

Financial Benefits of Implementing ISO 14001 in PT. PJB Tanjung Awar-Awar Indonesia

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Abstract— The ISO 14001 Environmental Management System is one of the systems widely used by companies in environmental management, one of which is the generation sector in Indonesia. This study aims to examine the application of the ISO 14001 Environmental Management System at PT. PJB PLTU Tanjung Awar-Awar from the financial aspect. This financial feasibility analysis uses data calculations based on the rupiah exchange rate assuming the 2020 State Budget, 5-year program life with an interest rate of 4.50%, which comes from the 2020 BI Rate and 20% MARR (Minimum Acceptable Rate of Return). From this financial analysis, it shows that the results of the calculation of financial feasibility in implementing the Environmental Management System ISO 14001: 2015 are declared feasible to run with the results that are Net Present Value (NPV) > 0 of \$ 494,235 and Internal Rate of Return (IRR) > MARR of 97%. This shows that the application of ISO 14001 brings financial benefits for companies that implement it.

Index Terms—Environmental Management System, ISO 14001:2015, Steam Power Plant, Financial Analysis

I. INTRODUCTION

ISO 14001 is an international standard with worldwide acceptance based on the concept of preventing environmental pollution, improving environmental performance and complying with applicable laws [1]. In fulfilling company obligations as an effort to protect the environment, companies can use the legal framework in planning environmental management actions [2]. ISO 14001 is a program that can assist companies in regulatory compliance and has been proven effective in various countries [3]. In several other countries as a whole, it is evident that the application of ISO 14001 to power plants has a good impact on environmental aspects [4], improves compliance with environmental regulations [5], prevents environmental pollution [6], and encourages efforts to minimize waste [7]]. The main difficulties that usually arise in implementing ISO 14001 are lack of qualified human resources, lack of implementation, lack of regulatory compliance, lack of management support and high costs [8]. Therefore, the analysis of financial benefits in implementing ISO 14001 at PT. PJB PLTU Tanjung Awar-Awar Indonesia is interesting to discuss, especially for companies that will implement it.

II. REVIEW

A. ISO 14001 Environmental Management System in Indonesia

In Indonesia, the assessment of the compliance of industrial

operations to the environment and society is through a rating program launched by the Ministry of Environment of the Republic of Indonesia. The program is called PROPER, the rankings are marked with certain colors, namely gold, green, blue, red and black ratings. This is done in order to make companies in Indonesia more focused on environmental preservation. In its efforts to achieve the assessment criteria for more aspects of compliance, PT. PJB PLTU Tanjung Awar-Awar must meet the criteria for implementing the ISO 14001 Environmental Management System.

In Indonesia, it also regulates environmental violations, including in Law 32 of 2009 which states that if you commit an act that results in exceeding the standard criteria for environmental damage, you will be subject to criminal sanctions, namely 3 years in prison and a fine of at least \$ 204,890. With the existence of ISO 14001: 2015, it is expected to help companies comply with environmental regulations in force in Indonesia.

B. Financial Analysis

In fulfilling the financial aspect, namely by using criteria including Net Present Value (NPV and Internal Rate of Return (IRR). NPV is a model that takes into account the overall cash flow pattern of an investment in relation to time, based on a certain discount rate. NPV is cash flow. forecasts of the future discounted at this time. NPV is a tool that can analyze risks and identify a project [9]. Approach The formula used is :

$$NPV = \frac{Rt}{(1+i)^t} \quad (1)$$

Note:

Rt = the net cash flow in time t

i = the discount rate used

t = cash flow time

After the NPV value is obtained, it can be compared with the following data :

If the NPV > 0 then the investment made provides benefits to the company, so that the project can be executed.

If NPV = 0 then the investment made is not made

the company loses or gains profit, so that if the project is implemented or not, it will not affect the company's finances.

If the NPV < 0, the investment to be made will result in losses for the company, then the project is rejected.

