

ECONOMIC INTERNAL RATE OF RETURN IN WATER TREATMENT PLANT PROJECT

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Abstract- In 2014 the increased clean water service only reach up to 50% of the total population in Indonesia, or about 160.000 l/s. The needs of a lot improvement in this sector make clean water as business commodity. PT. TeknoTirta Nusantara (TTN) and PDAM KabupatenSerang are interested to developing the quality and quantity of clean water supply in KabupatenSerang. This research are to calculate the investment feasibility study, conducting risk analysis through sensitivity analysis method, assessing the performance of the company using economic value added method, last to identify and measure of financial risks that threaten a company or projects (risk mapping).

Keywords: clean water, feasibility study, sensitivity analysis, economic value added, risk mapping.

Introduction

In 2014 the increased clean water service only reach up to 50% of the total population in Indonesia, or about 160.000 l/s. Meanwhile the target of Millennium Development Goal in clean water sector that must be achieved by the Indonesian government in 2015 is 80 %. The needs of a lot improvement in this sector make clean water as business commodity.

PT. TeknoTirta Nusantara (TTN) and PDAM KabupatenSerang are interested to developing the quality and quantity of water supply inKabupatenSerang. The main problem for all PDAM in Indonesia is they are not bankable so they cannot develop their business. As the result they need some investor to invest in PDAM to develop water supply. In order to decrease the investment capital they seek for water treatment plant, which has innovative technology with effective cost. PT. TeknoTirta Nusantara (TTN) has innovative technology to provide water treatment plant, which have an engineering breakthrough and a financial breakthrough.

To get this project done, it takes amount budget to be invested so feasibility study is required. Feasibility study consists of many aspects that should be studied and inspected its feasible, so that the result of the study is used for making decision whether the business can be conducted, delayed, and even canceled.

Furthermore this study is to assess the economic value added of the project. The economic values added of this project are for:

- Utilize investor in order to lay investment in this project
- Assumption that give all parties information about the project

Methodology

They are six steps of methodology that is being used: preliminary observation, literature review, methodology and data collection, data processing, data analysis, conclusion and suggestion.

Preliminary Observation. The first step in doing this research is preparation of the study. The study can be done in many ways, such as reading literature review getting information from internet and observing the real condition and having discussion with the project officer, lecture, and tutor. After that the authors goes to identification the problem where the problem formulated into the research question. The research question related to the background of the problem.

Literature Review.

The literature review was done by gathering the theory, definition and other knowledge regarding to the objective of the research from the book, internet, journal and thesis. And so forth to get the information, which used a thinking framework.

Methodology & Data Collection.

To solve the problem that have been come up, the author needs a qualitative data and quantitative data from the business of PT. TeknoTirta Nusantara. Doing interview with engineering and financial feasibility team collects the qualitative data. Thus the author's can identified the internal aspect of the project and the output for problem formulation become more valid. The quantitative data is the secondary data that have been collect by the project itself. The output of this data will be collect as operational aspect. The quantitative data can be analyzed by assessing the data to be measure as possible. So the authors can determine Water Treatment Plant project's feasibility.

Data Processing.

The processing data is the steps where the raw data are transformed into the meaningful information. The first step is to define the input, the input are the operational aspect and the internal aspect (organizational and human resources aspect). Furthermore the operational aspect will be arranged and sorting into operational expenditure. The data of engineering aspect are given from the engineering feasibility team then will be process by financial feasibility team into capital expenditure information. Then both of the output will be combined into projected cash flow.

Data Analysis.

The secondary data that have been attained will be used for the calculation of the project's feasibility. The analysis includes the calculation of the initial investment, NPV, IRR, Profitability Index, Payback Period, projected Cash flow and sensitivity analysis.

Conclusion and Recommendation.

After getting the collective data, the last step is creating the conclusion. The result from the conclusion will answer the research question and the purpose of question. And then give the recommendation about the condition of the project throughout this study.

Feasibility Study Analysis

Water Production of WTP per Year.

The water production per year is 500 l/s or equal to 15,552,000 m³/year.

But there is in plant losses 5% so the real production is $(100\% - 5\%) \times 15,552,000 = 14,774,400$

Project Investment Analysis.

Based on engineering feasibility study, with the assumption of USD/IDR are 12.000, the total investment is Rp.298,208,000,000 (capital investment cost + pre-investment cost).

Project Financial Analysis.

