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# Carbon Emission Reduction's Impact on a Company's Performance

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***Abstract*—This study explores carbon emission reduction's impact on a company's performance in Indonesia. The examples are seven companies that were publicly listed between 2008 and 2013. Carbon emission is the independent variable and financial performance (ROA, ROS, ROE) is the dependent variable. Therefore, this study discovered reducing carbon emission reduction substantially affected ROS and ROE, although ROA wasn't affected. When it comes to ROA, that's probably because the capital expenditure intensity which occurs with carbon emission investment into the production process is low. This study is valuable because stakeholders can benchmark as well as evaluate the company's performance based on laws, code, norms, and their performance benchmarks. Additionally, stakeholders may do a comparison of that performance inside the company as well as with other companies over a specific timeframe. It is additionally valuable as a vital means to take part and converse with additional businesses as well as the local populations. The study topic is very new in both Indonesia and worldwide. Furthermore, this issue ought to inspire companies to be better aware of the type of environment which is going to affect that company's performance long range.**

***Keywords—carbon emission, financial performance, company's performance***

## I. INTRODUCTION

In the past several decades, the environmental issues have been extremely critical issues amongst governments, specialists, and businesses. Around 70 percent of the disasters that have happened recently were brought on due to climate change. That's a rise of 20 percent from 20 years ago. Heavy rains, tropical storms, as well as droughts and floods are cases of climate change. These type of things are expected to happen more often during the upcoming 20 years [1].

Environmental problems have been a debated issue all over the world ever since the 1960s. At that time, the globe was hit by several environmental irregularities, like European pollution, Japan facing Minamata illnesses, as well as the United States had a lot of different creatures go extinct. After that, the Stockholm Conference ended up being the method of discussing the world's environmental problems. All the governments worldwide getting involved in the activity of improving environmental issues, developing countries are becoming more united, and the globe is establishing transparency so it can save the planet. People in civilizations worldwide are cultivating a more considerate approach to their environment [2].

Following the Stockholm Conference, environmental awareness issues grew in several societies. The 1992 Earth Summit in Rio de Janeiro underlined the environmental links with development. This resulted in the forming of "Agenda 21" on forestry philosophies, biodiversity and climate change [3]. Furthermore, the Kyoto Protocol concentrated on decreasing environmental damage in 1997 by mandating environmental reporting to be mandatory, particularly in countries which significantly contributed to the emission of Greenhouse Gas (GHG). The countries which became a part of the Kyoto Protocol must lower their emissions beginning in 2005 [4]. Following the Kyoto protocol, a World Summit on Sustainable Development (WSSD) got held in Johannesburg in 2002 because the people were calling for additional effort to be made concerning environmental matters.

In 1971, Indonesia responded to the Stockholm conference by issuing the Presidential Decree No. 16. The Indonesian government formed a committee entitled, "*Panitia Perumus dan Rencana Kerja Bagi Pemerintah di Bidang Lingkungan Hidup*." They needed to create a specialized department in the government center to handle the environment in order to lead an improved way of supervising the happenings regarding the environment.

In 1975, another degree was established with the Presidential Decree No. 27. This established yet another board entitled, "*Panitia Inventarisasi dan Evaluasi Kekayaan Alam.*" Its primary responsibility was to manage the demand as well as the offerings available in the societal, monetary, ecological, and political arenas now and in the future (2). Additionally, in 1997 Indonesia compiled Act No. 23, in article 5 on managing the environment. Moreover, in 2oo7 Act No. 40 concerning limited liability companies, in Article 1 section 3, states corporations are responsible to the societies as well as the environment [5].

To endorse any environmental matters, Ikatan Akuntansi Indonesia (IAI) (Indonesian Accounting Board)" issued a regulation supporting the outline for environmental

 

conservatism with Pernyataan Standar Akuntansi Keuangan (PSAK) (Generally Accepted Accounting Principles) numbers 32 and 33. PSAK 32 (forestry accountancy) along with PSAK 33 (general mining accountability) declared every business in the mining industry as well as "Hak Pengusahaan Hutan (HPH)" (Natural Forest Management Permit) has to report all of its environmental performance within their own financial statements [6].

Environmental disclosure is identified as a supplier of both private and public info, economic and non-economic info, and the quantifiable and non-quantifiable info linked to the companies' environmental matters. The info must be shown in the yearly report or it may be done in another form. Nevertheless, most of this output is normally supplied in a separate environmental report [7].

