The effect of media exposure, type of companies, and environmental performance on carbon emission disclosure of Indonesia companies

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ABSTRACT

The Effect of Media Exposure, Type of Companies, and Environmental Performance on Carbon Emission Disclosure (CED) in Indonesian Companies (Empirical Studies on Manufacturing Companies Listed on The Indonesia Stock Exchange for the 2016-2018 Period). This study aimed to obtain empirical evidence regarding the effect of Media Exposure, Type of Companies, and Environmental Performance on the disclosure of carbon emissions in manufacturing companies in Indonesia. Measurement of the extent of carbon disclosure was done using a checklist developed based on the information request sheet provided by the CDP (Carbon Disclosure Project). The populations of this study were all manufacturing companies listed on the Indonesia Stock Exchange from 2016 to 2018. The samples of this research were taken from manufacturing companies listed on the Indonesia Stock Exchange from 2016 to 2018 using the purposive sampling method. There were 15 companies in 2016, 15 companies in 2017, and 15 companies in 2018 that met the criteria as research samples. The classic assumption test was performed for data analysis, and regression analysis was conducted for hypothesis testing. The results of this study indicate that Media Exposure affects the disclosure of corporate carbon emissions in Indonesia, while the Type of Companies and Environmental Performance had no effect on the disclosure of corporate carbon emissions in Indonesia.

Keywords: Carbon emissions, greenhouse gases, voluntary disclosures

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INTRODUCTION

Climate change is now garnering significant global attention as an environmental issue (Haque & Islam, 2013). According to the Intergovernmental Panel on Climate Change (2019), the average global surface temperature is increasing at a rate of 1.5°C, leading to climate change in various regions, including Indonesia. One of the primary contributors to climate change worldwide is greenhouse gases produced by human activities. Fifty of the 500 largest listed companies globally are responsible for nearly three-quarters of the 3.6 billion metric tons of greenhouse gases (IPCC, 2018).

Efforts by the international community to address climate change began after the signing of the United Nations Framework Convention on Climate Change (UNFCCC) (Kardono, 2010). Indonesia ratified the Kyoto Protocol through Law No. 17 of 2004, aiming to promote sustainable development and participate in global efforts

to reduce greenhouse gas emissions.

Article 4 of Presidential Decree No. 61 of 2011 states that business actors also participate in efforts to reduce GHG emissions. However, carbon emission disclosure in Indonesia is still voluntary, and the practice is rarely observed by business entities. According to Pradini and Kiswara (2013), the level of disclosure of greenhouse gas emissions practices, including carbon emissions, is still insufficient to meet ISO 14064-1 guidelines. Companies that disclose carbon emissions face various considerations, including gaining legitimacy from stakeholders and avoiding negative trends. This is especially crucial for companies emitting greenhouse gases, as it can lead to increased operating costs, reduced demand, reputation risks, legal proceedings, fines, and penalties (Berthelot & Robert, 2011).

Luo et al. (2013) and Choi et al. (2013) examine factors influencing carbon emission disclosure. The measurement basis for carbon emission disclosure is an information request sheet provided by the Carbon Disclosure Project (CDP). However, the factors influencing carbon emission disclosure vary between studies. Luo et al. (2013) used variables such as Independent Developing Country, ROA, Leverage, Growth opportunities, Carbon Emission, Size, Legal System, ETS, and Newer Asset, while Choi et al. (2013) considered Company Size, Profitability, Carbon Emission Level, Industry Type, and Quality of Corporate Governance as independent variables. Based on these studies, further testing was conducted on factors influencing carbon emission disclosure in Indonesian companies.

This study aims to examine factors affecting carbon emission disclosure in manufacturing companies in Indonesia from 2016-2018, covering Media Exposure, Regulators, and Environmental Performance. The selection of the research period from 2016 to 2018 was based on the adoption of ISO standards related to greenhouse gases (GHGs) by the National Standardization Agency (BSN) in December 2009. BSN established four Indonesian National Standards (SNI) on GHGs, including SNI ISO 14064-1: 2009, SNI ISO 14064-2: 2009, SNI ISO 14064-3: 2009, and SNI ISO 14065: 2009, as references for calculating carbon emissions (Bsn.go.id, 2009). The next section will present a literature review, followed by an explanation of the methodology. The research results will then be presented, discussed, and concluded.

