; Accepted Desember 31, 2024;
Published: Janjuari 03, 2025

healthcare is a fundamental right for all individuals. Additionally, one of the goals outlined in the Surabaya City Government's Medium-Term Development Plan (also known as RPJM) for the health sector is to enhance public health, provide accessible and affordable healthcare services, and promote a healthy environment and lifestyle.

The Surabaya city government is striving for equitable distribution of health infrastructure that is adequate and in accordance with the Minimum Service Standards (SPM) in the health sector. This effort is still a problem for the Surabaya City Government, especially in fulfilling health infrastructure facilities for the West Surabaya area, even though development and economic activity are growing very rapidly in West Surabaya.

The Surabaya City Government is planning to enhance health services for the community by developing the Bhakti Dharma Husada Regional Public Hospital (RSUD), taking into account advancements in health science, technology, and the socio-economic factors of the community. The aim is to provide high-quality and affordable services to achieve optimal health outcomes. The hospital is being constructed on Surabaya City Government land on Jl. Raya Kendung No.115-117, situated in Sememi Village, Benowo District, Surabaya City.

Until 2019, before the covid-19 pandemic, the Bhakti Dharma Husada Regional Public Hospital (RSUD) was growing rapidly and patient visits to health services had increased. Some services require more space. In addition, there is a community need for executive and VIP services. Since its first operation in 2010, the Bhakti Dharma Husada Regional Public Hospital (RSUD) has only carried out renovations in 2021, namely the construction of the PCR laboratory building and the intermediate care room (RPI). Regional Public Hospital (RSUD) Bhakti Dharma Husada has never carried out large-scale development to increase service capacity. Meanwhile, the types and number of services continue to grow.

To address the issue faced, the Bhakti Dharma Husada Regional Public Hospital (RSUD) plans to develop services by constructing a new building for the Bhakti Dharma Husada Regional Public Hospital (RSUD). The new building is planned to be used for the development of old services and the provision of new services (Astasari et al., 2024a)v. Related to the plan, it is necessary to prepare an investment feasibility analysis of the Development of Regional Public Hospital (RSUD) Bhakti Dharma Husada Surabaya City.

Regional Public Hospital (RSUD) Bhakti Dharma Husada now has a capacity of 207 beds. In accordance with the Standards for the Implementation of Hospitals Class B, C and D Directorate of Specialised Medical and Dental Services, Directorate General of Medical

Services, Ministry of Health of the Republic of Indonesia in 2005, the Bhakti Dharma Husada Hospital is classified as class B. For this reason, it is necessary to analyse investment activities in hospitals so as to produce alternative business patterns that are efficient but still prioritise quality in order to maintain hospital competitiveness with other private health facilities.

Based on previous research conducted by Agni (2022) related to the financial feasibility of investing in Hospital Inpatient and Outpatient Service Development Plans, cash flow analysis has taken into account all cost components including investment costs, operational costs and revenue derived from inpatient and outpatient service rates. An evaluation of the investment was conducted by analysing the costs and using the discounted cashflow method, considering parameters like Payback Period (PP), Net Present Value (NPV) and Internal Rate of Return (IRR). The results of the analysis indicate that the investment is viable and can be implemented. This is evident from the positive Net Present Value (NPV), a higher Internal Rate of Return (IRR) than expected, and a shorter Payback Period (PP) compared to the planned duration of the investment (Hardi et al., 2024). However, the research has not taken into account the components that have a high enough influence on the success or failure in the process of investment activities. Therefore, in addition to calculating the investment feasibility analysis, it is also necessary to analyse the effect of changes in cost components on investment feasibility (Pradana et al., 2024). This analysis is known as sensitivity analysis, where the variables that have been determined will be analysed for their level of influence on the overall investment feasibility. The variables can be selected based on the highest level of fluctuation against changes in global economic conditions, the level of vulnerability to policy changes, or variables that want to be changed in implementing a business development innovation.

