Economic Feasibility Analysis of PT Trigunapratama Abadi's Hazardous Waste Processing and Collection Activities

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A R T I C L E I N F O

ABSTRACT

PT Triguna Pratama Abadi is a company that manages and destroys hazardous and toxic B3 waste. In addition, the company also produces B3 waste, for example paper-producing waste that is used as scrap paper for egg holders and contaminated soil waste into red bricks, not only that this company is also a medical waste destruction company whose scope can be from outside the city of Karawang. This business feasibility analysis activity is one of the efforts in providing alternative policies for processing and collecting B3 waste. The purpose of this study is to determine whether or not a company is feasible. With descriptive research methods and literature, the results of the analysis of the economic feasibility of processing activities are as follows, NPV Rp. 239.029 million, IRR 183% B/C value 14.28 and PBP 2 years. And the analysis of the economic feasibility of collecting activities is obtained as follows, NPV Rp. 445.269 million , IRR 238% B/C value 1.61 and PBP 7 years. With these results, a decent result is obtained in the economic activities of B3 waste management and collection at PT Triguna Pratama Abadi.

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1. Introduction

The better the condition of the economy, the greater the types of activities that surround it. As for industrial activities, which of course have an impact on increasing the volume of waste, especially hazardous and toxic waste (B3). If the increase in the amount of waste is not matched by the rate of waste management, of course it will cause a buildup of waste. If this happens in the long term, it will disrupt the ecosystem as a whole, and in the end it will harm humans themselves. (Agritech, 2007)

Because of this, special handling of B3 waste is carried out to maintain the preservation and survival of living things. To achieve this, it is necessary to manage waste in a place with the right technology, and of course carried out by a company that already has an official permit from the government. In order to participate in realizing the environmental preservation efforts, PT Trigunapratama Abadi is here to take part in B3 waste management activities.

In running a company, proper business processes are needed to reflect the quality or feasibility of the company (Asthutiirundu & Lay, 2013). An activity for processing and collecting B3 waste from PT Trigunapratama Abadi, requires an appropriate method of analyzing financial aspects in making economic feasibility decisions at PT Trigunapratama Abadi.

The financial aspect is related to determining the amount of funds and at the same time their allocation as well as finding related sources of funds efficiently so as to provide maximum profit (Suratman, 2002). The purpose of doing a financial feasibility analysis is to avoid too large an investment for activities that turn out to be unprofitable (Husnan and Suwarsono, 1997). As is known from 6M management (Man, Material, Machine, Money, Method, Market) this financial aspect is a determinant or a tool in assessing the possible benefits of investment from business activities (Freddy Rangkuti, 2016).

Every aspect to be interpreted as feasible must have a certain standard of value. However, the assessment decision is not only made on one aspect. Assessment to determine eligibility must be based on all aspects that will be assessed later. Economic feasibility is defined as the feasibility for all parties who use, directly or indirectly, from a construction or development of a transportation system. In relation to economic analysis, the benefits obtained should be greater than the costs incurred. Therefore, the calculation of benefits is a vital factor in deciding whether a development plan or a developer, in this case the monorail is feasible or not. (Sri Wahyuni, 2012).

2. Methods

Writing articles using descriptive methods and library research methods. Descriptive method is a method used to find out the description and condition of a thing by describing it in as much detail as possible based on existing facts, while the library research method is collecting information collected from analysis of NPV, IRR, Net BC, PBP, books, journals and the internet. The company's financial document data uses primary data methods in the form of interviews, and observations which are then directly practiced at PT Triguna Pratama Abadi.

$$NPV = \sum_{t=1}^{n} \frac{B_t}{(1+i)^t} \frac{C_t}{}$$

The time and place of the research was carried out during the first quarter of 2022 ending January 17 – March 31, 2022. The target or target of this research is to determine the economic situation of the company in processing and collecting B3 waste and analyzing economic feasibility.

