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The Impact of Carbon Emission Transparency on Firm Value: Role of Company Characteristics as a Moderating Factor

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Abstract

The increasingly urgent global climate crisis drives companies to be more transparent in disclosing the environmental impacts they cause, one of which is through carbon emission disclosure. This study aims to analyse how the disclosure of carbon emissions affects firm value, considering company characteristics as a moderating variable. This study employs the panel data regression method, applied to manufacturing sector companies listed on the stock exchanges of ASEAN countries, namely the Philippines, Indonesia, Malaysia, Thailand, and Vietnam, over the period from 2015 to 2023. The panel data regression method was chosen to address variations between countries and companies, as well as to account for factors influencing the relationship between carbon emission disclosure and firm value. The carbon emission disclosure variable is measured based on sustainability reports and carbon emission-related information published by the companies. The value of the firm is measured using Tobin's Q, which compares the market value of the company to the replacement value of its assets, illustrating the market's perception of the company's prospects. In addition, company characteristics, such as sales growth rate (Growth Sales) and profitability, are used as moderating variables to test whether these characteristics influence the impact of carbon emission disclosure on firm value. The results of this study are expected to serve as a reference for policymakers and firm management in enhancing environmental transparency and understanding its impact on firm value.

Keywords: Carbon Emission Disclosure, Firm Value, Firm Characteristics, ASEAN Countries, Manufacturing Sector

Introduction

In an era of increasing competition, where rivalry is intensifying both in domestic and international markets, companies are required to maintain or achieve a competitive advantage by placing full attention on their operational and financial activities. One of the efforts made by company owners and management is to enhance corporate performance by maximizing the funds obtained from investors. If a company intends to secure substantial funding from investors, it must possess an appealing business model. One way to enhance a company's appeal is by increasing its value. (Falisova & Glova, 2021)

Han et al., (2023) in their study identify that corporate value has become increasingly important as the financial markets grow more complex. By understanding a company's value, management can effectively control and evaluate the business strategies being implemented. Corporate value plays a crucial role in determining a company's relative position in the global market, particularly in helping investors make informed investment decisions. Moreover, corporate value is essential in business decision-making, as it serves as a key consideration in decisions regarding capital increases, asset acquisitions, or determining the company's dividend policy.

In recent years, corporate value across various sectors has experienced significant fluctuations. Factors such as profitability, capital structure, company size, and dividend policies are recognized as the main determinants of corporate value. However, as global attention on sustainability issues has increased, non-

financial factors such as carbon emission disclosures have begun to receive particular attention. This suggests that investor perceptions of environmental sustainability factors influence corporate value. (Kurnia et al., 2021)

The COVID-19 pandemic and geopolitical tensions, such as the Russia-Ukraine war, have disrupted supply chains, altering consumer behavior and impacting macroeconomic conditions. The COVID-19 pandemic, which began in late 2019, resulted in widespread shutdowns of economic sectors and restrictions on company operations. According to data from the Global Financial Market (2022), the stock market has exhibited a volatile trend since 2019, with significant fluctuations arising from global economic uncertainty. The World Bank Report (2021) indicates that more than 70% of stock price fluctuations in emerging markets are attributed to external factors, including global economic conditions and international relations.

The global economic downturn caused by the COVID-19 pandemic also had a significant impact on corporate value, particularly in developing countries such as those in Southeast Asia, which are more vulnerable to uncertainty. On the other hand, the Russia-Ukraine war, which began in 2022, has posed a new challenge, as it is linked to the surge in global energy and commodity prices, which have significantly affected economic stability. (Huka & Kelen, 2022)

COVID-19 pandemic has driven significant changes in how companies operate. Many companies were required to adapt to remote working systems and minimize operational costs. This shift has accelerated digitalization and technological transformation across various sectors. For instance, the food and beverage sector has demonstrated that its growth is heavily influenced by consumer purchasing power, which has been pressured by inflation and the slowing global economic growth rate. Additionally, rising costs, particularly for raw materials and shipping, have affected profitability across various industries, especially in sectors reliant on foreign supply chains. (Soegiantoro et al., 2024)

