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INVESTMENT ANALYSIS ON THE DEVELOPMENT OF WATU ULO FISHING PORT BASED ON FINANCIAL ASPECTS AND SENSITIVITY ASPECTS

Tati Mushalihati Ratuinsani[1*], Haris Muhammadun[2], Laksono Djoko Nugroho[3]
[1-3]Master of Civil Engineering, Faculty of Engineering, Universitas 17 Agustus 1945 Surabaya
E-mail: [1)] atuinsanitati@gmail.com, [2)] hardun.wtu1@gmail.com,
[3)] laksononugroho7366@gmail.com

Abstract

Watu Ulo Beach serves as a vital hub for fishing communities, supplying resources for sea fishing and serving as a landing point for catches. The local government plans to construct a fishing port at Watu Ulo to enhance facilities for fishermen. This study assesses the financial feasibility and sensitivity of investing in the port's construction, considering three income scenarios: pessimistic, moderate, and optimistic. Financial analysis using NPV, IRR, BCR, and PP methods deems the project feasible for moderate and optimistic scenarios, but not for the pessimistic scenario due to IRR (6.15%) < MARR (7.72%). Sensitivity analysis reveals that revenue sensitivity is critical for all scenarios, with the investment becoming unfeasible if revenue falls below certain thresholds: -13.67% for pessimistic, -39.96% for moderate, and -40.75% for optimistic scenarios. Operating cost sensitivity is also crucial, rendering the investment unfeasible if costs deviate beyond specific thresholds: -15.96% for pessimistic, +22.67% for moderate, and 25.59% for optimistic scenarios.

Keywords: *Fishing Port, Financial Analysis, Sensitivity Analysis*

1. INTRODUCTION

The construction of the Fishing Port is a way from the Regional Government, namely the East Java Provincial Maritime and Fisheries Service, to be able to support fishermen in order to catch fish properly and get abundant results in order to increase the potential for regional original income (PAD) from the fisheries sector.

Based on data from the East Java Provincial Maritime and Fisheries Service as the manager of the Fishing Port, it is obtained that the data of ships leaning on Watu Ulo Beach are around 63 units of Payang boats, and 400 units of fishing boats using hand line fishing gear or fishing rods. And the type of fish catch is in the form of grouper, layur fish and several other types of reef fish. For the catch of Payang nets in the form of tuna, fly fish, lemuru, selar, skipjack, baby tuna and several other types of pelagic fish.

In this study, an investment feasibility analysis of the Watu Ulo Fishing Port in Jember Regency was conducted. (Kristiawan et al., 2017)The investment feasibility analysis carried out was reviewed based on financial aspects and sensitivity aspects. The purpose of this research is to test whether or not the investment in the construction of a fishing port in Watu Ulo, Jember Regency, is feasible if it is built. This aims to avoid unfavorable things such as errors in building technical planning, errors in estimating the target market, constraints in construction implementation, cost overruns, and errors in planning the management of fishing ports.

2. LITERATURE REVIEW

2.1. Previous Research

Research conducted by (Frederika et al., 2017) aims to determine the feasibility of hotel development in Nusa Dua Bali. The feasibility analysis used in this study uses cash flow analysis, NPV, BEP, BCR and PP.

Research conducted by (Nugraheni, 2020) aims to determine whether or not it is feasible to invest in Heavy Equipment based on pessimistic scenarios, moderate scenarios, optimistic scenarios from financial aspects and sensitivity aspects. (Giatman, 2006)The financial aspect is carried out economic analysis using the NPV, IRR, BEP, and PP methods.

Research conducted by Soehendra Wardhana. (2022) aims to determine the feasibility of investment in the construction of apartments in Batam. Financial feasibility analysis is carried out by NPV and IRR methods, two alternatives are made, namely alternatives based on value and alternatives based on design.

2.2. Investment Feasibility Analysis

Analysis is the investment of capital for one or more assets that are owned and usually have a long term in the hope of getting profits in the future. According to some experts, what is meant by investment is:

1. Ahmad K, 1996 Investment is placing money or funds in the hope of obtaining certain additional or profit on the money or funds.
2. Budikusuma W, 2011, Investment is using resources (money, time, goods) to create an addition to existing facilities.

2.3. Port

According to Law No.17 of 2008 concerning shipping, it is stated that a port is a place consisting of land and / or waters with certain boundaries as a place of government activities and business activities that are used as a place for ships to lean, up and down passengers, and / or loading and unloading goods, in the form of terminals and ship berths equipped with shipping safety and security facilities and port support activities as well as a place for intra-and intermodal transportation movements.

