

The Influence of Environmental Cost on Profitability and Firm Value

(A Study of First Section Chemical Companies Listed on Japan Stock Exchange in 2016 – 2018)

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Abstract—Environmental cost is a set of methods to measure the total environmental conservation cost. The purpose of this study is to examine the influence of environmental cost towards profitability measured by ROA, ROE, and NPM, and firm value measured by PER and Tobin’s Q. The type of this research is explanatory with a quantitative approach. The object of this study is First Section Chemical Companies listed on the Japan Stock exchange in 2016-2018. The study uses 20 chemical companies with 60 samples of environmental accounting data from sustainability and annual report. The data analysis technique is a descriptive analysis and a simple regression. The results show that (1) environmental cost has a significant negative effect on return on asset, (2) environmental cost has a significant negative effect on return on equity, (3) environmental cost has a significant negative effect on net profit margin, (4) environmental cost has no significant effect towards price-earnings ratio, and (6) environmental cost has significant negative effect towards Tobin’s Q.

Keywords—environmental cost, profitability, firm value

I. INTRODUCTION

Japan has experienced four big chemical industry environmental disasters, as recorded by the New York Times (1997). The earliest Japan environmental issue was in the post-war period during the country’s industrial boom, which led Japan to be the worst polluted country in the world. Two of the four cases happened in chemical companies. The earliest was the Chisso Chemical Company disaster in 1945 by discharging organic mercury to Minamata Bay, causing 2,262 people poisoned and shrunk the city population from 50,000 to 33,000 [1]. Over the past decades, Japan has its concern regarding environmental issues. The negative impact has been significant, leading both government and society to form environmental regulations, such as environmental accounting guidelines.

The guidelines are also crucial because the Japanese chemical industry is a global player with many global customers and competitors. The government should ensure that

the companies contribute to environmental preservation activities and compliance with guidelines. Table 1 shows the significance of Japan chemical industry at the global level.

TABLE I. GLOBAL TOP 50 CHEMICAL COMPANIES 2016 -2018

Rank	2016		2017		2018	
	Country	Sales	Country	Sales	Country	Sales
1	China	1,331	China	1,293	China	1,198
2	USA	528	EU	542	EU	565
3	EU	507	USA	466	USA	468
4	Japan	140	Japan	154	Japan	180
5	South Korea	113	South Korea	122	South Korea	127

Source: Cefic Facts & Figures 2018 and 2020 (in € billion), data proceed 2020

The world highly valued chemical industries are Europe, North America, and Japan as the world's top 5 chemical sellers [2]. These numbers reflect Japan's chemical industry's global recognition that in return, along with the past industry bad experiences have made Japan concerning the industry and companies' environmental sustainability. Furthermore, data shows that Japan has significant export sales to international trade its own world-leading chemical companies, including Toray Industries, Mitsubishi Chemical, Sumitomo Chemical, and the other Japan chemical companies that continuously rates under C&EN’s Global Top 50 chemical companies in sales. In detail, there are eight companies in 2016, 6 companies in 2017, and 7 companies in 2018 as the world's top 50 chemical companies [3].

The Japan Ministry of Environment recorded that since 1999, Japan was involved in tackling environmental issues by participating in United Nations as a member of the expert working group to practice environmental accounting [4]. Environmental accounting guidelines issued by the Japan Ministry of Environment aim to provide rules for companies to achieve sustainable development, maintain influence with the community, and pursue the effectiveness and efficiency of environmental conservation activities [5]. In application,

environmental accounting consists of investment amount and expense amount on environmental cost. The expense amount refers to environmental cost, and investment amounts are expenditures allocated during a target period for environmentally sustainable operations for future business profits.

Based on the concern of Japan's big chemical industry and its future negative environmental impact, this research is analyzing the influence of environmental cost on profitability and firm value. Both profitability and firm value are used to evaluate the influence of environmental cost on past financial performance and develop future strategic decisions that influence future investment decisions. Accounting data focus on evaluating a company's internal operating efficiency that includes such past performance that indicates profitability. On the other hand, the firm value represents the investors' expectations and the market reaction to the company's general performance.

The research findings will provide significant insight into Japan's implementation of environmental accounting and cost, immensely benefiting Indonesia in the future. The environmental cost in environmental accounting has no regulation under the Indonesia accounting standard. It means that the disclosure of environmental accounting is voluntary. According to the Institute of Indonesia Chartered Accountants, a company's annual report should accommodate stakeholders' interests [6]. PSAK No. 1 in 2014 Paragraph Nine (9) explained that the company can provide an additional report, such as environment and value-added statement, particularly to the industry in which the environment plays an essential role for industries that acknowledge internal management as a user of the report [7]. PSAP No. 1 in 2010 explained that the company can provide additional environmental reports, including waste management costs [8].