Gholami et al. (2022) found that market sentiment has a significant impact on corporate value, particularly in the context of behavior-oriented investment strategies. When sentiment is positive, investors tend to be more optimistic, which can indirectly lead to an increase in stock prices. On the other hand, negative news or uncertainty can trigger panic, resulting in a sharp decline in stock prices. Additionally, inflation and interest rates can directly affect consumer purchasing power and corporate investment. According to a study conducted by P. Liu (2023), a strong relationship exists between macroeconomic conditions and stock market movements. When interest rates rise due to tight monetary policies, it can lead to higher borrowing costs for companies, which negatively affects their profits and stock prices. Furthermore, innovation and technological advancements are also key factors in enhancing corporate value. Companies that can adapt and innovate in response to changes in the era often gain a competitive advantage in the market.

However, it is often overlooked that various activities undertaken by a company to enhance its value also impact the environment, one of which is the company's operational activities. Industrial activities within companies have become a major contributor to global warming. Operational activities that produce waste, where each machine used relies on fossil fuels and emits exhaust gases from combustion byproducts, lead to air pollution in the form of greenhouse gases (Nyahuna & Doorasamy, 2023). Industrial growth positively correlates with the amount of greenhouse gas emissions generated by companies worldwide (Buse, 2024). The greenhouse gases emitted from industrial activities result in an increase in carbon emissions on Earth.

According to data from the Global Carbon Project (2020), carbon emissions decreased by approximately 2.4 billion metric tons due to lockdown policies during the pandemic. The reduction in carbon emissions was attributed to a 35% decline in daily industrial activities, driven by global energy demand restrictions (Chofreh et al., 2021). Following the end of the pandemic, carbon emissions increased as corporate operational activities resumed to normal levels. Carbon emissions, as one of the primary contributors to climate change, have become a central focus in mitigation efforts. The corporate sector, being one of the most significant sources of carbon emissions, plays a crucial role in achieving global emission reduction targets. Therefore, carbon emissions reporting by companies has become increasingly important to enhance transparency and accountability regarding the environmental impacts they generate (Opferkuch et al., 2021). Southeast Asia, with its rapid economic growth, faces significant challenges in addressing climate change. The increase in carbon emissions from the manufacturing sector risks exacerbating climate change impacts, such as rising sea levels, flooding, droughts, and extreme weather events, which threaten economic and social stability.

Carbon emissions disclosure can provide critical information for investors, regulators, and other stakeholders to assess a company's environmental performance and make informed decisions (Siddique et al., 2023). Furthermore, carbon emissions disclosure can encourage companies to reduce emissions through technological innovation, energy efficiency, and sustainable business practices (Nijhof et al., 2019). However, the level of carbon emissions disclosure by companies in Southeast Asia remains varied and suboptimal. Several studies indicate that larger companies and those listed on stock exchanges tend to be more active in disclosing carbon emissions compared to small and medium-sized enterprises. Factors such as government regulation, pressure from investors, and management awareness also influence the level of carbon emissions disclosure by companies. (Long et al., 2023)

Implications of carbon emissions disclosure on economic dynamics, particularly in Southeast Asia, also warrant attention. Carbon emissions disclosure can influence foreign direct investment (FDI), stock market performance, and sustained economic growth. Foreign investors tend to be more attracted to companies with strong environmental performance and transparency in disclosing their carbon emissions (Osiyevskyy et al., 2020). Carbon emissions disclosure can impact stock prices,

with companies that voluntarily disclose their carbon emissions generally exhibiting better stock market performance (A. Siddique et al., 2023). Furthermore, carbon emissions disclosure may drive technological innovation and investment in renewable energy, thereby contributing to sustainable economic growth in Southeast Asia.

Carbon emissions disclosure has become a significant issue in light of the global shift towards sustainability and corporate social responsibility. A study conducted by Rangga & Kristanto (2023) identifies how carbon emissions disclosure sends a positive signal to stakeholders, including investors. Furthermore, this signal conveys that the company is not only focused on financial profit but also on its environmental impact. Thus, transparency in reporting carbon emissions not only reflects the company's commitment to sustainability but also enhances its image in the eyes of the public and stakeholders. The importance of reporting carbon emissions is reflected in how investors assess companies. Wiryawan (2023) asserts that investors are increasingly taking environmental factors into consideration in their investment decisions. Voluntary carbon emissions disclosure demonstrates sound risk management and contributes to enhancing the company's value.