3. RESEARCH METHODS

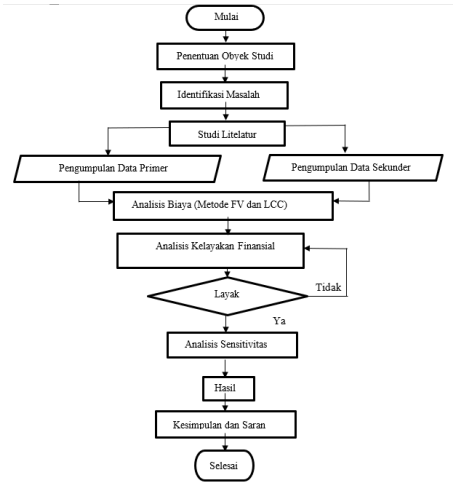
The research location of Watu Ulo Beach is in Sumber Rejo Village, Ambulu District, Jember Regency. The data used in this research are primary and secondary data. Primary data was obtained from observations at the research location and interviews with the relevant agencies, namely the East Java Provincial Maritime and Fisheries Service to obtain data on the number of ships docked at the port, the number of fish catches and data on the number of fishermen, operational cost data. Secondary data used includes masterplan data, Engineering Estimate data, and some statistical data and regulations that are in accordance with this research. After obtaining such data, an investment feasibility analysis is carried out based on financial aspects and sensitivity aspects.

3.1. Data Analysis Techniques

To answer the steps needed in the research, what must be done include:

1. Conduct a literature study

2. Identify Investment Costs, namely:
   2.1 Investment Costs
   2.2 Operating Costs
   2.3 Income Value
   2.4 Projecting Costs for the Year 2025
3. Creating Scenarios based on Rental rates i.e. Pessimistic Scenario, Moderate Scenario and Optimistic Scenario
4. Calculating the Financial Feasibility Analysis, namely:
   4.1 Net Present Value (NPV)
   4.2 Internal Rate Return (IRR)
   4.3 Payback Period (PP)
   4.4 Benefit Cost Ratio (BCR)
5. Perform Sensitivity Analysis Calculations, namely:
   5.1 Sensitivity Based on Revenue Value Factor
   5.2 Sensitivity Based on Operating Costs



Source: Author's Processed Data (2023)

Figure 1. Research Flow Chart.

4. RESULTS AND DISCUSSION

4.1. Data Description

In this data description, researchers try to collect data in the form of primary data and secondary data. For primary data, researchers conducted observations at the research location and conducted interviews with the relevant offices to find out the number of ships that docked, the amount of fish catch, and data on the number of fishermen in the port. As for primary data, researchers collected data in the form of Masterplan, Engineering Estimate (EE) data or Cost Budget Plan (RAB), statistical data and regulations that are suitable for application in this study(Statistik, 2009).

Watu Ulo Beach is located in Sumber Rejo Village, Ambulu District, Jember Regency. At this time, Watu Ulo Beach has been used by fishermen to lean the fishing

boat and as a place to fill supplies for fishing. From the latest known data, the total number of boats leaning on the beach is 447 units, the number of registered fishermen is 10,250 people and the fish catch is 4950, 375 tons.



Source: East Java Provincial Maritime and Fisheries Service (2023)

Figure 2. Master Plan of Watu Ulo Fishing Port.

4.2. Research Findings

Based on the research findings, primary and secondary data were obtained. Primary data includes data in the form of the number of fishermen on Watu Ulo Beach, the number of ships that lean on Watu Ulo Beach and the number of fish catches obtained from 2018 to 2023. Which is listed in the following table:

Table 1. Data on the number of fishermen 2018-2023

No.	Tahun	Nelayan (Orang)	Selisih dari tahun Sebelumnya	Prosentase dari Tahun Sebelumnya
1	2018	12638	0	0
2	2019	12638	0	0
3	2020	6263	-6375	-50%
4	2021	12638	6375	100%
5	2022	10250	-2388	-19%
6	2023	10250	0	0

Source: DKP JATIM interview, processed by the author (2023).

Table 2. Data on the number of fishermen 2018-2023

No.	Tahun	Kapal (Unit)	Selisih dari tahun Sebelumnya	Prosentase dari Tahun Sebelumnya
1	2018	3085	0	0%
2	2019	3085	0	0%
3	2020	943	-2142	-31%
4	2021	409	-534	-43%
5	2022	447	38	9%
6	2023	447	0	0%

Source: DKP JATIM interview, processed by the author (2023).