IRR is an indicator of the level of efficiency of an investment. The function of IRR is to determine whether an investment is carried out or not. As a reference, the investment made must be higher than the Minimum Acceptable Rate of Return (MARR). MARR is the minimum rate of return on an investment made by an investor. The program is said to be carried out if the rate of return is greater than the rate of return when investing elsewhere. Approach The formula used is:

$$IRR = r_a + \frac{NPV_a}{NPV_a - NPV_b} (r_b - r_a) \quad (2)$$

Note:

r_a = lower discount rate chosen

r_b = higher discount rate chosen

N_a = NPV at r_a

N_b = NPV at r_b

III. METHODOLOGY

A. Data Collection for ISO 14001 Application Requirements

Some of the data requirements needed in the preparation year for implementing ISO 14001 as an initial investment include equipment costs for implementing ISO 14001, costs for preparing ISO 14001 documents, training and certification costs, internal audit fees and external audit fees. This investment cost represents a number of costs used to initiate the implementation of the ISO 14001 Environmental Management System program. Meanwhile, in the development year it is adjusted to the needs of the company, consisting of fixed costs and variable costs. In this program, fixed costs are the implementation of Management Review Meetings, routine team meetings, internal audits, implementation of water and air quality tests in accordance with laws and regulations and company permits, implementation of B3 waste management, reporting of environmental monitoring to related agencies. While the variable costs are training / certification, recertification, pre-assessment audits (recertification of ISO 14001) and recertification of ISO 14001.

B. Feasibility Assessment for Financial Aspects

In assessing the financial aspect through the calculation of the criteria for Net Present Value and Internal Rate of Return (IRR). The calculation of financial feasibility uses the current interest rate of 4.50%, which comes from the 2020 BI Rate. Meanwhile, the Minimum Acceptable Rate of Return (MARR) is 20%.

IV. RESULT AND DISCUSSION

A. Investment Costs for Preparation for ISO 14001 Implementation

The investment cost is the cost needed as an initial step to starting the ISO 14001 Environmental Management System program. The investment required to realize the ISO 14001 program is \$ 106,391 which consists of supporting equipment costs, document preparation costs, training and certification costs, internal audit fees, and fees. external audit.

B. Fixed and Variable Costs of ISO 14001 Administration

Fixed costs and variable costs are costs incurred during the development year, namely from year 1 to year 5. Fixed costs include the implementation of Management Review Meetings, regular team meetings, internal audit, implementation of quality tests. water and air in accordance with the laws and permits owned by the company, the implementation of the management of hazardous and toxic waste, environmental monitoring reporting to the relevant agencies. While variable costs include training / certification, recertification, pre-assessment audit and recertification of ISO 14001. The costs required in year 1 are \$ 93,128, year 2 are \$ 83,376, year 3 are \$ 86,790, year 4 are \$ 99,958, year 5 are \$ 83,376.

C. Cash In Implementation of ISO 14001 at PT. PJB PLTU Tanjung Awar-Awar Indonesia

Cash In is the sum of Net Profit and depreciation. Depreciation is the depreciation of an asset over its useful life. The benefits of implementing the ISO 14001 Environmental Management System include compliance with environmental laws and regulations in force in Indonesia. Thus the implementation of the ISO 14001 Environmental Management System provides the advantage of avoiding criminal sanctions as stipulated in Law 32 of 2009 which states that if you commit an act that results in exceeding the standard criteria for environmental damage, you will be subject to criminal sanctions, namely 3 years in prison and a fine. at least \$ 204,890. This is the Net Profit value that will be included in the calculation of financial studies in this study.

Meanwhile, the depreciation value in the application of ISO 14001 is obtained from the total investment divided by the economic life of the program, which is 5 years. So the depreciation value in this program is \$ 21,278.

D. Calculation of Financial Feasibility

Detailed data on the financial feasibility of implementing ISO 14001 at PT. PJB PLTU Tanjung Awar-Awar is shown in Table 1. The NPV Financial Feasibility Calculation shows the net benefit value obtained during the program of \$ 494,235 which is obtained from the NPV minus the initial investment and obtained $NPV > 0$. This NPV value shows the SML program can generate benefits of \$ 494,235. In Table 2. The calculation of IRR Financial Feasibility is used to see how much the return on the investment that has been made must be higher than the MARR, which is 20%. This IRR calculation comes from the assumption of a low interest rate of 4.50% and a high interest of 10%. Based on the feasibility calculation, the IRR value of the Environmental Management System program ISO 14001 PT. PJB PLTU Tanjung Awar-Awar obtained yields greater than 20% MARR which is equal to 97% or $IRR > MARR$.