2.1. Net Present Value (NPV) Analysis

NPV or net present value is the sum of the present value (Net Present) of net benefits. Raharjo (2007) states that the present value analysis is based on the concept of the time value of money, where all cash inflows and cash outflows are calculated against the current point in time at a desired minimum rate of return. The NPV value greater than 0 (zero) indicates that the business activity is feasible to continue. Systematically, the Net Present Value can be presented as follows (Abelson 1979):
It means: NPV is the current net benefit value, is the benefit or cash inflow in year t, is the cost or cash outflow in year t, is the discount rate (usually following the actual interest rate, whereas is the discount factor in year t.
The following is the meaning of the investment decisions that will be made:
- NPV > 0, it means it is feasible to run
- NPV < 0, meaning that it is not feasible to run
- NPV = 0, then the condition is in BEP/break-even point.

2.2. Internal Rate of Return (IRR) Analysis

Raharjo (2007) states that the IRR analysis produces a solution in the form of interest rates that apply to a series of alternative cash inflows and cash outflows. IRR can be calculated using one of the following NPV analysis approaches.

$$IRR = i + \left[(i_2 - i_1) \left(\frac{NPV\ +}{|NPV\ -|} \right) \right]$$

Meaning: IRR is the interest rate on internal returns, is the discount rate, is the interest rate when the positive NPV approaches zero, is the interest rate when the negative NPV approaches zero whose value is absolute. The method used above is a trial-and-error technique until the IRR value is obtained by interpolation. Alternative selection criteria are determined to be acceptable or feasible if and only if the IRR is greater than the interest rate ( ) submitted.

2.3. Analysis of Net Benefit Cost Ratio (Net BC)

Raharjo (2007) states that BC is a comparison of the equivalent value of all benefits to the equivalent value of all costs. This value can determine whether or not an effort is made. The effort made is considered feasible if and only if BC is greater than 1. Systematically, Net BC can be presented as follows (Abelson 1979):

$$Net\ BC = \frac{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}}{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}}$$

Meaning: Net BC is the ratio of positive cost benefits and negative cost benefits, is the benefit or cash inflow in year t , is the cost or cash outflow in year t, is the discount rate (usually following the actual interest rate), whereas is the discount factor in year t.

2.4. Pay Back Period (PBP) Analysis

Raharjo (2007) states that the PBP analysis calculates the time required for cash inflows (Cash inflows) to be the same as cash outflows. This analysis is usually used to measure the level of business risk, related to how quickly the value of the invested investment (I) can be returned. This analysis can be done by calculating the time value of money (called discounted payback analysis) or ignoring it by assuming that = 0% . Using the time value of money, the length of the payback period, , calculated using the equation:

$$I = \sum_{t=1}^{n_p} \frac{B_t - C_t}{(1+i)^t}$$

so that the value of (PBP) can be calculated from the simplification of the formula above through the equation:

$$n_p = \frac{I}{\sum_{t=1}^{n} \frac{B_t - C_t}{(1+i)^t}}$$

In carrying out this feasibility analysis, it is necessary to conduct an analysis to obtain economic feasibility, while the financial aspects to be analyzed consist of:
a.   Investment Plan and Source of Funds
b.   Revenue and Expense Projections
c.   Cash Flow Projection
d.   Financial analysis: Net Present Value (NPV), Internal Rate of Return (IRR), Net Benefit and Cost Ratio (Net B/C), and Payback Period (PBP).

3.   Results and Analysis

PT Trigunapratama Abadi was established in 1989/1990. The company is located in Karawang district – West Java and is engaged in the transportation and management services industry and the utilization of hazardous and toxic waste (B3 waste) which already has a permit from the State Ministry of the Environment (KLH) as well as permits from other agencies.This company has 4 working plants, Plant 1 for the management and utilization of paper B3 waste into scrap paper products. Plant 2 for the

management and reuse of hazardous waste oil into engine fuel substitution. Plant 3 for the management and utilization of contaminated soil B3 waste into red bricks. And Plant 4 for B3 Waste destruction includes medical waste, used packaging, medical products, and production products that have been contaminated with B3.

In order to provide benefits and positive values for the environment and the success of government programs through the Ministry of the Environment, namely 3R (Reuse, Reduce and Recycle). PT Trigunapratama Abadi has opened a new license related to the collection of hazardous waste, therefore several types of conditions are needed before being declared eligible for a processing and collection permit. As for the Financial Aspects to determine cost management and the economic model used by the company to find out how feasible the processing and collection of B3 waste is.