Table 3. Fish Quantity Data 2018-2023

No.	Tahun	Ikan (Ton)	Selisih dari tahun Sebelumnya	Prosentase dari Tahun Sebelumnya
1	2018	**5068,926**		
2	2019	4962,903	-106	-2%
3	2020	6144,065	1181	24%
4	2021	3164,773	-2979	-52%
5	2022	4950,375	1786	56%
6	2023	4950,375	0	0%

Source: DKP JATIM interview, processed by the author (2023).

4.3. Investment Cost, Operating Cost, Revenue Value

Secondary data obtained shows that the value of the Cost Budget Plan (RAB), which is Rp. 212,995,077,900.00, is planned for the 2021 fiscal year. The RAB value is used as an Investment Cost. Operating Costs of IDR 1,075,840,000.00 are taken from the Budget Control Document (DPA) of the Puger Technical Service Unit (UPT) which are both located in Jember Regency. (Daerah, 2016)The revenue value is taken from Governor Regulation No. 23 of 2023 concerning Adjustment of Regional Retribution Rates, for the revenue value is made into 3 scenarios, namely pessimistic scenario, moderate scenario, optimistic scenario. The revenue value for the pessimistic scenario is Rp. 11,201,253,567.00. The revenue value for the moderate scenario is Rp.17,864,065,837.00, The revenue value for the optimistic scenario is Rp.27,708,540,635.00,

4.4. Cost Analysis

1. Future Value (FV) Calculation

   Future Value in this study is to calculate the value in the coming year if what is known is the current value. It is known that the Secondary Data obtained by researchers is the value in 2021 and 2023, then the value will be projected to 2025(Morris et al., n.d.):

Table 4. Future Value Calculation Results

No.	Cost Component	Total Cost	Future Value Year 2025
1	Investment Costs	Rp. 212.995.077.900,00	Rp. 242.814.388.806,00
2	Operational Costs	Rp. 1.075.840.000,00	Rp. 1.226.457.600,00
3	Revenue Value (Pessimistic Scenario)	Rp. 11.201.253.567,00	Rp. 12.545.403.995,00
4	Revenue Value (Moderate Scenario)	Rp. 17.864.065.837,00	Rp. 20.007.753.737,00
5	Revenue Value (Optimistic Scenario)	Rp. 27.708.540.635,00	Rp. 31.033.565.511,00

Source: Author's Processed Data (2023).

2. Calculation of Life Cycle Cost (LCC)

Life Cycle Cost (LCC) in this study is to determine all investment costs required for the construction of the Watu Ulo Fishing Port - Jember Regency. (Berawi et al., 2021)Including Investment Costs, Operational and Maintenance Costs and the value of income obtained if the development is carried out, the details are in the following table:

Table 5. Life Cycle Cost Calculation Results

No.	Calculation Component	Nilai Life Cycle Cost
1	Pessimistic Scenario	Rp. 256.586.250.401,00
2	Moderate Scenario	Rp. 264.048.600.143,00
3	Optimistic Scenario	Rp. 275.074.411.917,00

Source: Author's Processed Data (2023).

After obtaining the results of the calculation of the Future Value and Life Cycle Cost values, then calculate the Financial Analysis and Sensitivity Analysis.

4.5. Financial Analysis

1. Cash Flow

Before the Financial Analysis is carried out, the cash flow is calculated first. Among them are in the following table :