Project Financial analysis analyze how good the outcome of the investment feasibility study of PT. TeknoTirta Nusantara, that are the Weighted Average Cost of Capital, Net Present Value, Payback Period, Internal Rate of Return and conclude whether the project feasible to be done or not.

Business Development.

Business development scenario determines about what business development will carried out by PT. TeknoTirta Nusantara (optimistic, base, pessimistic). In calculating the feasibility of this business, used three statements: base production, increasing production 5% and decreasing production 5%. This statement caused by limitation of WTP. The result of calculation of the indicator variable as financial feasibility by considering three scenarios, it can be seen in the table below:

Table3.1 Comparison of three scenarios

Scenario	IRR	NPV	PI
Optimistic	22%	332,382,561,951	2.1%
Basis	20%	266,611,339,700	1.89%
Pessimistic	18%	206,768,153,851	1.69%

WACC (weighted Average Cost of Capital)

To determine the profitability of the project, the WACC of the project must be generated. The function of WACC to PT. TeknoTirta Nusantara is to be the discount rate for the NPV calculation. The table below shows the capital Structure of PT. TeknoTirtaNusanantara:

Table 3.2 Capital Structure

Capital Structure	
Debt	100%
Equity	0%

That means PT. TeknoTirta Nusantara use all debt as the initial investment without equity. The calculation of the WACC is shown below:

Table 3.3 WACC Calculations

WACC Calculation				
Sources of Capital	Bank	Weight	Cost	Weighted Cost
Debt	BII	25%	12.50%	3%
	Mandiri	50%	11.50%	5.75%
	BNI	25%	12.00%	3.0%
Totals		100%	WACC	12%

From the calculation of WACC, the WACC of PT. TeknoTirta Nusantara is 12% the weights are gained from the debt structure of PT. TTN. And for the interest the data were from the private bank corporation credit rate, next the WACC will be used as the discounted rate to calculate net present value of the project.

Operational Cost

- Cost of labor, chemical cost, electricity cost, depreciation, interest, and overhead, retribution cost.

Revenue Stream

The revenue stream calculated based on the formula below:

$$\text{Constant net water production} \times \text{price} (1 + \text{growth rate})$$

Table 3.4 Payback Period

Year	Accumulated Cash Flow
0	0
1	60,249,700,000
2	94,958,929,194
3	130,398,871,049
4	166,773,780,396
5	204,319,655,956
6	272,225,660,045
7	341,857,310,542
8	413,567,249,643
9	487,756,704,506
10	559,607,748,268
11	666,607,762,227
12	771,021,967,706
13	872,730,258,187
14	971,583,259,799
15	1,037,687,409,167
16	1,179,234,545,748
17	1,317,439,688,861
18	1,452,126,709,247
19	1,583,111,344,138
20	1,710,199,837,096
21	1,896,705,042,681
22	2,078,878,489,571
23	2,256,475,292,155
24	2,429,239,917,343
25	2,596,905,912,802

This payback period provide the indication of both the risk and the liquidity of the project. According to the data above the positive value shows at years 7. A short payback means:

1. The investment IDR will be unlocked for many years; hence the project is relatively liquid.
2. The project cash flows are good, hence the project are not too risky.

Sensitivity Analysis

At this analysis, IRR is use to be compared in analyzing the sensitivity. More over the IRR is the discounted rate that makes a project break even. The result is in the following statement:

- The rate of change USD – IDR gives impact for every 20% increase in it, will decrease IRR 1.5%. Furthermore if the rate of USD – IDR is 131% the project are not feasible to develop.
- Interest rate gives impact for every 5% increase in it will decrease IRR 1%. Furthermore if the interest rate showed an increase of 18.5% the project are not feasible to develop.
- Escalation on chemical price gives impact for every 1% increase in it will decrease IRR as 1%. Furthermore if the escalation showed an increase of 18% the project are not feasible to develop.
- Escalation on electricity price gives impact for every 0.5% increase in it will decrease IRR as 1%. Furthermore if the escalation showed an increase of 12.8%, the project are not feasible to develop.

- Increase in labor cost gives impact for every 4% increase in it will decrease IRR as 1%. Furthermore if the escalation showed an increase of 23%, the project are not feasible to develop.
- Escalation on retribution gives impact for every 2 % increase in it will decrease IRR as 4%. Furthermore if the escalation showed an increase of 17%, the project are not feasible to develop.