LITERATURE REVIEW
Carbon emissions
The disclosure of carbon emissions (Carbon Emission Disclosure) is an emerging issue in various countries, reflecting the impact of climate change on organizational survival, and Indonesia is no exception. The company's disclosure of carbon emissions can be observed in both the annual report and sustainability report (Wulan, 2022). Several theories explain the disclosure of carbon emissions within environmental disclosures, including legitimacy theory and stakeholder theory.

Legitimacy Theory
Legitimacy theory posits that companies engage in social responsibility disclosure to gain legitimacy from the communities in which they operate and to enhance their long-term financial viability (Harsanti, 2011). At its core, this theory revolves around the concept of a "social contract" between the company and its community, defining societal expectations of organizational behavior. These expectations are dynamic and evolve over time, necessitating companies to adapt and respond to their changing environmental contexts (Rokhlinasari, 2015).

The industrial sector, often associated with environmental degradation due to the use of raw materials containing various chemicals and emissions, plays a significant role in nature's deterioration. Consequently, environmental responsibility reports, which include disclosures of greenhouse gas (GHG) emissions, represent the industry's efforts to transparently report its operational impact on the environment. Such disclosures are instrumental in exploring, controlling, and safeguarding nature and the environment. Moreover, disclosing GHG emission information is anticipated to generate added value for companies, enabling them to sustain their business operations effectively (Anggraeni, 2015).

Stakeholder Theory
Stakeholder theory asserts that companies operate not solely for their own benefit but must also serve the interests of a broad array of stakeholders, encompassing shareholders, creditors, consumers, suppliers, governments, the public, analysts, and others (Broadbent & Unerman, 2011). Consequently, the viability and success of a company are intricately tied to the support it garners from its stakeholders.

Several factors drive companies to prioritize stakeholder interests. Firstly, environmental issues have implications for various societal groups, potentially disrupting their quality of life. Secondly, in the era of globalization, the demand for environmentally friendly products is paramount for international trade. Thirdly, investors increasingly favor companies with robust environmental policies and initiatives. Lastly, non-governmental organizations (NGOs) and environmentalists are becoming more vocal in their criticism of companies that neglect environmental concerns (Rokhlinasari, 2015).

Stakeholder theory recognizes that different stakeholder groups hold diverse perspectives on organizational operations. Therefore, organizations engage in multiple "negotiated" social contracts with distinct stakeholder groups, rather than adhering to a singular contract with society at large, as proposed by legitimacy theory (Broadbent, Unerman, & Broadbent, 2014).

The Effect of Media Exposure on Carbon Emission Disclosure
Legitimacy theory extensively examines the impact of media coverage on the heightened pressure exerted by public demands on companies. The media plays a crucial role in driving social mobilization movements, particularly those spearheaded by environmental interest groups (Nur & Priantinah, 2012). Furthermore, the media serves as a vital conduit for disseminating information to the public, including details about a company's activities. Consequently, companies must remain cognizant of media scrutiny as it directly affects their reputation and values.

In this context, companies bear a moral responsibility to disclose their activities, extending beyond financial considerations to encompass social and environmental aspects. As media outlets increasingly monitor a country's environmental landscape, companies are incentivized to provide transparent disclosures about their operations (Nur & Priantinah, 2012). This aligns with research by Dawkins & Fraas (2011), which suggests a direct correlation between media visibility and the extent of voluntary disclosure regarding climate change. Similarly, Wang et al. (2013) posit that media exposure positively correlates with Corporate Social Responsibility (CSR) disclosure. Based on this rationale, the hypothesis formulated in this study is as follows:

H1: Media Exposure positively influences Carbon Emission Disclosure.