II. OVERVIEW

The study is using stakeholder and signaling theory based on the previous empirical research and background relevancy. Stakeholder theory by Freeman and Reed states that recognize the maximization of sustainable performance and the long-term value of the firm is the criterion to balance the interests of all stakeholders and enhance the long-term value of the company fulfillment on social responsibility environmental obligations, and reputation [9]. Besides, Spence states that companies can signal any news including voluntary reporting of sustainability performance, which in return will differentiate themselves from companies with poor sustainability performance [10].

III. RESEARCH METHODS

The research is using explanatory research with a quantitative approach. The study describes environmental cost as the independent variable and its influence on two dependent variables, which are profitability and firm value. Furthermore, the research location is Japan Stock Exchange official website, which is www.jpx.co.jp, and the company as secondary data

shows documentation for the collection technique. The population of this study covers 146 first section chemical companies under Japan Stock Exchange in 2016-2018 and a sample of 20 companies from the population criteria as follows:

- First section chemical companies on Japan Stock Exchange rated continuously in 2016-2018
- Companies published the English version of the annual and financial report in 2016-2018
- Companies published the English version of environmental accounting on Sustainability or CSR Reports in 2016-2018
- Companies are not having a loss in 2016-2018

IV. RESEARCH AND DISCUSSION

A. Classical Assumption

1) *Normality test:* The significance value of each variable shows the criteria of Asymp. Sig $0.200 \geq 0.05$. Thus, the data have a normal distribution.

2) *Autocorrelation test:* The value of Durbin Watson of each variable for $du < d < 4 - du$ criteria shows no autocorrelation. all regression models have a dw value that is in the range $du = 1.6162 < d < 4 - du = 2.3838$.

3) *Heteroscedastic test:* The research data is spread above and below the Y-axis to form a particular pattern (wavy, widened, the narrowed); it indicates no heteroscedasticity. There is no heteroscedasticity detected by analyzing the scatterplot graph.

B. Simple Linear Regression Analysis, Hypothesis Test, and Coefficient Determination

Results from simple regression analysis for five dependent variables and environmental cost as the dependent variable are as table 2 follow:

TABLE II. RESULTS OF SIMPLE REGRESSION ANALYSIS

	Models				
	1	2	3	4	5
Dependent Variables	ROA	ROE	NPM	PER	Tobin's Q
B	-0.166	-0.086	-0.174	-0.029	-0.565
Constants	0.264	-0.274	0.472	1.344	5.974
R Square	0.289	0.132	0.256	0.035	0.077
t	-4.992	-2.896	-4.618	-1.482	-2.060
Sig.	0.000	0.005	0.000	0.144	0.044

Source: data proceed, 2020

The regression formulas consist of five models based on the table shows below:

1) *Model 1:* The model is $ROA = 0.264 - 0.166 \text{Environmental cost}$. Result from regression shows the regression coefficient variable of Environmental cost is -0.166

with a negative sign. It means that an addition of 1 unit in environmental cost will decrease 0.166 for ROA, assuming that other variables are constant or 0. The hypothesis test may support environmental cost measured by annual total environmental cost significantly affecting ROA from t count = $-4.992 > t$ table = -2.01063 and t . sig (0.000) < 0.05 .

2) *Model 2:* The model is $ROE = -0.274 - 0.086$ Environmental cost. Result from regression shows the regression coefficient variable of environmental cost is -0.086 , with a negative sign shows the opposite direction. It means that an addition of 1 unit in environmental cost will decrease 0.086 for ROE, assuming that the other variables are constant or 0. The hypothesis test result may support environmental measured by annual total environmental cost significantly affecting ROE from t count = $-2.896 > t$ table = -2.01063 and t . sig (0.005) < 0.05 .

3) *Model 3:* The model is $NPM = 0.472 - 0.174$ Environmental cost. Result from regression shows the regression coefficient variable of environmental cost is -0.174 with a negative sign shows the opposite direction. It means that an addition of 1 unit in environmental cost will decrease 0.174 for NPM, assuming other variables are constant or 0. The hypothesis test may support environmental cost measured by the annual total environmental cost significantly affecting NPM from t count = $-4.618 > t$ table = -2.01063 and t . sig (0.000) < 0.05 .