3.1 Cost Model and Economic Model for Hazardous Waste Treatment Activities

In the analysis of the economic feasibility of B3 waste processing activities at PT Trigunapratama Abadi, taxes are not calculated. In the table of Assumptions for Calculation of Costs for Hazardous Waste Treatment Activities. The assumptions used are shown. Assumptions of fuel and energy cost components are in accordance with current prices.

Table 1.
Assumptions for calculating the cost of hazardous waste management activities

No.	Assumption	Unit	Score
1	Initial investment (Building + IMB levy)	Rp/year	2,150,900,000
2	Hazardous Waste Treatment Capacity for Packaging Washing (For Plastic Packaging)	Tons/day	24
3	Hazardous Waste Treatment Capacity for Packaging Washing (For Drum Packaging)	Pcs/day	1728
4	Hazardous Waste Treatment Capacity for Packaging Washing For Metal Tube Packaging)	Pcs/day	288
5	Reception		
	- Hazardous Waste Treatment for Packaging Washing (Plastic Packaging)	Rp/ton	2,000,000
	- Hazardous Waste Treatment for Packaging Washing (Drum Packaging)	Rp/pcs	40,000
	- Hazardous Waste Treatment for Packaging Washing (Metal Tube Packaging)	Rp/pcs	100,000
6	Percentage of receipts received		
	- First year	%	10
	- 2nd year	%	15
	- 3rd year	%	25
	- 4th year	%	45
	- 5th year	%	75
	- 6th year to 15	%	100
7	Owner's equity	%	100

a.   Investment Fee

The investment costs incurred by PT.Trigunapratama Abadi are Rp. 8,305,347,917. With details as listed in the following table. The land and building investment consists of the construction cost of the B3 waste treatment area building and the IMB retribution fee.

Table 2.
Investment costs for B3 waste treatment activities

No	Component	Total Cost (Rp)
1	Land and Building	Rp2,150,900,000
2	Machinery and Equipment	Rp1,954,447,917
3	Vehicle	IDR 4,200,000,000
	Total	**Rp8,305,347,917**

b. Estimated Operational cost

This fee is calculated based on the costs incurred during operations. Operational costs are seen in the table of estimated operational costs. The operational costs are calculated in 1 year.

Table 3.
Estimated Operating Costs

Operational Cost Component	Unit	Price (Rp)	Total Needs/year	Total (Rp)
Production cost				
Employee salary	Month	94.100.000	12	1,129,200,000
Fuel and energy				
Solar	Liter	14,500	18.000	261,000,000
Electricity	Rp/Month	17,506,695	12	210,080,340
PPE and ATD	-		-	75,000,000
Service/Maintenance of Machinery, Equipment, and Facilities	-		-	500,000,000
Advanced Processing Fee	Month	15,000,000	12	180,000,000
Total				**2,355,280,340**

c. Reception

Potential income from B3 waste processing activities from the producer. This income can be obtained since the first year of operation. The revenue forecast table shows the estimated revenue earned in 1 year. If the received effluent capacity and treatment capacity is 100%. In this study, it is assumed that the revenue obtained is 10% in the first year, 15% in the 2nd year, 25% in the 3rd year, 45% in the 4th year, 75% in the 5th year, and 100% new. obtained in the 6th year.

Table 4.
Estimated receipt

No	Receipt Type	Unit	Price (Rp)	Total Receipts / Year	Total (Rp)
1	Receipts from B3 Waste Treatment for Packaging Washing (For Plastic Packaging)	Tons/day	48,000,000	365	17.520.000.000
2	Receipts from B3 Waste Treatment for Packaging Washing (Drum Packaging)	Pcs/day	69.120,000	365	25,228,800,000
3	Hazardous Waste Treatment for Packaging Washing (For Metal Tube Packaging)	Pcs/day	28,800,000	365	10,512,000,000
	Total				**53,260,800,000**

d. Financial feasibility analysis

The results of the calculation of financial analysis can be seen in the table. Table of results of Feasibility Analysis of Investment in Hazardous Waste Treatment Activities. The results of the financial analysis show that the B3 waste processing activities of PT. The Eternal Trigunapratama deserves to be run. The cash flow is presented in the Cashflow table for B3 Waste Treatment Activities at PT. The Eternal Trigunapratama.