The Effect of Regulators on Carbon Emission Disclosure
Climate change is a significant contemporary concern that necessitates targeted action to facilitate the achievement of Sustainable Development Goals (SDGs). Government intervention, in the form of policies, is essential to realize SDG objectives (Jones et al., 2017). In response to this imperative, companies engage in environmental responsibility practices to enhance their legitimacy among stakeholders. The government, as a key stakeholder and regulator, wields considerable authority to compel companies to assume responsibility for environmental stewardship and carbon disclosure (Jung et al., 2016). When governments are attuned to environmental challenges arising from corporate activities, they are inclined to exert pressure on companies to adopt more environmentally responsible practices. Consequently, this dynamic positively influences the disclosure of carbon emissions (Pratiwi, 2017). Based on the aforementioned rationale, the hypothesis posited in this study is as follows:

H2: Regulatory intervention positively influences Carbon Emission Disclosure.

The Effect of Environmental Performance on Carbon Emission Disclosure
According to research by Dawkins & Fraas (2011), there exists a positive relationship between environmental performance and environmental disclosure, particularly regarding climate change. This finding aligns with the results of a study by Matsumura et al. (2014), which demonstrates that companies demonstrating proactive environmental initiatives, such as implementing robust pollution prevention programs and utilizing renewable energy sources, are more inclined to voluntarily disclose environmental information, including their carbon emissions levels. Such disclosures aim to communicate performance aspects not readily apparent to investors and other external stakeholders. Additionally, the research by Clarkson et al. (2008) supports these findings by revealing a positive association between environmental performance and the level of discretionary environmental disclosure.

As elucidated by Clarkson et al. (2008), companies with superior environmental performance often adopt proactive environmental strategies, motivating them to engage in voluntary environmental disclosure to inform investors and stakeholders. By disclosing their unique performance attributes through voluntary means, companies aim to distinguish themselves from competitors with poorer environmental performance, potentially enhancing their overall value. Based on these findings, the hypothesis formulated in this study is as follows:

H3: Environmental Performance positively influences Carbon Emission Disclosure.

Empirical Studies
Several studies have been conducted by various researchers on the issue at hand. Firstly, a study by Bo Bae Choi, Doowon Lee, and Jim Psaros in 2013 found that, for companies operating in emissions-intensive industries, factors such as the level of carbon emissions, company size/firm size, profitability, and corporate governance quality influence carbon emission disclosure. Secondly, Richatul Jannah's 2014 study concluded that media exposure, industry type, profitability, company size, and leverage affect the disclosure of corporate carbon emissions in Indonesia, while environmental performance does not. Thirdly, a study by Titik Akhiroh and Kiswanto in 2016 revealed that organizational visibility, profitability, managerial ownership, and the presence of an audit committee

significantly influence the extent of carbon emission disclosure, whereas factors such as environmental performance, financial distress, institutional ownership, and the proportion of independent commissioners do not. Lastly, a study by Atang Hermawan, Isye Siti Aisyah, Ardi Gunardi, and Wiratri Yustia Putri in 2018 indicated that regulators, company size, and profitability have an effect on carbon emission disclosure, while institutional ownership does not.

This study builds upon the research conducted by Choi et al. (2013), who investigated carbon emission disclosure among the top 100 companies in Australia. Carbon emission disclosure was measured using several items across five broad categories relevant to climate change and carbon emissions, as developed by Choi et al. (2013). These categories include risks and opportunities related to climate change, greenhouse gas emissions, energy consumption, greenhouse gas reduction efforts and costs, and carbon emissions accountability. The novel aspects of this study lie in the inclusion of the media exposure variable, type of companies, and environmental performance, within the research period of 2016-2018. The research focuses on manufacturing companies listed on the Indonesia Stock Exchange.