In compiling the research as described above, it takes several stages of research implementation so that the research preparation process has a systematic flow. As an initial stage of research, it can begin with the research preparation stage which is carried out to study the theoretical basis and previous research as a reference and open the researcher's insight. After that, it can be continued with the data identification stage, where the data to be collected can be classified based on the method of acquisition, namely primary data obtained through discussions with authorised agencies in overseeing the investment in the Development of the Bhakti Dharma Husada Regional Public Hospital (RSUD), both from the planning, design, implementation and procurement stages and secondary data obtained from city planning and budgeting documents that have been published on the Surabaya City

Government agency portal. After identifying the data to be collected, it can be continued at the data collection stage.

The information for this study was sourced from the Surabaya City Government's internal departments responsible for managing the planning, financial allocations, and execution of projects at the Bhakti Dharma Husada Regional General Hospital (RSUD). After the data is obtained, the data is categorised based on cost components, namely investment cost components, management cost components and revenue projection components. In each of these cost components, research is conducted and analysed so that the cash flow of investment in each alternative scheme can be compiled. After the cash flow has been prepared for each alternative scheme of health service levy tariff, the next step is to examine the feasibility of the investment. An evaluation was conducted to determine the viability of an investment based on factors such as Payback Period, Net Present Value, Internal Rate of Return, and Benefit Cost Ratio. Following this, a sensitivity analysis was performed on two cost variables - hospital management costs and revenue costs from health service tariffs. This analysis involved adjusting the values of these variables to gauge their impact on the overall feasibility of the investment. The purpose of this exercise was to understand how changes in the two cost components could potentially influence the success of the investment (Astasari et al., 2024b). Variables that are assumed to experience changes can be more than 1 (one) variable, but in the analysis it is assumed that changes will only occur alternately in one of the variables, so that changes in variables do not occur together. Then, to analyse changes in other variables, the changes will be analysed separately. In the final stage of the research, a conclusion will be drawn based on the analysis carried out, as well as several alternative suggestions for project owners in setting tariff setting policies and limiting management costs, as well as evaluating the research conducted so that suggestions can also be formulated for future researchers to develop the research that has been carried out.

The development of Bhakti Dharma Husada Regional Public Hospital (RSUD) is one of the strategic projects for the Surabaya City Government, so the results of this study are expected to contribute to the continuity of investment in the development of Bhakti Dharma Husada Regional Public Hospital (RSUD). From the results of this study, it will be possible to know the level of investment feasibility categorised based on several alternative tariff adjustments that are possible to do. Not only aims to assess whether the investment made is feasible enough, but the analysis carried out is also able to describe alternative patterns of limitation of each cost component that can be applied so that the investment made can still

be declared as a feasible investment and can generate the expected profit. Based on the analysis concluded, it can provide an overview of the limits to the management cost components and the amount of service tariffs that can be changed while still paying attention to the standards of investment feasibility of the Bhakti Dharma Husada Regional Public Hospital Development (RSUD). Of course, this is useful in formulating service tariff policies and limiting hospital management costs for project owners, in this case the Surabaya City Government.

Given the information provided previously, the aim of this research is to assess how investments in the Development of Regional Public Hospital (RSUD) Bhakti Dharma Husada Surabaya City are affected by revenue costs, management costs, and interest rates.

2. METHODS

Research Subject

This study focuses on the Bhakti Dharma Husada Regional Public Hospital (RSUD) which located at Jl. Kendung No.115-117, Semampir Village, Benowo District, Surabaya. The construction of Bhakti Dharma Husada Regional Public Hospital (RSUD) was initiated by the Health Office of the Surabaya City Government.

The decision to build Regional Public Hospital (RSUD) Bhakti Dharma Husada was influenced by various factors including geographical, demographic, and economic considerations. Benowo sub-district, with an area of approximately 23.73 km2, was chosen as the location due to its size and location. Benowo sub-district is a strategic location to be developed into an independent residential area equipped with trade and service facilities, given the number of settlements that are growing rapidly in Benowo sub-district. Demographically, the population in Benowo Sub-district is quite dense at 72,228 people as recorded in the Population and Civil Registration Office. The final aspect to consider is the economic factor, as the Regional Public Hospital (RSUD) Bhakti Dharma Husada is situated on land owned by the Surabaya City Government, which is advantageous for investment since there is no additional cost required for purchasing land.