GHG is one of the environmental issues. A research by Fornaro, Winkelman and Glodstein [8] indicated that this was a top contributor of global warming. Gases get entrapped in the atmosphere and then they contribute to raising the temperature. GHGs stem from burning fossil fuel as well as waste disposal done by neighborhoods, businesses, and the area households. GHG can be found on the planet in various form; there's 6 GHGs which play a part in the Global Warming Potential (GWP), like carbon dioxide ($CO_2$), as well as methane, ($CH_4$), hydrofluorocarbons (HFCs), nitrous oxide ($N_2O$), Sulphur hexafluoride (SF6) [9] and perfluorocarbons (PFCs). In 200, the World Resources Institute stated that the top added gas emission that increased global warming was carbon dioxide ($CO_2$), as it covers 77 percent of all GHG contributions [10].

To formulate an unanimously accepted standard for reporting Corporate Social Responsibility (CSR) as well as provide an appropriate and reliable approach to handling financial, social and environmental issues, the Global Reporting Initiative (GRI) came into play as the accepted guidelines [11]. GRI is centered on 3 aspects listed in Triple Bottom Line (TBL) reporting [12]. It's now quite vital for businesses to handle matters which concern all different types of stakeholders, whether internal or external. The CSR must act as the "corporation's commitment to conduct itself in a socially and environmentally responsible manner as it strives to meet financial goals" [13].

The TBL concept comprises people and planet, as well as profit dimensions [14]. Consequently, when talking about profit and viewpoints, reference [15] reveals that a decrease in the emissions of select pollutants increases economic performance, like the Return on Sales (ROS), as well as a Return on Assets (ROA), and a Return on Equity (ROE) from a section of S&P 500 companies. Reference [16] likewise shows a reduction in chemical emissions will enhance economic performance. Reference [17] found the asset book value along with the operational cash flow are adversely influenced by emission levels. Though, referencing operational cash flow affected the emissions level, it wasn't significant. On the reverse, reference [18] discovered GHG emissions practices don't really affect market performance. Consequently, the results are still unreliable.

Based on the explanation shown above, it encapsulates that the research from Hart and Ahuja [15] and Pogutz and Russo [16] discovered a positive relationship of carbon emission to company performance and the company's emissions were still extremely reliant on a company's growth in the market. Reference [17] discovered book value of any fixed assets decreased if a firm is emission liable and discovered it had an adverse correlation between long lived assets and operational cash flow and the firm's carbon emission level. Conversely, they additionally found that operational cash flow adversely affected emission liable firms.

Nevertheless, reference [18] didn't discover a relationship between a firm's performance and carbon emission. The results gave an uncertain conclusion. There's much debate amongst researchers on the way a rise in environmental behavior can contribute to a rise in efficiency, as well as market share, boosting brand value, and enhancing competitiveness [19].

This study looks at the empirical evidence of if the environmental performance ($CO_2$) has an effect on a firm's performance (ROA, ROE, ROS). It's important for business practices to lessen the environmental risks which can effect a monetary statement, boost efficiency and enhance operating performance, as well as improve the environmental, commercial, social, and economic value, as well as gaining a competitive benefit [20]. Secondly, it is valuable for the investors in their decision making prior to investing, to evaluate the social and ecological conditions to lessen risk, prevent unethical behavior of companies for improving investment returns in both the short and long range [21].

Thirdly, for the stakeholders, it's the standard and it evaluates the company performance based on existing laws, code, performance standards and norms. Fourthly, for the accountants, it may enhance the understanding on the way environmental as well as sustainable development concerns relate, developing long range future retrospective accounting methods and increasing the scale of the job's description [22]. Lastly, for the academicians, it expands their knowledge about the environmental matters and may end up being a reference in the future [23].

## II. Literature Review

Legitimacy theory may clarify voluntary disclosures. It clarifies that businesses can divulge the environmental characteristics for obtaining accountability and visibility as well as looking for a great image as a way to behave in a socially responsible fashion consistent with the norms and the expectations (9). The theory says an organization must operate in a place society deems they are operating inside the boundaries of a "social contract" between a corporation and society which gives it a license to run [9,24-26]. If a corporation doesn't run inside the boundaries of appropriate behavior in a community, that community will take action to remove that organization.

Therefore, management reacts to threats to an establishment's legitimacy whenever its actions aren't, or aren't seen as being in accordance with a "social contract" [25,27]. Whenever there's a possibility of an inconsistency between a company and social value systems, it'll lead to warnings about the organization's legitimacy in the way of legal, financial, and additional sanctions. A few researches discovered there's a relationship between angering the society and having positive yearly report sentences, as the investigators in those areas are: reference [28-30].

To conclude, legitimacy theory expounds that corporations attempt to depict themselves agreeing to norms and regulations that apply in a society. If they don't perform based on a social contract, a community will take action to remove the companies. Additionally, that viewpoint additionally believes the company must work inside a "social contract, altered based on the stakeholders' needs, additional organizations, and it promotes the business via social values.

