Economic Feasibility Study Of Raw Water Development For Rusunawa In Park Industrial Area Morowali District

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Abstract—The development of industrial estate in Morowali Regency, and the development of Flay over and Rusunawa, are necessary to build facilities and infrastructure for the construction of raw water networks for the needs of the community. This development requires a very large cost, so an investment feasibility study is needed to obtain an overview of the economic feasibility of constructing the building. The research method uses analytical methods, and quantitative approaches, and conducts interviews with relevant agencies. The data obtained are reviewed and analyzed using several assumptions of loan interest rates, and loan times. Calculation of financial analysis using the calculation of Net Present Value (NPV), and Benefit Cost Ratio (BCR). and Internal Rate Ratio (IRR). The results of the study concluded that the construction of facilities and infrastructure for raw water network construction in the Industrial Park area of Morowali Regency is feasible. The result of Net Present Value (NPV) is positive at 10% interest and 12% is calculated as an investment for 12 years. At 10% interest, Benefit Cost Ratio (BCR) 1.535 Internal Rate Ratio (IRR) capital return obtained 23.9%. At a loan interest rate of 12%, the benefit Cost Ratio (BCR) of 1,381, and the Internal Rate Ratio (IRR) of capital returns is 17.5%.

.*Keywords— Feasibility, Finance, NPV, BCR , IRR*

I. INTRODUCTION

The development of industrial estates in Morowali Regency is currently increasing, in line with the increasing number of incoming investments. Morowali Regency has a fairly large potential for nickel natural resources, therefore the government in Central Sulawesi Province provides support, one of which is the construction of Flay over and Rusunawa which is carried out through the Ministry of Public Works and Public Housing. Regional development still requires the development of other infrastructure, one of which is the manufacture of raw water facilities. This is necessary because the PDAM in Morowali Regency only manages the SPAM Unit in the Regency Capital and the SPAM IKK unit, namely the Morowali Regency Capital SPAM which is domiciled in Bungku City and the Witaponda District SPAM IKK. Because the development capital required is quite large, before the construction of raw water facilities in the industrial park area of Morowali Regency, an economic feasibility study is carried out. This needs to be done because the investment made is feasible or not. Because of this, the purpose of this study is to calculate the economic feasibility of developing raw water for Rusunawa in the industrial park area of the Morowali district.

II. LITERATURE REVIEW

A. Engineering Economics Concept

The concept of engineering economics is a study of the analysis of engineering investment, making decisions in making alternatives to see the benefits for the community or the company. Aspects of economic performance need to be done several things, namely: (1) estimated costs that must be incurred at this time; (2) estimated operational and maintenance costs required in the coming years; (3) estimated residual value or benefits that will be obtained in the coming year; (4) estimated duration of profitable investment; and (5) the estimated interest rate used. Evaluating the feasibility of investment, namely the technique in making decisions is always looking for some of the best alternatives. Because in the calculation of investment using several alternatives and taking profitable and feasible alternatives. Therefore, in evaluating the feasibility of technical investment and selecting the best alternative, it is necessary to carry out an equivalence process because the estimated cash flow and several variables, including economic age, and interest rates still contain uncertainty, so it is necessary to calculate the risks that will occur. And in general, technical investment has a long economic life (years). On the other hand, the value of money over time is not the same. .[1, 3, 13].

B. Cost

The cost of investment consists of three things, namely:

1) Investment Cost (cost)

Investment costs are all costs incurred in the implementation of construction development, including initial study costs, planning costs, implementation costs, construction supervision costs, and other unexpected costs in the implementation of construction activities [3, 13].

2) Operational Cost

Operational costs are all expenses that are routine or periodic at a certain time, for example, the cost of salaries of employees/employees, routine costs every time, administrative costs, and other unexpected costs. [3, 13].

3) *Maintenance Fee*

Maintenance costs are costs incurred routinely or certain that are used in the maintenance of existing structure construction.[3, 13].

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C. Benefits (benefits)

The benefit is the result of profits or benefits received due to the operational activities of construction development. The benefit, in this case, is the result of the development of operational activities obtained from the payment for the use of water flow violations, installation of water installations, expense fees from all PDAM water users [3, 13].

D. Comparative Analysis of Costs and Benefits

This analysis is carried out by comparing the initial construction costs, operational costs, and maintenance costs as well as the weirs built with the benefits that will be obtained. There are several methods used in this feasibility analysis, namely. [3,4,6,12,16].

E. Net Present Planning (NPV) Method

The Net Present Value method is a method used to calculate the difference between the current value of an investment and future net cash receipts at a certain discount rate. NPV shows the advantages of benefits compared to costs [15]. The assessment analysis of this method is when a positive NPV is declared feasible and if a negative NPV is declared not feasible.[5, 7,8, 9,10,11].

F. Benefit Cost Ratio (BCR) Method

The BCR method is a method by calculating the comparison between benefits and costs in an investment. If the BCR price is greater than one, it is declared feasible and not feasible if it has a value of less than one.[13].