Object

The object of this research consists of:

1. Different types of expenses can impact the viability of an investment, such as initial investment expenses, day-to-day operating costs, and potential earnings from health services at the Development of Regional Public Hospital (RSUD) Bhakti Dharma Husada;

2. Sensitivity of factors affecting investment in the Development of the Regional Public Hospital (RSUD) Bhakti Dharma Husada, namely health service tariffs and operational costs.

Location

The focus of this study is the Bhakti Dharma Husada Regional Public Hospital (RSUD), situated at Jl. Kendung No.115-117, Sememi, Kec. Benowo, Surabaya, East Java 60198. The geographical coordinates place the hospital between 070 21' South latitude and 1120 36' to 1120 54' East longitude. According to the building permit issued by the Head of Surabaya City Cipta Karya and Spatial Planning Office on 5 September 2009, the total area of the hospital is 15,668,998 m^2.

Research Instruments

The tools utilised for this study include interview scripts and observation forms, serving as means for collecting data (Birmingham & Wilkinson, 2003).

Data Collection Procedure

Data for the research on the Bhakti Dharma Husada Regional Public Hospital (RSUD) was gathered through interviews with relevant stakeholders, which was then recorded for later use in the research process. Observations were also made during data collection in order to gain a better understanding of the activities being undertaken.

Based on the type, the data collected in this research can be categorised as follows:

Primary Data

a. Interview

Interviews related to financing the development of Bhakti Dharma Husada Hospital covered aspects such as operational cost components, service tariffs, and hospital development budgets. This interview was conducted with the Surabaya City Government Budget Team, which acts as a planner and financial manager, as well as the Head of Government and Human Development at the Regional Development Planning, Research and Development Agency.

b. Observation

The proposed Hospital development is situated at 115-117 Kendung Street in the Sememi Village of Benowo District, Surabaya.

Secondary Data

a. Regional Development Planning, Research and Development Agency of Surabaya City:
   1) FS Document of Hospital Development

b. Surabaya City Health Office :
   1) Detailed data on health service tariffs
   2) Detailed data of hospital operational costs

Data Analysis Technique

Data analysis techniques are carried out with Sensitivity analysis. Sensitivity analysis is carried out with the aim of seeing the effect of a change in existing cost components. Changes in cost components can occur due to changes in circumstances or to adapt to existing business competition. Following the completion of the investment assessment using the predetermined method from the previous phase, a sensitivity analysis is conducted, considering the impact of variations in each component analysed on the profitability of the investment (Nathanael & Indryani, 2023). The sensitivity parameters reviewed in this study are as follows:

a. Hospital health service tariffs.
b. Hospital management fee.

3. RESULTS

Sensitivity Evaluation Results

Sensitivity analysis is needed in order to determine the extent to which the impact of investment parameters has been determined previously can change due to factors of situations and conditions during the life of the investment. so that these changes will result in a significant effect on the decisions that have been taken. Sensitivity analysis is reviewed based on three parameters, namely hospital service rates, hospital management costs and interest rates.

Sensitivity to Hospital Service Rates

Sensitivity analysis of service tariffs of the Bhakti Dharma Husada Regional General Hospital (RSUD) is presented in the table 1 as follows:

Table 1. Sensitivity Analysis of Service Tariffs at BDH Hospital.

Service Tariff Parameters					
Changes	**NPV**	**IRR**	**PP**	**BCR**	**Conclusion**
-17%	Rp 138.805.619.476,67	4,52%	9,14	1,07	Not Feasible
-15%	Rp 284.076.264.599,64	6,18%	8,85	1,09	Not Feasible
-10%	Rp 647.252.877.407,06	10,13%	8,18	1,16	Feasible
-5%	Rp 1.010.429.490.214,48	13,85%	7,5	1,22	Feasible
0%	Rp 1.373.606.103.021,91	17,39%	6,89	1,28	Feasible
5%	Rp 1.736.782.715.829,33	20,80%	6,35	1,35	Feasible
6%	Rp 1.809.418.038.390,81	21,47%	6,25	1,36	Feasible

Service Tariff Parameters					
Changes	**NPV**	**IRR**	**PP**	**BCR**	**Conclusion**
7%	Rp 1.882.053.360.952,30	22,14%	6,16	1,37	Feasible
8%	Rp 1.954.688.683.513,78	22,80%	6,08	1,39	Feasible
10%	Rp 2.099.959.328.636,75	24,12%	5,87	1,41	Feasible

Source: Author's Processed Data, 2024

Based on the table 1, it can be concluded that the investment becomes unfeasible when there is a decrease in hospital service rates reaching -15%. From the calculation results, a 5% change in service rates can cause a 26.44% change in NPV value against the initial NPV value. The graph of the relationship between hospital service rates and NPV can be seen in Figure 1.