Table 5.
Cashflow of B3 waste processing activities at PT Trigunapratama Abadi

No	Uraian	Tahun Ke-														
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a	Penerimaan	5.326.080.000	7.989.120.000	13.315.200.000	23.967.360.000	39.945.600.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000	53.260.800.000
	Total Penerimaan	623.151.360.000														
b	Pengeluaran															
	Investasi	8.305.347.917														
	Biaya Operasional	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340
	total biaya pengeluaran	10.660.628.257	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340	2.355.280.340
	total pengeluaran	36.568.711.997														
c	arus kas (a-b)	-5.334.548.257	5.633.839.660	10.959.919.660	21.612.079.660	37.590.319.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660	50.905.519.660
	arus kas kumulatif	-5.334.548.257	299.291.403	11.259.211.063	32.871.290.723	70.461.610.383	121.367.130.043	172.272.649.703	223.178.169.363	274.083.689.023	324.989.208.683	375.894.728.343	426.800.248.003	477.705.767.663	528.611.287.323	579.516.806.983
d	NPV															
	Faktor PV (DR 10%, 15 tahun)	0,9	0,83	0,75	0,68	0,62	0,56	0,51	0,47	0,42	0,38	0,35	0,32	0,29	0,26	0,23
	PV dari manfaat	-4.801.093.431	4.676.086.918	8.219.939.745	14.696.214.169	23.305.998.189	28.507.091.010	25.961.815.027	23.925.594.240	21.380.318.257	19.344.097.471	17.816.931.881	16.289.766.291	14.762.600.701	13.235.435.112	11.708.269.522
	NPV pada DR 10%	239.029.065.101														
	IRR	183%														
	B/C Ratio	17														
	PBP	3	tahun													

3.2 Cost Model and Economic Model for hazardous waste collection activities

In the economic feasibility analysis of B3 waste collection activities at PT Trigunapratama Abadi, taxes are not calculated. In the table of Assumptions for Calculation of Costs for Hazardous Waste Collection Activities. The assumptions used are shown. Assumptions of fuel and energy cost components are in accordance with current prices.

Table 6.
Assumptions for calculating the cost of hazardous waste collection activities

No.	Assumption	Unit	Score
1	Initial investment (Building + IMB levy)	Rp/year	10,065,365,000
2	Collection capacity (maximum)	Tons/day	94
3	Reception		
	B3 waste collection from producers	Rp/ton	10,000,000
4	Percentage of receipts received		
	First year	%	10
	2nd year	%	15
	3rd year	%	25
	4th year	%	45
	5th year	%	75
	6th year to 15	%	100
5	Owner's equity	%	100

a. Investment Fee

The investment costs incurred by PT.Trigunapratama Abadi are Rp. 16,669,657,017. With details as listed in the following table. The land and building investment consists of the construction costs of the B3 waste collection area building and the IMB retribution fee.

Table 7.
Investment costs for B3 waste treatment activities

No	Component	Total Cost (Rp)
1	Land and Building	Rp10,065,365,000
2	Machinery and Equipment	Rp2.404.292.017
3	Vehicle	IDR 4,200,000,000
	Total	**Rp16,669,657,017**

b. Estimated Operational cost

This fee is calculated based on the costs incurred during operations. Operational costs are seen in the table of estimated operational costs. The operational costs are calculated in 1 year.

Table 8.
Estimated Operating Costs

No	Operational Cost Component	Unit	Price (Rp)	Total Needs/year	Total (Rp)
A	Production cost				
1	Employee salary	Month	94.100.000	12	1,129,200,000
2	Fuel and energy				
	Solar	liter	14,500	14,820	214.890.000
	Electricity	Rp/Month	5,835,565	12	70,026,780
3	PPE and ATD	Year		-	100,000,000
	Service/Maintenance of Machinery, Equipment, and				
4	Facilities	-		-	200,000,000
5	Advanced Processing Fee	Day	445,000,000	365	162.425 million
	Total				**164,139,116,780**

c. Reception

Potential income from B3 waste collection activities from producers. This income can be obtained since the first year of operation. The revenue forecast table shows the estimated revenue earned in 1 year. If the received effluent capacity and treatment capacity is 100%. In this study, it is assumed that the revenue obtained is 10% in the first year, 15% in the 2nd year, 25% in the 3rd year, 45% in the 4th year, 75% in the 5th year, and 100% new. obtained in the 6th year.