Economic Value Added

The Eva method is used to determine whether the project earns a pure economic profit. The pure economic profit refers to profit is higher than expected given particular line of business. The calculation are shown below:

Table 3.5 EVA

Economic Value Added			
Years	NOPAT	(Capital x WACC)	EVA
1	49,928,820,000	35,784,960,000	14,143,860,000
2	24,388,349,194	35,784,960,000	(11,396,610,806)
3	25,119,061,855	35,784,960,000	(10,665,898,145)
4	26,054,029,347	35,784,960,000	(9,730,930,653)
5	27,224,995,560	35,784,960,000	(8,559,964,440)
6	57,585,124,089	35,784,960,000	21,800,164,089
7	59,310,770,497	35,784,960,000	23,525,810,497
8	61,389,059,101	35,784,960,000	25,604,099,101
9	63,868,574,863	35,784,960,000	28,083,614,863
10	61,530,163,762	35,784,960,000	25,745,203,762
11	96,679,133,959	35,784,960,000	60,894,173,959
12	94,093,325,479	35,784,960,000	58,308,365,479
13	91,387,410,481	35,784,960,000	55,602,450,481
14	88,532,121,612	35,784,960,000	52,747,161,612
15	85,521,381,368	35,784,960,000	49,736,421,368
16	131,226,256,581	35,784,960,000	95,441,296,581
17	127,884,263,113	35,784,960,000	92,099,303,113
18	124,366,140,386	35,784,960,000	88,581,180,386
19	120,663,754,891	35,784,960,000	84,878,794,891
20	116,767,612,958	35,784,960,000	80,982,652,958
21	176,184,325,585	35,784,960,000	140,399,365,585
22	171,852,566,890	35,784,960,000	136,067,606,890
23	167,275,922,584	35,784,960,000	131,490,962,584
24	162,443,745,188	35,784,960,000	126,658,785,188
25	157,345,115,459	35,784,960,000	121,560,155,459

The project has positive EVA in year 1, but in years 2,3,4, 5 this project has a negative EVA means that this project does not have a surplus value of the investment, because at that year PT. TTN has a great expenditure for capital which is payment for debts. In the following years the project show the positive EVA which means the project is worth to doing and the project earns more than its cost of capital each year.

Risk Mapping

From the sensitivity analysis, PT. Teknotirta Nusantara has six risk that potentially occur, they are:

Table 4.5 Risk Type

Risk
Exchange rate (USD/IDR) fluctuation
Increasing Interest Rate
Increase in price of chemical
Increase in Retribution
Increase in Labor Salary

To measure the risk author uses rating to rank the risk that may be raised. The rating is divided into two categories which is impact rating and possibility rating, that can be seen in table below:

Table 4.6 Risk Identification

Impact rating	
Rating	Criteria
1	Not important
2	Minor
3	Medium
4	Major
5	Extreme

Rating	Criteria		
		Qualitative	Quantitative
E	Very High	Very like to occur	>80%
D	High	Likely to occurred	>60%-80%
C	Moderate	Equal to occur	>40%-60%
B	Low	Less likely to occur	>20%-40%
A	Very Low	Almost Impossible to occur	>20%

To make it simple the measurement of the risk mapping can be seen on the matrix table below:

Table 4.7 Risk Mapping

Risk Mapping Table						
Probability	Impact					
	1	2	3	4	5	
E						
D						B1
C				M1		
B		B4	B2;B3			
A						F1

Description:

- Red = Extreme
- Orange = Major
- Yellow = Moderate
- Green = Low Risk

Conclusion and recommendation

Investment Value

From financial feasibility study author generated an capital budgeting outcome about current condition. The condition were good and feasible to develop.

Sensitivity Analysis

From the sensitivity analysis described the most significantly affect the business is variable exchange rate follow by fluctuation on interest rate.

Economic Value Added

The EVA calculation show a positive result , so it means the project are worth to doing, and the project earns more than its cost of capital each year.

Risk Mapping

The six risk are summarized in table below:

Risk Mapping Table					
Probability	Impact				
	1	2	3	4	5
E					
D					B1
C				M1	
B		B4	B2;B3		
A					F1

Recommendation

- Letter of intend of potential buyer should be made
- Negotiate with bank cooperation to find a lower rate
- Contract between PT.TTN, PDAM, and Costumer should be made so that all financial parameters and assumption in the Feasibility Study can be met.
- Make a mitigation of risk from risk mapping that was created by the author.

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