G. Internal Rate of Return (IRR) Method

The IRR method, also known as the Rate of Return (ROR), is a method of calculating the balance between all expenses and all income earned from investments, where this balance occurs at a certain interest rate. An investment is said to be feasible if the resulting IRR is greater than or equal to the MARR (Minimum Attractive Rate of Return). MARR is the minimum value of the acceptable rate of return or interest, so if an investment is from MARR then the investment is considered uneconomical .[3, 13].

III. Material And Methods

The research location is in the industrial park area, Bohodopi district, Morowali district in the province of Central Sulawesi.

FITURE 1 LOCATION OF RAW WATER IN THE INDUSTRIAL PARK DISTRICT, KAB. MOROWALI

This research includes quantitative descriptive, literature study. This research is descriptive, because the researcher is trying to obtain information about the phenomena being observed at this time.[2]. which describes the economic feasibility of investing in raw water development for Rusunawa in the industrial park area of Bohodopi District, Morowali district in Central Sulawesi province. The data needed are primary data and secondary data. Primary data were obtained from the field and also data from survey results.

While secondary data is data that is needed and obtained from the results of planning, statistical data on community conditions and the research location area. The research step, after obtaining primary and secondary data about raw water development for Rusunawa in the industrial park area, Bohodopi District, Morowali Regency in Central Sulawesi province, is used to analyze the calculation of the economic feasibility study, namely calculating the investment cost which consists of the initial investment cost, operating costs and maintenance costs. . Furthermore, the calculation of the benefits obtained from the construction of the construction. The steps in conducting research can be seen in the research flow chart below

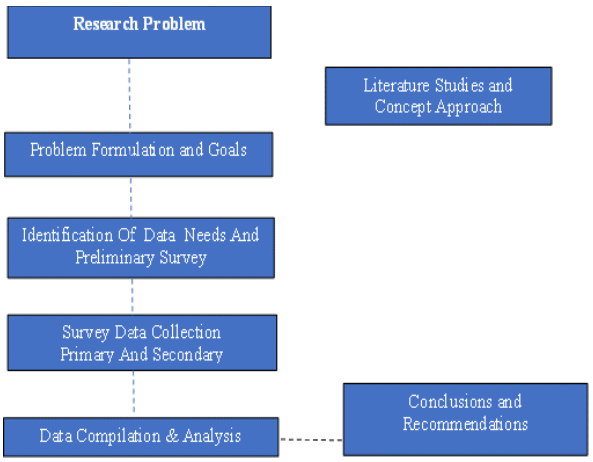

FIGURE 2. FLOWCHART RESEARCH

IV. Result

A. Investment cost

The investment cost of the feasibility evaluation in terms of the price of the construction building is Rp. 27.255.117.000,-This price includes fees; Preparation of work, Construction of weirs, WTP reservoir, 4 bridges, 4 pipelines, and roads. While the cost of renting the location or land is not taken into account because it has been given by the local government of Morowali [1].

B. Operational Cost and Maintenance Cost

Operational costs are all expenses that are routine or periodic at a certain time. The operational costs incurred in the implementation of this construction are (1) maintenance and construction operational costs, (2) office costs, and (3) office staff costs, field workers, and experts. While maintenance costs are costs incurred routinely or specifically used in the maintenance of existing building construction, the total cost is Rp. 660,000,000, -/year. Overall the calculation of investment costs in the manufacture of Raw Water Development for Rusunawa in

the Industrial Park Morowali Regency as a whole can be seen in table 1.

TABEL 1. COST OF RAW WATER DEVELOPMENT IN MOROWALI REGENCY

No	Description	Volume	Price (RP)	Quantity (RP)
A	Development Cost	Ls		27.255.117.000
B	Opersional and maintenance cost			
1	Weir care	ls	60.000.000	60.000.000
2	Office employee payment	10 person	3.000.000/ month	360.000.000
3	Payment of dam guard	4 person	2.500.000/ month	120.000.000
4	Payment Experts	2 person	5.000.000/ month	120.000.000
	Total Maintenance Cost/year			660.000.000

C. *Operating Income*

Operating income is obtained from the cost of installing new installations, the cost of paying for the use of drinking water every year for each family of residents and residents of the Rusunawa, defense and security and public facilities, annual subscription fees, and monthly/yearly expenses. The standard subscription fee is taken based on Morowali Regent Regulation regarding drinking water tariffs at local water companies in Morowali Regency [12]. The population at the Industrial Park area based on survey data was obtained as many as 10,499 people, while the occupants of the 4-story Rusunawa were 2500 people. In the area of the Ministry of Defense and Security, the total population is 10,500 people. So the total population is 23,499 people. The needs used for public facilities are taken 15% of the domestic needs (population). For water discharge taken 60 lt/second. According to secondary data, the need for water is 200 liters/person/day. The number of families from the calculation results is determined by each family consisting of 4 people so that a total of 5875 families are obtained. The description of the calculation of the cost of income for the construction of the Baku water installation can be seen in table 2.