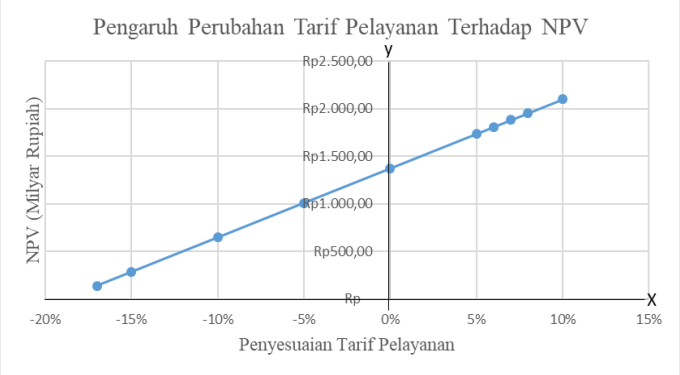

Figure 1. Sensitivity Graph of Changes in Hospital Service Rates to NPV
Source: Author's Processed Data, 2024

Sensitivity to Hospital Management Fee

Sensitivity analysis of the management costs of the Bhakti Dharma Husada Regional General Hospital (RSUD) is presented in the table 2 below:

Table 2. Sensitivity Analysis of Management Cost of BDH Hospital.

Operating Cost Parameters						
Changes	**NPV**		**IRR**	**PP**	**BCR**	**Conclusion**
-20%	Rp	2.426.803.859.824,74	29,01%	4,96	1,57	Feasible
-15%	Rp	2.163.504.420.624,03	26,04%	5,41	1,49	Feasible
-10%	Rp	1.900.204.981.423,32	23,11%	5,96	1,41	Feasible
-5%	Rp	1.636.905.542.222,61	20,23%	6,40	1,34	Feasible
0%	Rp	1.373.606.103.021,91	17,39%	6,89	1,28	Feasible
5%	Rp	1.110.306.663.821,20	14,58%	7,39	1,23	Feasible
10%	Rp	847.007.224.620,49	11,79%	7,96	1,18	Feasible
15%	Rp	583.707.785.419,78	9,02%	8,40	1,13	Not Feasible
20%	Rp	320.408.346.219,08	6,25%	8,88	1,09	Not Feasible
23%	Rp	162.428.682.698,65	4,59%	9,16	1,06	Not Feasible

Source: Author's Processed Data, 2024

Based on the table 2, it can be concluded that the investment becomes unfeasible when the increase in operating costs reaches 15%. From the calculation results, a 5% change in operating costs can cause a 19.17% change in NPV value to the initial NPV value. The graph of the relationship between hospital operating costs and NPV can be seen in Figure 2.

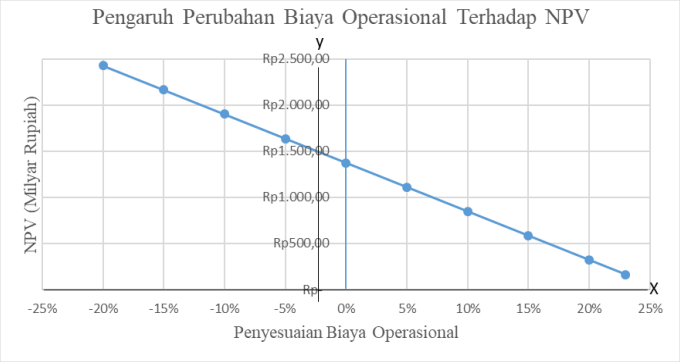

Figure 2. Sensitivity graph of changes in hospital management costs Hospital Management Cost Changes to NPV

Source: Author's Processed Data, 2024

Sensitivity to Interest Rate

Sensitivity analysis to interest rates is presented in the table 3 below:

Table 3. Sensitivity Analysis to Interest Rate.