Based on the background and previous studies, the author will further investigate the effect of carbon emissions disclosure on firm value, with corporate characteristics serving as a moderating variable, in Southeast Asia, specifically in the Philippines, Indonesia, Malaysia, Thailand, and Vietnam, during the period from 2015 to 2023. In this study, carbon emissions disclosure is the independent variable, and its impact on firm value, the dependent variable, will be examined. Corporate characteristics are assessed through two key aspects: profitability and sales growth (Growth Sales). This study also includes a control variable, namely firm size (Firm Size). The results of this study are expected to provide insights into whether carbon emissions disclosure can attract investor interest and enhance the company's reputation, potentially contributing to the sustainable growth of firm value. The purpose of this study is to analyze the effect of carbon emissions disclosure on firm value in Southeast Asia, a region that lags behind developed countries in emissions disclosure. Additionally, this study will analyze the impact of carbon emissions disclosure on investor decision-making behavior and its effects.

Literature Review and Hypothesis

Carbon Emission Disclosure and Firm Value

Harits & Mutasowifin (2024) argue that carbon emissions disclosure practices can be viewed as a value-added factor for investors, indicating that such transparency reflects the company's commitment to sustainable business practices. This finding is consistent with Y. S. Liu et al. (2023), who emphasize that eco-efficiency and green innovation, along with carbon emissions disclosure, can positively affect firm value if moderated by the company's financial performance. This finding implies that companies demonstrating strong environmental management through transparent emissions reporting may experience an increase in firm value. Hilmi et al. (2020) demonstrate in their research that competition and profit growth can influence the level of carbon emissions disclosure, which, in turn, can impact firm value. This suggests that both external market factors and internal company dynamics play a critical role in shaping investor perceptions of carbon emissions. Companies that prioritize transparent carbon emissions disclosure and actively engage in sustainability initiatives can not only enhance their reputation but also increase their firm value over time. However, some studies present a more skeptical view regarding the relationship between carbon emissions disclosure and firm value. Research conducted by Perdichizzi et al. (2024) found no significant impact of carbon emissions disclosure on stock returns, indicating that investors may not always react positively to such disclosures. Studies suggest that carbon emissions disclosure may not affect firm value, indicating that the market might not fully recognize the implications of such disclosures. Therefore, based on a review of previous studies and prior empirical findings, the first hypothesis formulated is:

H1: Carbon Emission Disclosure has a Positive Effect on Firm Value

Profitability and Firm Value

Profitability and firm value are two variables that have long been a focal point in management and accounting research. According to Sukanti & Rahmawati (2023) profitability and firm value are key variables that have long been central to research in management and accounting. Profitability, measured through various indicators such as Return on Assets (ROA) and Earnings Per Share (EPS), reflects the company's efficiency in generating profit from its operations. On the other hand, firm value, typically measured by market indicators such as stock price or Tobin's Q, reflects investor perceptions of a company's performance and future growth potential.

Khalisma (2024) presents empirical evidence showing a significant impact of profitability on firm value. Existing research demonstrates that high profitability can reflect efficient management, contributing to an increase in the firm's market value. As profitability rises, a company tends to demonstrate better performance in the eyes of the market, reflected in higher stock prices and a larger Tobin's Q ratio. Therefore, the relationship between profitability and firm value is crucial, as high profitability not only enhances the company's attractiveness in the market but also fosters a positive perception of its future growth potential. Faizal et al. (2024) reveal that a company's profitability plays a key role in its dividend policy decisions. Research indicates that the dividend policy adopted by the company positively influences firm value, with profitability playing a role in enhancing these decisions. This suggests that more profitable companies can distribute higher dividends, which ultimately boosts investor confidence and enhances the firm's value. Therefore, based on the review of previous studies and prior empirical findings, the second hypothesis formulated is:

H2: Profitability has a Positive Effect on Firm Value

Sales Growth and Firm Value

The relationship between sales growth and firm value is a key aspect that has been extensively studied in financial management and business. Sales growth is often considered a primary indicator of a company's performance, which can influence investor perceptions of the firm's value. Research by Lo et al. (2023) demonstrates that sales growth impacts market performance, which can serve as an indicator of firm value in the non-cyclical consumer goods sector. Rapid sales growth indicates that the company has greater appeal to investors, thereby increasing its market value. This study also emphasizes that, in the context of consumer companies, sales growth is often regarded as a key factor reflecting the company's ability to adapt and thrive in a competitive market. Candani & Badera (2022) found in their study that sales growth has a positive effect on firm value, which aligns with signaling theory. This theory suggests that companies showing good performance through increased sales send a positive signal to the market, thus enhancing firm value. This suggests that sales growth has a significant impact on firm value, where increased sales play a crucial role in enhancing the company's market value.

Ichwanudin et al. (2025) found that sales growth has a positive impact on firm value. This suggests that sustained sales growth can build strong market confidence in a company's long-term potential. Furthermore, consistency in sales growth can signal the sustainability and competitiveness of the company in the market, which is an important factor in investor assessments of its stability and future growth prospects. Therefore, companies that can maintain high sales growth rates are more likely to attract investor attention and secure the necessary resources for optimal expansion. Based on the review of previous studies and prior empirical findings, the third hypothesis formulated is:

H3: Sales Growth has a Positive Effect on Firm Value

Corporate Profitability in Moderating the Relationship Between Carbon Emission Disclosure and Firm Value

Nur & Panggabean (2022) state that companies with high profitability are more likely to invest in sustainability practices and disclose carbon emissions. This can create a positive perception among investors, which in turn can increase firm value. Innovative companies that not only comply with environmental regulations but also integrate them into their core business strategies tend to report better financial results. This is particularly evident in Southeast Asia, where emerging markets emphasize the integration of sustainability in scaling operations.

Maharani et al. (2024) in their research found that corporate profitability, often measured by ratios such as Return on Assets (ROA) and Net Profit Margin (NPM), has a significant impact on stock prices. High profitability can enhance investor confidence, potentially leading to increased stock prices. In the context of carbon emissions disclosure, companies that demonstrate a commitment to sustainability and maintain strong profitability are generally viewed more positively by investors. This suggests that profitability can act as a moderating variable, strengthening the relationship between carbon emissions disclosure and firm value. In this case, carbon emissions disclosure can serve as a positive signal to investors, indicating that the company is not only focused on short-term profits but also on long-term sustainability.

However, research conducted by Ferrat (2021) did not find a significant impact of financial performance (profitability) in moderating the relationship between carbon emissions reporting and firm value. Therefore, based on the review of previous studies and prior empirical findings, the fourth hypothesis formulated is:

H4: Corporate Profitability Moderates the Relationship Between Carbon Emission Disclosure and Firm Value

Sales Growth in Moderating the Relationship Between Carbon Emission Disclosure and Firm Value

Fortune (2018) reveals that a company's growth rate moderates the relationship between carbon emissions disclosure and the company's financial performance. In other words, companies experiencing faster growth tend to derive greater benefits from transparent carbon emissions disclosure, primarily when such disclosures reflect the company's genuine efforts to reduce its carbon footprint. The company's growth rate serves as a moderating factor, as it can enhance investor confidence in the company's ability to address environmental challenges and shape market perceptions of its long-term potential. As demand for sustainability and environmental transparency increases, companies demonstrating rapid growth and utilizing carbon disclosures to showcase their commitment to sustainability will be better positioned to capitalize on market opportunities and enhance their profitability.

Choiriah (2021) identifies that the role of stakeholders in sustainability-oriented companies is highly influential. Stakeholders, including consumers, investors, employees, and society, are increasingly pressuring companies to not only produce high-quality products but also consider the environmental impact of these products. These demands can stem from social pressures or increasingly stringent regulations. Stakeholders expect companies to produce high-quality goods that are also environmentally friendly. This approach is taken not only to enhance the company's reputation but also to ensure the company's long-term sustainability in a market that is increasingly focused on environmental and social factors. By producing more environmentally friendly products, companies can strengthen consumer loyalty, as consumers increasingly demand sustainable products. Therefore, based on a review of previous studies and prior empirical findings, the fifth hypothesis formulated is:

H5: Sales Growth Moderates the Relationship Between Carbon Emission Disclosure and Firm Value

Research Method

According to Sugiyono (2009), research methods are a scientific approach to obtaining data with specific objectives and benefits. The type of research conducted in this study is quantitative research with a causal approach, which is a research design intended to investigate causal relationships between the variables under study. Therefore, this study aims to identify and analyze the

effect of one variable on another and to gain a deeper understanding of the direction and strength of the relationship between these variables. The causal quantitative approach enables researchers to test hypotheses related to cause-and-effect relationships more objectively and measurably.

Unit of analysis and the population used in this study are companies in the manufacturing sector listed on the stock exchanges of Southeast Asia, specifically in the Philippines, Indonesia, Malaysia, Thailand, and Vietnam, during the period from 2015 to 2023. The sample comprises 103 companies, selected based on several considerations related to the sector's relevance and representativeness, as well as the specific objectives of the research. The primary reason for selecting this sample is the direct relevance to carbon emissions, which is the primary focus in analyzing environmental impacts and the economic factors involved in the manufacturing industry. This study prioritizes companies that explicitly disclose their carbon emissions, as such information reflects the company's commitment to transparency and environmental sustainability. Companies that disclose carbon emissions data tend to have clearer internal policies for managing and mitigating environmental impacts and are more prepared to meet evolving standards and regulations regarding the reduction of their carbon footprint.

Therefore, selecting companies that disclose their carbon emissions provides a more representative and accurate depiction of their environmental practices and policies, which can be analyzed. Additionally, there are limitations in terms of geographical representativeness and industry sector. Although the study includes five countries in Southeast Asia, not all countries have the same level of openness or regulation regarding carbon emissions reporting, which may affect the availability of data. Variations in reporting standards or government regulations regarding carbon emissions across these countries could serve as limiting factors that affect the quality and consistency of the available data. This study uses panel data regression, which is a combination of cross-sectional data and time-series data. In other words, panel data refers to data from the same individuals observed over a certain period.

Results

Descriptive Statistic Variable

Table 1. Descriptive Analysis

Variabel	Mean	Median	Minimum	Maximum	Std. Deviation	Variance
Tobin's Q	2,244	1,377	0,326	27,189	2,653	7,039
CED (Item)	8,003	7,975	2,254	13,982	2,374	5,634
ROA	0,064	0,046	-0,533	0,840	0,103	0,011
Growth Sales	0,086	0,069	-0,980	4,356	0,341	0,116
Firm Size	30,642	30,700	26,653	33,730	1,465	2,146

Based on Table 1, the characteristics of the five variables under study are presented, namely Firm Value (Tobin's Q), CED (Carbon Emission Disclosure), Return on Assets (ROA), Growth Sales, and Firm Size, based on data covering 927 observations. The Firm Value variable has an average of 2.244, with a lower median value of 1.377, indicating that the distribution is centered around lower values compared to the average. The wide range of values, with a maximum value of 27.189 and a minimum value of 0.326, shows significant variation between companies with the highest and lowest values. CED shows an average value of 0.000, meaning there is no general trend in the data overall; however, with a very high maximum value (5.979) and a very low minimum value (-5.750), it indicates significant variation between companies. Return on Assets (ROA) has an average of 0.000, indicating a generally balanced performance between profits and losses at the asset level, with a relatively small standard deviation (0.103), suggesting a concentrated distribution. Growth Sales has an average sales growth of 0.086, indicating positive growth overall, although still considered low. The very high maximum value (4.356) and the negative minimum value (-0.980) indicate a significant disparity in sales growth among companies.

Meanwhile, the Firm Size variable shows an average company size of 30.642, with a median value almost identical (30.700), suggesting that most companies in the sample have relatively uniform sizes. The narrow range of company sizes, with a maximum value of 33.730 and a minimum of 26.653, along with a standard deviation of 1.465, indicates consistency in company size across the sample. Overall, the results of this descriptive analysis provide a clear picture of the distribution and variation of each variable in this study, which can serve as a basis for further analysis of the relationships among these variables.