Additional researchers also think companies must maintain a great image. A way this is done is via environmental disclosure. This involves strategies of info disclosure for maintaining a good image creation, like, sharing information and data with the public on existing activities, as well as for addressing the concerns of stakeholders, and paying attention not just to monetary performance, but also to environmental and social performance. Consequently, the public will learn more as well as better accept the company.

### *A. Conceptual Framework*

Conceptual framework of the research can be seen on figure 1.

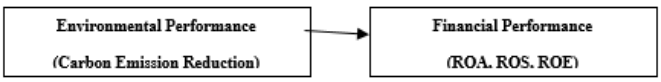


Fig. 1. Conceptual framework.

### *B. Hypothesis*

The majority of studies have shown there's a positive relation between environmental and firm performances. Therefore, if a corporation keeps on reducing its carbon practices, this ends up having a positive effect on its economic performance. Researchers on this topic are [15,16,31-35].

Furthermore, reference [17] reveals a negative relation between reducing carbon emissions on the value of assets and operational cash flow. The research discovered asset book values along with operational cash flow goes down if the businesses are emission responsible. In the meantime, the book value is adversely associated with its emission level, and the empirical results demonstrate the emission levels are what played a part in the operational cash flow, however not substantially, and it negatively correlates with the levels of emission.

The study results which have a positive relation between reductions in environmental performance with a company's performance are: [15,16,31-33,35]. Though, [17] indicates a negative relation between reducing carbon emissions on the asset values as well as the operational cash flow. The study discovered that asset book values as well as operational cash flow goes down if the businesses are emission liable. The carbon emission as well as the asset value are linked via Australian Regulation, AASB 36 asset impairment markers. In the meantime, the book value is adversely linked to the emission levels, and the empirical results indicate the operational cash flow is not substantially affected by the emission levels, and adversely correlate with the levels of emission. It is linked with the carbon reduction strategy of carbon tax and payment.

Founded on the prior research, our hypothesis would be to scrutinize the impact reducing carbon emissions has on economic performance, ROA, ROE and ROS.

## III. METHODS

The populace of this study is all listed companies registered in the Indonesia Sustainability Reporting Award (ISRA). The study utilizes purposive sampling methods, the examples are forty-three businesses which applied the GRI Standard from 2008 to 2013, leaving out non-polluting trades (i.e. banking, education, and telecommunication), businesses which don't habitually publish a sustainability report along with delisting businesses. Consequently, the examples are just seven out of forty-three. The economic performance and sustainability report info are collected from the company's websites. Variables can be seen on table 1 bellow.

TABLE I. VARIABLES [36]

| No | Variable | Description | Measurement | Formula |
|---|---|---|---|---|
| 1 | Independent | Carbon Emission (CO2) | Ton | (Carbon Emission Current Year – Carbon Emission Prior Year)/ Carbon Emission Prior Year |
| 2 | Dependent | Operating Performance | ROA, ROS | ROA= Net Income / Total Assets<br>ROS= (Sales – COGS – S&A Expenses)/Sales |
| 3 | Dependent | Financial Performance | ROE | Net Income / Total Equity(36) |
| 4 | Control | Size | | Log to Total Assets |
| 5 | Control | EBITDA/Total Sales | | Earnings before interest, tax, depreciation, and amortization/total sales |
| 6 | Control | Debt to Equity Ratio | | Debt/Equity |

### A. *Research Model*

- ROA = αit + β1 Cit + β2 Sit + β3 EBITDA3it t + β4 DERit+eit
- ROS = αit + β1 Cit + β2 Sit + β3 EBITDA3it t + β4 DERit+eit
- ROE = αit + β1 Cit + β2 Sit + β3 EBITDA3it t + β4 DERit+eit

Where:

α = Constant value at the time period of t
ROA = Return on Asset
ROS = Return on Sales
ROE = Return in Equity
CEit = Carbon Emission observed at the time period of t.
Sit = Company size observed at the time period of t.
EBITDAit = Earnings before interest, tax, depreciation, and amortization observed at the time period of t.
DERit = Debt-to-equity ratio observed at the time period of t.
eit = Random error that is constant through the lengths of the time range.

## IV. RESULTS AND DISCUSSION

Results can be seen on table 2 below.