Interest Rate Parameters				
Changes	**NPV**	**IRR**	**MARR**	**Conclusion**
6,00%	Rp 1.373.606.103.021,91	17,39%	9,21%	Feasible
7,00%	Rp 1.217.174.665.695,93	17,39%	10,24%	Feasible
8,00%	Rp 1.074.132.508.001,53	17,39%	11,27%	Feasible
9,00%	Rp 943.205.988.779,64	17,39%	12,30%	Feasible
10,00%	Rp 823.254.379.277,05	17,39%	13,33%	Feasible
11,00%	Rp 713.254.821.869,30	17,39%	14,36%	Feasible
12,00%	Rp 612.289.117.996,79	17,39%	15,39%	Feasible
13,00%	Rp 519.532.107.964,20	17,39%	16,42%	Feasible
14,00%	Rp 434.241.437.922,62	17,39%	17,45%	Not Feasible
15,00%	Rp 355.748.537.275,11	17,39%	18,48%	Not Eligible

Source: Author's Processed Data, 2024

Based on the table 3 above, it can be concluded that the investment becomes unfeasible when there is an increase in interest rates reaching 14%. From the calculation results, it is concluded that the greater the interest rate, the smaller the change in NPV value. The graph of the relationship between interest rates and NPV can be seen in Figure 3.

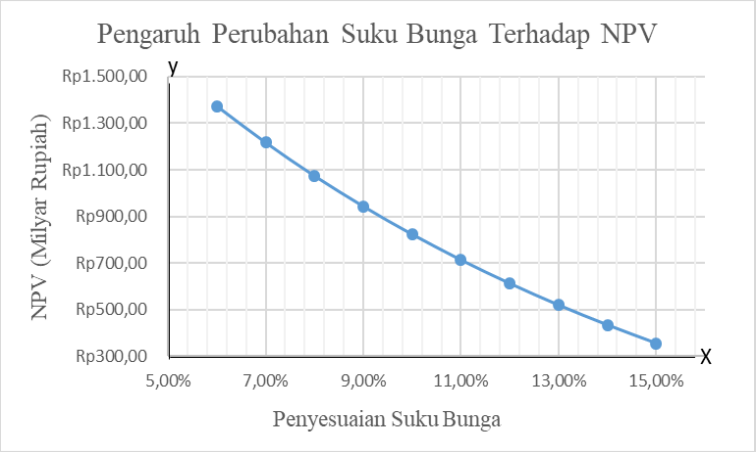

Figure 3. Graph of Interest Rate Changes against NPV
Source: Author's Processed Data, 2024

Based on the discussion of the sensitivity analysis above. The level of sensitivity of investment in the development of the Bhakti Dharma Husada Regional General Hospital (RSUD) found that changes in service rates are more sensitive than changes in operating costs and changes in interest rates that are getting bigger cause changes in NPV values to get smaller.

4. CONCLUSION

Based on the results of investment evaluation and sensitivity analysis of adjustments to management costs and potential revenue for the development of the Bhakti Dharma Husada Regional General Hospital (RSUD) on the Net Present Value (NPV) parameter. Internal Rate of Return (IRR). Payback Period (PP) and Benefit Cost Ratio (BCR). then produce the following conclusions:

a. Adjustment of service tariffs is feasible, but when the reduction in service tariffs is up to 15%, the investment becomes unviable and a 5% change in service tariffs can cause a 26.44% change in NPV value to the initial NPV value.
b. Adjustment of management costs with an increase in costs of up to 10% or a decrease in costs of up to 20% still provides a feasible prospect for investment to be implemented, but when the increase in operating costs is up to 15%, the investment becomes unviable and a 5% change in operating costs can cause a change in NPV value of 19.17% against the initial NPV value.
c. Interest rate adjustment shows the limit of investment feasibility at a maximum interest rate of 13%, above this value the investment becomes unviable.

It can be concluded from the discussion of the sensitivity analysis above that service tariffs are more sensitive to changes than operating costs and that larger changes in interest rates cause smaller changes in NPV values.

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