The Data Panel Analysis Techniques

To examine the effect of carbon emission disclosure on firm value, a panel data regression analysis is conducted. Panel data regression offers alternative models, namely the Common Effect, Fixed Effect, and Random Effect models. Three tests are performed to select the appropriate panel data estimation technique. First, the F-statistic test,, also known as the Chow Test,, is used to determine whether to choose between the Common Effect method and the Fixed Effect method. Second, the Hausman Test is used to determine which method is more suitable: the Fixed Effects method or the Random Effects method. Third, the Lagrange Multiplier Test is applied if the results of the previous two tests do not provide a conclusive decision.

Table 2. Chow Test

Effects Test	Statistic	d.f.	Prob.
Cross-section F	21.688425	(102,820)	0.0000
Cross-section Chi-square	1210.972560	102	0.0000

Based on Table 2, it can be observed that the F-statistic probability value is 0.0000. This value is less than 0.05, indicating that H_1 is accepted, and thus the fixed effect model is used for the analysis. Therefore, since the fixed effect model is selected, the next test

required is the Hausman test to determine whether to use the fixed effect model or the random effect model. Therefore, the next test is the Hausman test.

Table 3. Hausman Test

Test Summary	Chi-Sq. Statistic	Chi-Sq. d.f.	Prob.
Cross-section random	18.447705	3	0.0004

Based on Table 3, it can be observed that the resulting probability value is 0.0004. This value is smaller than 0.05, indicating that H_1 is accepted, and the model to be used should be the Fixed Effect model. The results of both tests conducted (the Chow Test and the Hausman Test) indicate that the best model to use is the Fixed Effects model. Therefore, based on these results, the Lagrange Multiplier test is not conducted further.

Table 4. T- Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	2.570093	0.229663	11.19069	0.0000
CED	-0.095687	0.027260	-3.510158	0.0005
ROA	6.920243	0.675120	10.25039	0.0000
GROWTH SALES	-0.008325	0.137404	-0.060590	0.9517
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.784043	Mean dependent var		2.243957
Adjusted R-squared	0.756390	S.D. dependent var		2.653155
S.E. of regression	1.309514	Akaike info criterion		3.484561
Sum squared resid	1406.159	Schwarz criterion		4.037556
Log likelihood	-1507.352	Hannan-Quinn criter.		3.695520
F-statistic	28.35289	Durbin-Watson stat		0.926257
Prob(F-statistic)	0.000000			

Based on Table 4, the regression analysis results using the fixed effects approach on the panel data are presented, focusing on the coefficients, t-statistics, p-values, and adjusted R-squared values for each variable. The coefficient for the constant variable (C) is 2.570093, indicating that the average value of the dependent variable is approximately 2.570093 when all other independent variables are zero. The coefficient for the CED variable is -0.095687, which suggests that for each one-unit increase in CED, the dependent variable will decrease by 0.095687 units, assuming all other variables remain constant. Meanwhile, the coefficient for ROA (previously referred to as Profitability) is 6.920243, meaning that a one-unit increase in ROA will result in a 6.920243 unit increase in the dependent variable, indicating a significant positive relationship between ROA and the dependent variable.

The coefficient for Growth Sales is -0.008325, indicating that each one-unit increase in sales growth will decrease the dependent variable by 0.008325 units, although the effect is relatively small.

The t-statistic for CED is -3.510158, indicating that this coefficient is statistically significant at the 0.05 level. Similarly, the t-statistic for ROA is 10.25039, suggesting that ROA has a significant influence on the dependent variable. In contrast, the t- statistic for Growth Sales is -0.060590, which is very close to zero, indicating that its effect is not statistically significant. The probability values for C, CED, and ROA are all minimal (less than 0.05), indicating that these three variables are statistically significant in influencing the dependent variable. However, the probability for Growth Sales is 0.9517, which is much greater than 0.05, suggesting that this variable is not statistically significant. The Adjusted R-squared value of 0.756390 indicates that approximately 75.64% of the variation in the dependent variable can be explained by this model, after adjusting for the number of independent variables used. This suggests that the model has good predictive power, although about 24.36% of the variation remains unexplained. Overall, these analysis results show that CED and ROA significantly contribute to the dependent variable, while Growth Sales does not have a significant effect. The panel data regression equation obtained is as follows:

$$Y = \alpha + \beta_1 X + \beta_2 M_1 + \beta_3 M_2 + \varepsilon_t$$

$$Tobin's\ Q = \alpha + \beta_1 \text{CED} + \beta_2 \text{ROA} + \beta_3 \text{GROWTH SALES} + \varepsilon_t$$

$$\textit{Tobin's Q} = 2.570093 - 0.095687\ \text{CED} + 6.920243\ \text{ROA} - 0.008325\ \text{GROWTH SALES} + \varepsilon_t$$