4) *Model 4:* The model is $PER = 1.344 - 0.029$ Environmental cost. Results from regression show the regression coefficient variable of environmental cost is -0.029 with a negative sign shows the opposite direction. It means that an addition of 1 unit in environmental cost will decrease 0.029 for PER, assuming that other variables are constant or 0. The hypothesis test may support environmental cost measured by the annual total environmental cost has no significant effect on PER from t count = $-1.482 < t$ table = -2.01063 and t . sig (0.144) > 0.05 .

5) *Model 5:* The model is $Tobin's Q = 5.974 - 0.565$ Environmental cost. Results from regression show the regression coefficient variable of environmental cost is -0.565 with a negative sign shows the opposite direction. It means that an addition of 1 unit in environmental cost will decrease by 0.565 for Tobin's Q, assuming that other variables are constant or 0. The hypothesis test may support environmental cost measured by the annual total environmental cost significantly affecting Tobin's Q. If t count = $-2.060 > t$ table = -2.01063 and t . sig (0.044) < 0.05 .

V. CONCLUSION AND SUGGESTION

A. Conclusion

The findings indicate a significant negative effect of environmental costs on all profitability indicators. It implies that environmental cost is a burden for the overall company

costs that lead to profit reduction. On the contrary, environmental costs do not significantly affect the market or firm value measurements: price-earnings ratio and Tobin's Q. The authors assume that investors' investment decisions are motivated by other factors such as risk and return, which are not analyzed in this study. The negative but significant effect of environmental costs on Tobin's Q may occur since the environmental cost cannot attract investors, because higher environmental cost shows the company cannot maximize its profit, leading the investor to release shares off the market and lower the shares price.

Environmental cost shows how the company allocates each environmental activity expense and prioritizes whether the environmental issue is essential in the business process to enhance company profitability. It highlights the profitability as a company indicator to returning its assets, equities, and sales to profits. The research result shows that higher environmental cost leads to lower profit reduction as a significant negative effect. The sign results are in line with Buana and Nuzula (2019) stated that environmental cost has a significant negative effect on ROA and NPM. However, Buana and Nuzula stated no significant effect on ROE [11].

These findings are not in line with Falope and Offor stated that environmental cost has a significant positive effect on ROA [12]. Similiary, Okafor evidenced a significant positive effect on ROA because the environmental cost can enhance company performance in energy saving for tools or processes that positively affect cost-saving to generate profit [13]. Makori and Jagongo also proved that environmental cost significantly affects NPM [14]. Similarly, Iheduru and Chukwuma stated that environmental cost significantly affects NPM since the company manages to disclose and manage environmental cost effectively to gain economic benefit [15]. The lower environmental cost leads to a higher profit increase. The company can obtain additional profit by selling production waste, implementing better energy-saving technology, and environmental preventive activities that serve to increase the effectiveness and receive profits. On the subject of stakeholder theory, the environmental cost can indicate the synergy and integration from all of the company's stakeholders in achieving better environmental-friendly operations while maintaining its profits. The company needs to balance each of the stakeholders' interests to gain economic benefits.

In related with firm value, the research results show environmental cost has no significant effect on PER and negative significant effect on Tobin's Q. Higher environmental cost leads to the lower market reaction as none and significant negative effect means that it is not valued significantly by investors as an expected expense. Companies need to attract investors with high-profit returns and minimal cost. The results are in line with Buana and Nuzula stated that investors assume environmental as burden for the overall company cost for investors leads to negative impact on expected earnings [11].

The authors predict that environmental cost may positively affect the firm or market value measurements if investors are

interested in social information, including environmental activities in any report disclosures. The companies disclose additional information as credibility signals for investors to invest in the companies' stocks. Therefore, in the communication process, the environmental cost reduces information asymmetry and helps gain competitive advantage and reputation, leading to value maximization as a good investment prospective. On the subject of signaling theory, the environmental cost can signal investors and shareholders the sustainability performance that will differentiate themselves from firms with another company. Any information disclosure sends different signals to the market and receives responses from the market.

B. Suggestion

- The prospective researcher can develop further research by considering different variables and adding the observation year for further studies.
- The study shows that environmental cost has a negative effect on both profitability and Tobin's Q. It shows that the company should have a good environmental cost allocation to prevent profit reduction and give a significant value maximization as a prominent signal to investor and shareholder.
- Indonesia should provide an official guideline for environmental accounting to analyze the environmental cost better that can benefit Indonesia in the future.

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