Table 6. Arus Kas Skenario Nesting site

TAHUN ke	TAHUN	INVESTASI	OPERASIONAL	PENDAPATAN	NET INCOME
0	2025	Rp 242.814.388.806	0	0	-Rp 242.814.388.806
1	2026		Rp 1.300.045.056	Rp 13.298.128.235	Rp 11.998.083.179
2	2027		Rp 1.373.632.512	Rp 14.050.852.474	Rp 12.677.219.962
3	2028		Rp 1.447.219.968	Rp 14.803.576.714	Rp 13.356.356.746
4	2029		Rp 1.520.807.424	Rp 15.556.300.954	Rp 14.035.493.530
5	2030		Rp 1.594.394.880	Rp 16.309.025.194	Rp 14.714.630.314
6	2031		Rp 1.667.982.336	Rp 17.061.749.433	Rp 15.393.767.097
7	2032		Rp 1.741.569.792	Rp 17.814.473.673	Rp 16.072.903.881
8	2033		Rp 1.815.157.248	Rp 18.567.197.913	Rp 16.752.040.665
9	2034		Rp 1.888.744.704	Rp 19.319.922.152	Rp 17.431.177.448
10	2035		Rp 1.962.332.160	Rp 20.072.646.392	Rp 18.110.314.232
11	2036		Rp 2.035.919.616	Rp 20.825.370.632	Rp 18.789.451.016
12	2037		Rp 2.109.507.072	Rp 21.578.094.871	Rp 19.468.587.799
13	2038		Rp 2.183.094.528	Rp 22.330.819.111	Rp 20.147.724.583
14	2039		Rp 2.256.681.984	Rp 23.083.543.351	Rp 20.826.861.367
15	2040		Rp 2.330.269.440	Rp 23.836.267.591	Rp 21.505.998.151
16	2041		Rp 2.403.856.896	Rp 24.588.991.830	Rp 22.185.134.934
17	2042		Rp 2.477.444.352	Rp 25.341.716.070	Rp 22.864.271.718
18	2043		Rp 2.551.031.808	Rp 26.094.440.310	Rp 23.543.408.502
19	2044		Rp 2.624.619.264	Rp 26.847.164.549	Rp 24.222.545.285
20	2045		Rp 2.698.206.720	Rp 27.599.888.789	Rp 24.901.682.069
21	2046		Rp 2.771.794.176	Rp 28.352.613.029	Rp 25.580.818.853
22	2047		Rp 2.845.381.632	Rp 29.105.337.268	Rp 26.259.955.636
23	2048		Rp 2.918.969.088	Rp 29.858.061.508	Rp 26.939.092.420
24	2049		Rp 2.992.556.544	Rp 30.610.785.748	Rp 27.618.229.204
25	2050		Rp 3.066.144.000	Rp 31.363.509.988	Rp 28.297.365.988
26	2051		Rp 3.139.731.456	Rp 32.116.234.227	Rp 28.976.502.771
27	2052		Rp 3.213.318.912	Rp 32.868.958.467	Rp 29.655.639.555
28	2053		Rp 3.286.906.368	Rp 33.621.682.707	Rp 30.334.776.339
29	2054		Rp 3.360.493.824	Rp 34.374.406.946	Rp 31.013.913.122
30	2055		Rp 3.434.081.280	Rp 35.127.131.186	Rp 31.693.049.906
31	2056		Rp 3.507.668.736	Rp 35.879.855.426	Rp 32.372.186.690
32	2057		Rp 3.581.256.192	Rp 36.632.579.666	Rp 33.051.323.474
33	2058		Rp 3.654.843.648	Rp 37.385.303.905	Rp 33.730.460.257
34	2059		Rp 3.728.431.104	Rp 38.138.028.145	Rp 34.409.597.041
35	2060		Rp 3.802.018.560	Rp 38.890.752.385	Rp 35.088.733.825

Source: Author's Processed Data (2023).

Table 7. Arus Is Skenario Moderate

TAHUN ke	TAHUN	INVESTASI	OPERASIONAL	PENDAPATAN	NET INCOME
0	2025	Rp 242.814.388.806	0	0	-Rp 242.814.388.806
1	2026		Rp 1.300.045.056	Rp 21.208.218.962	Rp 19.908.173.906
2	2027		Rp 1.373.632.512	Rp 22.408.684.186	Rp 21.035.051.674
3	2028		Rp 1.447.219.968	Rp 23.609.149.410	Rp 22.161.929.442
4	2029		Rp 1.520.807.424	Rp 24.809.614.634	Rp 23.288.807.210
5	2030		Rp 1.594.394.880	Rp 26.010.079.859	Rp 24.415.684.979
6	2031		Rp 1.667.982.336	Rp 27.210.545.083	Rp 25.542.562.747
7	2032		Rp 1.741.569.792	Rp 28.411.010.307	Rp 26.669.440.515
8	2033		Rp 1.815.157.248	Rp 29.611.475.531	Rp 27.796.318.283
9	2034		Rp 1.888.744.704	Rp 30.811.940.756	Rp 28.923.196.052
10	2035		Rp 1.962.332.160	Rp 32.012.405.980	Rp 30.050.073.820
11	2036		Rp 2.035.919.616	Rp 33.212.871.204	Rp 31.176.951.588
12	2037		Rp 2.109.507.072	Rp 34.413.336.428	Rp 32.303.829.356
13	2038		Rp 2.183.094.528	Rp 35.613.801.653	Rp 33.430.707.125
14	2039		Rp 2.256.681.984	Rp 36.814.266.877	Rp 34.557.584.893
15	2040		Rp 2.330.269.440	Rp 38.014.732.101	Rp 35.684.462.661
16	2041		Rp 2.403.856.896	Rp 39.215.197.325	Rp 36.811.340.429
17	2042		Rp 2.477.444.352	Rp 40.415.662.550	Rp 37.938.218.198
18	2043		Rp 2.551.031.808	Rp 41.616.127.774	Rp 39.065.095.966
19	2044		Rp 2.624.619.264	Rp 42.816.592.998	Rp 40.191.973.734
20	2045		Rp 2.698.206.720	Rp 44.017.058.222	Rp 41.318.851.502
21	2046		Rp 2.771.794.176	Rp 45.217.523.447	Rp 42.445.729.271
22	2047		Rp 2.845.381.632	Rp 46.417.988.671	Rp 43.572.607.039
23	2048		Rp 2.918.969.088	Rp 47.618.453.895	Rp 44.699.484.807
24	2049		Rp 2.992.556.544	Rp 48.818.919.119	Rp 45.826.362.575
25	2050		Rp 3.066.144.000	Rp 50.019.384.344	Rp 46.953.240.344