Table 5. Moderating Test

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	5.761245	5.819320	0.990020	0.3225
CED	-0.083351	0.034150	-2.440705	0.0149
ROA	7.386724	0.681995	10.83106	0.0000
GROWTH SALES	-0.029000	0.141739	-0.204603	0.8379
CED_ROA	-0.985767	0.240210	-4.103776	0.0000
CED_GROWTH SALES	0.044966	0.064828	0.693618	0.4881
FIRM SIZE	-0.114603	0.189909	-0.603465	0.5464
Effects Specification				
Cross-section fixed (dummy variables)				
R-squared	0.788632	Mean dependent var		2.243957
Adjusted R-squared	0.760691	S.D. dependent var		2.653155
S.E. of regression	1.297903	Akaike info criterion		3.469563
Sum squared resid	1376.279	Schwarz criterion		4.038208
Log likelihood	-1497.408	Hannan-Quinn criter.		3.686492
F-statistic	28.22496	Durbin-Watson stat		0.919867
Prob(F-statistic)	0.000000			

Based on Table 5, the following can be observed:

A. **Coefficients**

1. The constant (C) has a coefficient of 5.761245, indicating that the average firm value is approximately 5.761245 units when all other independent variables are zero. This constant value reflects the baseline of the dependent variable before considering the influence of the other variables.
2. CED (Carbon Emission Disclosure) has a coefficient of -0.083351, suggesting that for each one-unit increase in CED, the firm value will decrease by 0.083351 units, assuming all other variables remain constant. This indicates a negative relationship between CED and firm value.
3. ROA has a coefficient of 7.386724, meaning that a one-unit increase in ROA will result in a 7.386724-unit

increase in firm value. This reflects a strong, positive relationship between the company's financial performance (ROA) and firm value, indicating that profitability plays a crucial role in determining the firm's market value.

4. Growth Sales has a coefficient of -0.029, indicating that each one-unit increase in sales growth will reduce the firm's value by 0.029 units. Although the effect is small, it suggests that sales growth can negatively impact firm value, possibly because the market may not positively value the investments required to support growth.
5. The interaction between CED (Carbon Emission Disclosure) and ROA (Return on Assets), denoted as CED_ROA, has a coefficient of -0.985767, suggesting that the interaction between CED and ROA has a significant adverse effect on firm value. A one-unit increase in this interaction will reduce the firm value by 0.985767 units. This indicates that while ROA has a positive effect on firm value, its interaction with CED diminishes that positive effect.
6. The interaction between CED (Carbon Emission Disclosure) and Growth Sales, denoted as CED_Growth Sales, has a coefficient of 0.044966, indicating that the interaction between CED and Growth Sales has a positive impact on firm value, although the effect is relatively small. Each one-unit increase in this interaction will increase the firm value by 0.044966 units. This suggests that, in specific contexts, sales growth driven by CED can have a positive impact on firm value.
7. Firm Size, as a control variable, has a coefficient of -0.114603, indicating that each one-unit increase in firm Size will decrease the firm value by 0.114603 units. This suggests that larger companies tend to have lower values, which may be influenced by factors such as managerial complexity and higher risk.