METHODS

In this study, Carbon Emission Disclosure was assessed utilizing a checklist derived from the research conducted by Choi et al. (2013). Choi et al. (2013) developed a comprehensive checklist based on the information request sheet provided by the Carbon Disclosure Project (CDP) to measure the extent of carbon emission disclosure. This checklist encompasses five broad categories relevant to climate change and carbon emissions, comprising a total of 18 items. Below is the carbon emissions disclosure checklist:

TABLE 1. Carbon Emission Disclosure Checklist

Category	Item
Climate Change: Risks and Opportunities	CC-1: Risk assessment/description (rules/regulations both specifically, and general) related to climate change and actions taken to manage these risks.
	CC-2: Current (and future) assessment/description front) of financial, business and financial implications opportunities of climate change.
GHG / Greenhouse Gas	GHG-1: Description of the methodology used to calculate greenhouse gas emissions (e.g. GHG or ISO protocol).
	GHG-2: Existence of external verification the quantity of GHG emissions by whom and on what basis.
	GHG-3: Total greenhouse gas emissions (metric ton CO2-e) produced.
	GHG-4: Disclosure of scope 1 and 2, or 3 direct GHG emissions.
	GHG-5: Disclosure of GHG emissions based on origin or source (for example: coal, electricity, etc.).
	GHG-6: Disclosure of GHG emissions based on facility or segment level.
	GHG-7: Comparison of GHG emissions with previous years.
EC/Energy Consumption	EC-1: The amount of energy consumed (e.g. tera-joules or PETA-joules).
	EC-2: Quantification of the energy used from renewable resource.
	EC-3: Disclosures by type, facility or segment.
Gas Reduction Greenhouse and Costs (RC / Reduction and Cost)	RC-1: Details of the plan or strategy to reduce GHG emissions.
	RC-2: Specifications of the target level/level and year of GHG emission reduction.
	RC-3: Reduction of emissions and costs or savings (costs or savings) achieved when this is as a result of the reduction plan carbon emissions.
	RC-4: Future emission costs taken into account in shopping planning capital (capital expenditure planning).
Emission Accountability Carbon AEC/Accountability of Emission Carbon)	AEC-1: Indication of where the committee board (or other executive bodies) have responsibility for actions related to climate change.
	AEC-2: Description of the mechanism by which the board (or other executive body) review company progress regarding change climate.

Source: Choi et al., (2013)

The Carbon Emission Disclosure index calculation involves several steps. Firstly, each disclosure item is assigned a score on a dichotomous scale, where a score of 1 is given if the firm includes the information in its report. Thus, if a company discloses all items, it receives a maximum score of 18, while a score of 0 indicates no disclosure. The scores for each item are then summed up to obtain the company's total Carbon Emission Disclosure index score. Media exposure is measured using a dummy variable, with a value of 1 assigned to companies that disclose

more information related to carbon emissions through various channels such as the company's website, annual reports, sustainability reports, newspapers, and other media. If a company does not utilize these channels for disclosure, it receives a value of 0. Regulator involvement is assessed by differentiating between state-owned enterprises (SOEs) and private companies. SOE companies are coded as 1, while private companies are coded as 0. Environmental performance is evaluated using PROPER (Program for Environmental Performance Rating and Reporting), a rating system utilized by the Indonesian government to assess and monitor the environmental performance of companies.

The population of this study comprised all manufacturing companies listed on the Indonesia Stock Exchange (IDX) from 2016 to 2018. According to Sugiyono (2010), the population is a generalization area consisting of objects or subjects with specific qualities and characteristics determined by researchers for study, from which conclusions are drawn. Additionally, Arikunto (2013) describes the population as the entire subject of research or the essential total number of samples. Sugiyono (2017) further defines the sample as a part of the population that possesses certain characteristics. The sample for this study was selected based on several criteria. These criteria included manufacturing companies listed on the IDX during the period from 2016 to 2018, companies that provided annual reports or sustainability reports for those years, and companies that explicitly or implicitly disclosed carbon emissions. This disclosure could involve at least one policy related to carbon or greenhouse gas emissions or at least one carbon emission disclosure item.