TABLE II. RESULTS

| Variables | | ROA | ROE | ROS |
|---|---|---|---|---|
| C | Coeff. | -0.394114 | -0.919480 | 1.036105 |
| | Sig. | 0.1450 | 0.1151 | 0.2209 |
| CE | Coeff. | -0.003340 | *0.042742 | **-0.045164 |
| | Sig. | 0.7329 | 0.0814 | 0.0443 |
| Size | Coeff. | 0.013215 | 0.027936 | -0.030246 |
| | Sig. | 0.1235 | 0.1302 | 0.2555 |
| EBITDA | Coeff. | ***0.698630 | ***1.208753 | *0.551414 |
| | Sig. | 0.0000 | 0.0000 | 0.0051 |
| DER | Coeff. | **-0.020963 | **0.051428 | -0.008113 |
| | Sig. | 0.0410 | 0.0386 | 0.7017 |
| F-statistic | Coeff. | 36.454720 | 13.190970 | 30.812170 |
| Prob(F-statistic) | Sig. | 0.000000 | 0.000004 | 0.000000 |
| R-squared | | 0.084552 | 0.007338 | 0.862239 |
| Adj R-squared | | 0.054037 | -0.025751 | 0.180292 |

Source: Statistical Results from E-Views

### A. *F-tests*

The F-Test findings show the carbon emission might impact the ROA, the ROE, and the ROS (Prob(F-statistic) less 10%)).

### B. *T-tests*

The T-test finding show reduction in carbon emissions may impact ROS (adverse and substantial at 5 percent), it indicates that if carbon emissions are lessened, ROS ought to go up. That may occur due to a direct relation between profits and sales. The supposition of ROS going up is attributable to, in Indonesia, an increase in the clients' inclination to go with businesses that are environmentally orientated as well as the awareness climate change generates opportunities regarding margins unit of sales.

In the meantime, reduction in carbon emission may impact ROE (positive and substantial at 10 percent), which signifies that if there is a reduction in carbon emissions, then ROE ought to go down too. That may occur due to a business needing additional time to transform equity into profits. Therefore, carbon reduction cannot impact ROA. The outcome is distinct from Hart and Ahuja [15] and Pogutz and Russo [16] research. Those investigators discovered a positive relation and substantial impact between a reduction in carbon emissions with ROA. That condition may be because just some of the businesses released a voluntary sustainability report.

Regarding control variables, the size couldn't impact ROA, ROS and ROE respectively. The outcome of this study differed from Hart and Ahuja [15] and Pogutz and Russo [16]. In contrast, the size has a positive relation with ROE though it is not substantial, which implies as its size grows, the ROE will increase. In the meantime, EBITDA may impact ROA (positive and substantial at one percent), ROE (positive and substantial at one percent) and ROS (positive and substantial at 10 percent).

The results were confirmed via Hart and Ahuja [15] and Pogutz and Russo [16]. The researchers discovered EBITDA is positively substantial in both ROS and carbon emissions decrease. It indicates that if the reduction in carbon emissions goes down, ROS will also go down. DER may impact ROA (positive and substantial at 5 percent) and ROE (positive and substantial at 5 percent), while DER won't impact ROS.

## V. CONCLUSION

It was discovered that a reduction in carbon emissions wouldn't impact ROA. The findings revealed various outcomes via reference [16], explaining it's possible because of the capital outlay intensity for carbon emission investing into the production process is at a low level. This may be due to the tiny sample sizes observed. The reduction in carbon emissions may impact ROE positively, and the consequence is in conflict with findings in Pogutz and Russo [16] and Iwata and Okada [31]. It's indeed discovered that ROE is substantially impacted by carbon emission.

Though, ROE has a positive relation in this study. This may occur due to the business needing additional time to transform equity into profits. The reduction in carbon emissions may impact ROS in a negative way and that's proven in reference [15] and [16]. The supposition of an increase in ROS is because, in Indonesia, an increase in clients' eagerness to purchase from the environmentally oriented businesses as well as the awareness of climate change to produce opportunities in regards to margins unit of sales.

The information off the sustainability report which reveals carbon emissions is still quite small. Out of about 507 firms

listed in the Indonesia Stock Exchange, a mere 43 firms provided a sustainability report and seven are contained in this study. That condition causes the example size to be smaller. In additional study, it is anticipated to include more businesses joining in distributing a sustainability report which provides info on carbon emissions. Therefore, the information will be more complete.

The measurement for economic performances may utilize ROI (Return on Investment), and additionally analyzing reductions in carbon emissions may be considered an expense (short range) or saving (long range). Additional findings linked to sustainability reports: 1) There's not a standardized format for a sustainability report because sustainability reports remain voluntary in Indonesia. That produces an indistinct viewpoint in reading these sustainability reports, 2) The release time of a sustainability report varies. A few businesses supplied the info each year, others did it two times a year and some didn't provide one at all. It's anticipated in additional study to obtain the report release at the identical time, for example: each year, 3)

There are variations in evaluating sustainability reports. A few businesses were seen to be evaluated by independent assurance, those were PT. Aneka Tambang Tbk., PT. Tambang Batubara Bukit Asam Tbk and PT. Perusahaan Gas Negara Tbk. While, the additional businesses don't have external assurance, and 4) the government should be promoting the businesses in the future to be better aware of the environment via putting out a sustainability report. It's recommended that a sustainability report could change from being voluntary to being mandatory like a CSR report is.

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