Table 1. Net Present Value Financial Feasibility Results

Year	Cash Out (\$)	Cash In		Net Cash Flow (\$)	Faktor PV	PV (\$)
		Net Profit (\$)	Depresiasi (\$)			
	(2)	(3)	(4)	(5) = (3+4)-(2)	(6)	(7) = (5) x (6)
1	93.128	204.890	21.278	133.040	0,957	127.311
2	83.376	204.890	21.278	142.793	0,916	130.759
3	86.790	204.890	21.278	139.378	0,876	122.136
4	99.958	204.890	21.278	126.210	0,839	105.835

5	83.376	204.890	21.278	142.793	0,802	114.584
			NPV			600.626

Table 2. Internal Rate of Return Financial Feasibility Results

Year	Cash Out (\$)	Cash In		Net Cash Flow (\$)	Discount Rate	
		Net Profit (\$)	Deprecias i (\$)		4,5% (\$)	10% (\$)
(1)	(2)	(3)	(4)	(5) = (3+4)-(2)	(6)	(7)
0	106.391			-106.391	-106.391	-106.391
1	93.128	204.890	21.278	133.040	127.311	120.945
2	83.376	204.890	21.278	142.793	136.644	129.811
3	86.790	204.890	21.278	139.378	133.376	126.707
4	99.958	204.890	21.278	126.210	120.775	114.737
5	83.376	204.890	21.278	142.793	136.644	129.811
			TOTAL		548.358	515.621

The NPV and IRR calculations state that the ISO 14001 Environmental Management System program at PT. PJB PLTU Tanjung Awar-Awar is feasible to run. The assessment has been carried out by analyzing the cost of the initial requirements for implementing ISO 14001 until certification and recertification are achieved in the development year. Cost analysis is carried out by measuring the implementation of environmental management and the benefits in controlling pollution. In calculating the benefits obtained from implementing this program, consider the trade-offs that may occur between the benefits arising from implementing the ISO 14001 program and the environmental damage that may occur.

So that in this study the financial costs to control environmental damage are compared with the economic costs that arise if the damage occurs. This is adjusted to the prevailing regulations in Indonesia, namely in relation to violations of exceeding ambient air quality standards, water quality standards, sea water quality standards or environmental damage standard criteria (Law 32 of 2009).

V. CONCLUSION

The results of the calculation of the financial feasibility of the ISO 14001 Environmental Management System at PT. PJB PLTU Tanjung Awar-Awar shows that the implementation of the ISO 14001 Environmental Management System is feasible. This can be seen from the financial feasibility analysis, namely the NPV analysis which shows the benefits obtained of \$ 494,235, namely NPV > 0. While the IRR analysis shows that the ISO 14001 Environmental Management System program obtained is greater than the 20% MARR which is 97% so that the program is feasible to run.

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REFERENCES

- [1] Ciravegna Martins da Fonseca, L.M., "ISO 14001:2015: An Improved Tool For Sustainability," Journal of Industrial Engineering and Management 8, 2015, pp 37-50.
- [2] Martins F, Fonseca L., "Comparison Between Eco-Management and Audit Scheme and ISO 14001:2015," Energy Procedia 153, 2018, pp 450-454.
- [3] Prakash A., Potoski M., "Global Private Regimes, Domestic Public Law: ISO 14001 and Pollution Reduction," Comparative Political Studies 47, 2013, pp 363-394.
- [4] Wong J.J., Abdulah M.O., Bains R., Tan Y.H., "Performance Monitoring: A Study on ISO 14001 Certified Power Plant in Malaysia," Journal of Cleaner Production 147, 2017, pp 165-174.
- [5] McGuire W., "The Effect of ISO 14001 On Environmental Regulatory Compliance in China," Ecological Economic 105, 2014, pp 254-264.
- [6] Flejszman. A.M., "Benefits of Environmental Management System in Polish Companies Compliant with ISO 14001," Polish Journal of Environmental Studies 18, 2008, pp 411-419.
- [7] Singh M., Bruecker M., Padhy P.K., "Environmental Management System ISO 14001: Effective Waste Minimisation in Small and Medium Enterprises in India," 102, 2015, pp 285-301.
- [8] Waxin M.F., Knuteson S.L., Bartholomew A., "Driver and Challenges for Implementing ISO 14001 Environmental Management System in An Emerging Gulf Arab Country," Journal of Environmental Management 63, 2017.
- [9] Groenendaal W.J., "Estimating Net Present Value Variability for Deterministic Model," European Journal of Operational Research 107, 1998, pp 202-213.

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