The collected data was processed using statistical analysis tools, specifically multiple linear regression analysis, with the following equation model:

Y= α + β1 X1 + β2 X2 + β3 X3 + e

Where**:**
Y = Carbon Emission Disclosure
α = Constant
β1- β3 = Regression Coefficient
X1 = Media Exposure
X2 = Regulator
X3 = Environmental Performance
e = Error

RESULT AND DISCUSSION
Result
Description of Research Samples
The object of this research was manufacturing companies listed on the Indonesia Stock Exchange (IDX) during the period of 2016-2018. The sample selection in this study utilized a purposive sampling method. Based on this method, 15 companies met the sample criteria. An explanation of the sampling process is shown in the table below.

TABLE 2. Population and Research Samples for 2016-2018

Sample Criteria	Total
Manufacturing sample companies that publish Annual Report and Sustainability Report in 2016-2018	123
Companies that did not disclose information on carbon emissions of Greenhouse Gas emissions in the Annual Report and Sustainability Report	(108)
Research Samples based on Criteria	15

This purposive sampling method ensures that the selected companies meet specific criteria relevant to the study, including the availability of annual or sustainability reports and the disclosure of carbon emissions. These criteria help in obtaining a focused and relevant sample for analyzing the impact of various factors on Carbon Emission Disclosure.

Descriptive statistics in this study are presented in Table 3. The table shows that 45 annual and sustainability reports were examined during the research period from 2016 to 2018. This indicates that the study analyzed a total of 45 reports from 15 manufacturing companies over the three years, providing a comprehensive view of the Carbon Emission Disclosure practices within this sector.

TABLE 3. Descriptive Statistics

	N	Minimum	Maximum	Mean	Std. Deviation
Media Exposure	45	0	1	0,76	0,435
Regulator	45	0	1	0,13	0,344
Environmental Performance	45	1	4	3,07	0,751
Carbon Emission Disclosure	45	0	17	7,82	6,143
Valid N (listwise)	45				

Table 3 presents the descriptive statistics for the variables studied, including Media Exposure, Regulator, PROPER (environmental performance), and Carbon Emission Disclosure, based on the 45 annual and sustainability reports examined from 2016 to 2018. The mean value for Media Exposure was 0.76 with a standard deviation of 0.435, indicating relatively low variability, suggesting that the level of media exposure among the studied companies was generally low, with most companies either fully disclosing or not disclosing at all. The Regulator variable had a mean value of 0.13 and a standard deviation of 0.344, higher than the mean, reflecting a high degree of variability and indicating that only a small proportion of the companies studied were state-owned enterprises.

For PROPER, the mean value was 3.07 with a standard deviation of 0.751, indicating moderate variability in environmental performance across the studied companies, with most scoring around the mean value. The Carbon Emission Disclosure variable had a mean value of 7.82 and a standard deviation of 6.143, showing low variability and suggesting that the extent of carbon emission disclosure was generally low, with significant differences in reporting practices among companies. Overall, these descriptive statistics provide a detailed overview of the central tendency and variability of the key variables, highlighting consistent behavior across most companies for Media Exposure, PROPER, and Carbon Emission Disclosure, while showing more diversity in terms of state versus private ownership in the Regulator variable.

Discussion

The results of the hypothesis testing were obtained through multiple linear regression analysis, as summarized in Table 4. The regression results show that Media Exposure significantly affects Carbon Emission Disclosure (CED), while the Regulator and Environmental Performance do not have a significant impact on CED.