TABEL 2 REVENUE FROM PAYMENT OF RAW WATER USER

No	Description	Need/person /day	Volume	Price of water /liter/Rp	Income per year
1	Population	200	10499	3	2.267.784.000
2	Residents of Rusuna	200	2500	5	900.000.000
3	Security of defence	200	10500	6	4.536.000.000
4	Public facilities	200	1575	3	340.200.000
		Amount KK		Cost /kk/month	
5	Load cost	5875		20.000	1.410.000.000
	Total Total Income/Year				9.453.984.000
			Month/KK	Cost/Rp	Total Installation Cost
6	New Installation Fee		5875	2.000.000	11.867.500.00
					0

D. *Investment Calculation Assumption*

The calculation of this investment analysis uses several assumptions and limitations, namely:

1. The implementation period of construction for 2 years.
2. Interest rates on loans are calculated at 10% and 12%.
3. The financial payback period, in borrowing for the implementation of work takes a period of 8 years to 12 years.
4. Full capital composition of the loan.
5. It is assumed that the interest on the loan begins to be paid in the second year because in the second year the clean water network starts operating.
6. The selling price of water for residents is Rp. 2000,-/m3 according to the applicable regent's regulation standard.
7. The selling price of water for the residents of the flats. 2500,-/m3 following the applicable regent's regulations.
8. The selling price of water for defense and security is 2750,-/m3, according to the applicable regent's regulations
9. The selling price of water for public facilities is 2500,-/m3, according to the applicable regent's regulations
10. Installation fee Rp. 2.000,000,-/KK, according to the standards of the applicable regent's regulations
11. Cost of expenses per family of Rp. 20,000, -/month.

The calculation uses several alternatives to obtain the most profitable loan repayment investment in raw water development for Rusunawa in the industrial park area of the Morowali district. Calculation analysis using Net Present Value (NPV), Benefit Cost Ratio (BCR), and Internal Rate of Return (IRR). [14, 16].

TABLE 3. ASSUMPTION OF CALCULATION WITH CASH FLOW (DCF) ON CAPITAL (10%) APPROACH

Discounted Cash Flow (DCF) Approach on Capital														
Interest Rate: 10 %														
No	Description	0	1	2	3	4	5	6	7	8	9	10	11	12
1	Revenue from subscriptions				5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000
2	Income from Expenses				1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000
3	Revenue from new installs				11.867.500.000									
4	Total Income				19.011.856.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000
5	construction cost	27.255.117.000												
6	Operational & Maintenance Cost				660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000
7	Cash Flow				18.351.856.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000
8	Discounted Cash Flow (DCF)				1,331	1,464	1,611	1,772	1,949	2,144	2,358	2,594	2,853	3,138
9	Discounted Cash Flow (DCF) Approach on Capital				13.788.021.037	4.429.204.918	4.025.050.279	3.659.343.115	3.327.016.932	3.024.419.776	2.749.938.931	2.499.751.735	2.272.820.189	2.066.397.706
10	Total Income (PV)/12	41.841.964.618												
11	Net Present Value (NPV)	14.586.847.618												
12	IRR	23.9 %												
13	Benefit Cost Ratio (BCR)	1,535												

TABLE 4. ASSUMPTION OF CALCULATION WITH CASH FLOW (DCF) ON CAPITAL (12%) APPROACH

Discounted Cash Flow (DCF) Approach on Capital														
Interest rate: 12 %														
No	Uraian	0	1	2	3	4	5	6	7	8	9	10	11	12
1	Revenue from subscriptions				5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000	5.734.356.000
2	Income from Expenses				1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000	1.410.000.000
3	Revenue from new installs				11.867.500.000									
4	Total Income				19.011.856.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000	7.144.356.000
5	construction cost	27.255.117.000												
6	Operational & Maintenance Cost				660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000	660.000.000
7	Cash Flow				18.351.856.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000	6.484.356.000
8	Discounted Cash Flow (DCF)				1,405	1,574	1,762	1,974	2,211	2,476	2,773	3,106	3,479	3,896
9	Discounted Cash Flow (DCF) Approach on Capital				13.061.819.217	4.119.667.090	3.680.111.237	3.284.881.459	2.932.770.692	2.618.883.683	2.338.390.191	2.087.687.057	1.863.856.281	1.664.362.423
10	Total Income (PV)/12	37.652.429.331												
11	Net Present Value (NPV)	10.397.312.331												
12	IRR	17,4769%												
13	Benefit Cost Ratio (BCR)	1,381												

CONCLUSION

The results showed that the economic feasibility of developing raw water for Rusunawa in the industrial park area of the Morowali district was feasible. The result of Net Present Value (NPV) is positive at 10% interest and 12% is calculated as an investment for 12 years. At 10% interest, Benefit Cost Ratio (BCR) 1.535 Internal Rate Ratio (IRR) capital return obtained 23.9%. At 12% loan interest, the Benefit Cost Ratio (BCR) of 1, 381 and the Internal Rate Ratio (IRR) of return on capital obtained 17.5%.

Suggestion: It is hoped that all parties will be able to re-evaluate in more detail for a feasibility analysis if there is a change in policy from the government related to finance, including capital assistance, loan interest, and the length of time for borrowing from the government.

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