Source: Author's Processed Data (2023).

2. Investment Feasibility Analysis Using NPV, IRR, BCR, and PP Methods

Table 8. Investment Analysis Results

No	Investment Analysis	Pessimist	Moderate	Optimistic	Ket
1	Investment Lifespan	35 Years	25 Years	15 Years	
2	NPV	Rp. 1.841.984.707,00	Rp. 505.817.875,00	Rp. 16.042.456.566,00	>0 Feasible
3	IRR	6,15%	9,68%	11,91%	Pessimistic Scenario IRR < MARR 7.72%, Not Feasible. Moderate Scenario IRR, Optimistic>MARR 7.72, Feasible.
4	BCR	1,1596	1,5314	1,643	>1 Feasible
5	PP	27 Years	14 Years	9 Years	<Investment Age, Eligible

Source: Author's Processed Data (2023).

3. Sensitivity Analysis of Revenue and Operating Expense Values

Table 9. Sensitivity Analysis Results

No.	Sensitivity Analysis	Pessimist	Moderate	Optimistic

1	Investment Lifespan	35 Years	25 Years	15 Years
2	Revenue Value NPV = 0	-13,67%	-39,96%	-40,75%
3	Operational Costs NPV = 0	-15,96%	+22,67%	+25,59%

Source: Author's Processed Data (2023).

5. CONCLUSION

1. Calculation Analysis The cost analysis of needs has been carried out for the work of the Watu Ulo Fishing Port Development Planning in Jember Regency if it is carried out in 2025 using the FV (Future Value) method for Investment Value Rp. 242,814,388,806, Operating Costs Rp. 1,226,457,600. The Revenue Value for the Pessimistic Scenario is Rp. 12,545,403,995, the Moderate Scenario is Rp. 20,007,753,737, the Optimistic Scenario is Rp. 31,033,565,511.00. As for the LCC (Lyfe Cycle Cost) value, the pessimistic scenario is Rp. 256,586,250,401, the moderate scenario is Rp. 264,048,600,143, the optimistic scenario is Rp. 275,074,411,917.
2. From 3 Pessimistic, Moderate and Optimistic Scenarios, the Investment Analysis is obtained if the NPV, BCR, PP Analysis states that the Development is Feasible to implement. Meanwhile, the IRR Analysis states that the Pessimistic Scenario is not feasible, while the Optimistic and Moderate Scenarios state that it is feasible to implement.
3. From the results of the Sensitivity Calculation Analysis The income value for the pessimistic scenario is sensitive at -13.67% if it is smaller than that the investment becomes unfeasible. The value of income for the moderate sensitive scenario at -39.96% if it is smaller than that the investment becomes unfeasible. The value of income for an optimistic scenario is sensitive at -40.75% if it is smaller than that, the investment becomes unfeasible. And if the Operating Cost Sensitivity for the pessimistic scenario is sensitive at -15.96% if it is smaller than that the investment becomes not feasible. The revenue value for the moderate sensitive scenario is +22.67% if it is greater than that, the investment is not feasible. The revenue value for the optimistic scenario is sensitive at 25.59%, if it is greater than that, the investment is not feasible.

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