TABLE 4. Hypothesis Test Result

Variables	Unstandardized Coefficients (B)	Significance Value ($\alpha = 5\%$)
(Constant)	-4,331	.145
Media Exposure	11,124	.000
Regulator	-3,196	.094
Environmental Performance	1,361	.111

The regression equation derived from the analysis is as follows:

CED = (-4,331) + 11,124 X1 - 3,196 X2 + 1,361 X3 + e

Interpretation of Results
Media Exposure

The analysis shows that Media Exposure (X1) has a positive and significant effect on Carbon Emission Disclosure, with a coefficient of 11.124 and a significance value of 0.000. This indicates that increased media attention significantly enhances the extent of carbon emission disclosures by companies. The positive influence of media suggests that companies are motivated to disclose environmental information to garner a favorable public image and legitimacy within the community. This finding aligns with the legitimacy theory, which posits that companies disclose social responsibility information to gain societal approval and enhance long-term financial performance. It also supports the stakeholder theory, emphasizing that companies should serve the interests of their stakeholders, not just their own.

These results corroborate previous research by Dawkins and Fraas (2011), which found a direct association between media visibility and voluntary climate change disclosure. Wang et al. (2013) also highlighted that media exposure positively relates to corporate social responsibility (CSR) disclosure.

Regulator

The Regulator (X2) variable did not show a significant effect on Carbon Emission Disclosure, with a coefficient of -3.196 and a significance value of 0.094. This finding suggests that the regulatory pressure from state-owned enterprises (SOEs) does not significantly influence companies' carbon disclosure practices. This result is contrary to the findings of Pratiwi (2017), which indicated a positive relationship between regulatory pressure and carbon disclosure. However, it aligns with Windrianningsih (2018), who found that government efforts do not significantly impact carbon emission disclosure. This discrepancy could be due to variations in regulatory enforcement or the differing responses of companies to regulatory pressures.

Environmental Performance

The Environmental Performance (X3) variable also did not significantly affect Carbon Emission Disclosure, with a coefficient of 1.361 and a significance value of 0.111. This result contrasts with the research by Dawkins and Fraas (2011), which indicated a positive relationship between environmental performance and environmental disclosure. According to Pradini and Kiswara (2013), companies with high PROPER ratings might feel less compelled to disclose their greenhouse gas emissions, as their high ratings already signal their commitment to environmental management. This phenomenon suggests that achieving high environmental performance might reduce the perceived need for additional voluntary disclosure, as the PROPER ratings already provide substantial recognition.

CONCLUSION

This study delved into the intricate dynamics of environmental reporting within the Indonesian manufacturing sector, aiming to decipher the factors that influence Carbon Emission Disclosure (CED) among companies listed on the Indonesia Stock Exchange (IDX) between 2016 and 2018. Through an examination of Media Exposure, regulatory pressures (Regulator), and Environmental Performance, the research shed light on the mechanisms driving corporate transparency regarding carbon emissions. Notably, the findings illuminated the significant impact of Media Exposure, revealing that companies with heightened media visibility tend to disclose more comprehensive information regarding their carbon emissions. This underscores the critical role of media in shaping public perception and influencing corporate disclosure practices, aligning with theories of legitimacy and stakeholder engagement, where companies strive to gain societal approval and meet stakeholder expectations by divulging environmental information.

Contrary to expectations, regulatory pressure, represented by the Regulator variable, did not exhibit a significant influence on Carbon Emission Disclosure. This unexpected finding suggests that state-owned enterprises (SOEs) and private companies exhibit similar patterns in their disclosure practices, regardless of regulatory oversight. While regulations exist to govern environmental reporting, their enforcement may lack the stringency required to compel significant changes in corporate behavior. This discrepancy between regulatory intent and practical impact highlights the need for more robust and consistently enforced environmental regulations to drive meaningful improvements in disclosure practices and ensure environmental accountability across all sectors.

Additionally, Environmental Performance, as measured by the PROPER rating system, did not emerge as a significant determinant of Carbon Emission Disclosure. Although companies with high PROPER ratings may be assumed to disclose more environmental information, the findings suggest otherwise. This underscores the complexity of the relationship between environmental performance and disclosure practices, hinting at potential complacency among high-performing companies who may rely on their ratings to signal environmental commitment, rather than engaging in detailed voluntary disclosures. This calls for a re-evaluation of existing measurement frameworks and a deeper understanding of how environmental performance influences disclosure behavior in the Indonesian context.

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