Table 9.
Estimated acceptance

No	Receipt Type	Unit	Price (Rp)	Total Receipts / Year	Total (Rp)
1	B3 waste receipts from producers	Ton	940.000.000	365	343,100,000,000
	Total				**343,100,000,000**

d. Financial feasibility analysis

The results of the calculation of financial analysis can be seen in the table. Table of results of the Feasibility Analysis of Investment in Hazardous Waste Collection Activities. The results of the financial analysis show that the activities of collecting B3 waste at PT. The Eternal Trigunapratama deserves to be run. The cash flow is presented in the Cashflow table for B3 waste collection activities at PT. The Eternal Trigunapratama.

Table 10.
Cashflow for hazardous waste collection activities at PT Trigunapratama Abadi

No	Uraian	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
a	Penerimaan	34.310.000.000	51.465.000.000	85.775.000.000	154.395.000.000	257.325.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000	343.100.000.000
	Total Penerimaan	4.014.270.000.000														
b	Pengeluaran															
	Investasi	16.669.657.017														
	Biaya Operasional	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780
	total biaya pengeluaran	180.808.773.797	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780	164.139.116.780
	total pengeluaran	2.478.756.408.717														
c	arus kas (a-b)	-146.498.773.797	-112.674.116.780	-78.364.116.780	-9.744.116.780	93.185.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220	178.960.883.220
	arus kas kumulatif	-146.498.773.797	-259.172.890.577	-337.537.007.357	-347.281.124.137	-254.095.240.917	-75.134.357.697	103.826.525.523	282.787.408.743	461.748.291.963	640.709.175.183	819.670.058.403	998.630.941.623	1.177.591.824.843	1.356.552.708.063	1.535.513.591.283
d	NPV															
	Faktor PV (DR 10%, 15 tahun)	0,9	0,83	0,75	0,68	0,62	0,56	0,51	0,47	0,42	0,38	0,35	0,32	0,29	0,26	0,23
	PV dari manfaat	-131.848.896.417	-93.519.516.927	-58.773.087.585	-6.625.999.410	57.775.247.596	100.218.094.603	91.270.050.442	84.111.615.113	75.163.570.952	68.005.135.624	62.636.309.127	57.267.482.630	51.898.656.134	46.529.829.637	41.161.003.141
	NPV pada DR 10%	445.269.494.660														
	IRR	238%														
	B/C Ratio	1,619469338														
	PBP	7	tahun													

So that obtained from the two activities as follows:

Table 11.
Feasibility analysis of processing and collection

Analysis	Processing	Collection	Criteria	Information
NPV	239.029.065.101	445,269,494,660	NPV > 0	WORTHY
IRR	183%	238%	IRR > i	WORTHY
NET B/C	17	1.619469338	NETB/C > 1	WORTHY
PBP	3	7		

4.   Conclusion

B3 waste processing and collection activities at PT Trigunapratama Abadi get the following analysis results: Efforts to develop B3 waste processing and collection business investments at PT Trigunapratama Abadi show a significant feasibility, where the NPV value in a 3-year processing activity scenario can generate a benefit of Rp. 239,029,065,101 with an internal rate of return of 183%. And number 17 shows that the value of benefits is 17 times greater than the costs, so this investment is considered feasible to be developed. Efforts to develop B3 waste processing and collection business investment at PT Trigunapratama Abadi showed significant feasibility, but the IRR seemed irrational because it was more than 100%. This is a weakness of the IRR calculation. In some cases it is possible not to use the IRR calculation because the calculation results show an irrational IRR (negative IRR or IRR more than 100%). The goal to be achieved by all companies is to increase company profits, expand market share and complete work support facilities, facilities and infrastructure. For that to be declared competitive, of course, it must be proven by an analysis of activities covering the financial aspects.

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