B. **T-Statistics**

1. The t-statistic for CED is -2.440705, which is lower than -2, indicating that this coefficient is statistically significant and hurts firm value.
2. The t-statistic for ROA is 10.73140, which is much greater than 2, indicating that the ROA coefficient is highly statistically significant and has a substantial positive contribution to firm value.
3. The t-statistic for Growth Sales is -0.204603, which is close to zero, indicating that this coefficient is not statistically significant in influencing firm value.
4. The t-statistic for the interaction between CED (Carbon Emission Disclosure) and ROA (Return on Assets), denoted as CED_ROA, is -4.103776, which is lower than -2, indicating that the interaction between CED and ROA is statistically significant and has a significant negative impact on firm value.
5. The t-statistic for the interaction between CED (Carbon Emission Disclosure) and Growth Sales, denoted as CED_Growth Sales, is 0.693618, which is close to zero, indicating that the interaction effect between CED and Growth Sales is not statistically significant.

C. **Probability (P-value)**

1. The probabilities for CED, ROA, and the interaction between CED (Carbon Emission Disclosure) and ROA (Return on Assets), denoted as CED_ROA, are minimal (0.0149, 0.0000, and 0.0000, respectively), indicating that these three variables are statistically significant in influencing firm value.
2. The probability for Growth Sales is 0.8379, which is much larger than 0.05, indicating that this variable is not statistically significant in influencing firm value.
3. The probability for the interaction between CED (Carbon Emission Disclosure) and Growth Sales, denoted as CED_Growth Sales, is 0.4881, which is greater than 0.05, indicating that the interaction between CED and Growth Sales is not statistically significant.

Discussion

The Effect of Carbon Emission Disclosure on Firm Value The results of this study are inconsistent with those of previous research conducted by Han et al. (2023) dan Matthews et al. (2024) which found that carbon emission disclosure (CED) has a positive and significant impact on firm value. This finding suggests that the market is becoming increasingly sensitive to environmental issues, particularly in the manufacturing sector (Dumrongwong & Papangkorn, 2025). This is due to the growing pressure from various stakeholders, such as regulators, consumers, and investors, who demand greater transparency regarding corporate sustainability and environmental responsibility. When companies disclose their carbon emissions, it may create a negative perception among stakeholders, especially those who are more concerned with the environmental impact of the company's operations. However, this study aligns with the research conducted by Rachmadhika & Firmansyah (2025) which suggests that the adverse effect is due to the perception that companies disclosing high levels of carbon emissions are seen as less environmentally friendly, which can reduce the company's image in the eyes of investors and consumers. The existing disclosure may raise concerns, particularly regarding potential future environmental costs, such as expenses associated with complying with stricter environmental regulations or costs incurred to improve a damaged reputation. Moreover, investors who prioritize portfolios focused on environmentally friendly companies (e.g., those involved in green technologies) may avoid stocks of companies considered unsustainable, leading to a reduction in investment interest (i.e., stock prices) and a decline in the market value of the company (Donkor et al., 2025).

The Effect of Corporate Profitability on Firm Value According to existing research findings, corporate profitability has a positive and significant impact on firm value. Profitability, which reflects a company's ability to generate profits from its operations, serves as a key indicator in the market's valuation of a company. The results of this study align with those of previous research conducted by Naibaho et al. (2024) which found that profitability,

measured by Return on Assets (ROA), has a significant positive effect on firm value. This is because investors tend to value companies that generate consistent profits, as they are considered to have stable and sustainable financial prospects (Astuti & Ahmar, 2025). When a company demonstrates strong financial performance, particularly in terms of profitability, it sends a positive signal to investors about the company's ability to survive and grow in the long term (Bui et al., 2023). Therefore, the higher the company's profitability, the more likely it is to achieve a higher market value (Asni & Agustia, 2021). This study also shows that profitability is directly related to firm value through the mechanism of investor confidence in good financial performance. This confidence becomes one of the factors driving investment decisions, where investors are more inclined to invest in companies with a stable profit record. This is further supported by another study conducted by Buallay et al. (2024) which states that companies with high profitability tend to be valued higher by the market. This is because investors and stakeholders assess that such companies have a greater potential for long-term growth.

The Effect of Sales Growth on Firm Value

Based on the research findings, it was found that Sales Growth (growth in sales) has a positive and significant effect on firm value. This suggests that an increase in a company's sales figures can directly contribute to an increase in firm value, which is reflected in stock prices, investor attractiveness, and market perceptions of the company's sustainability potential. These findings align with research conducted by Candani & Badera (2022) who found that sales growth has a positive and significant effect on firm value, consistent with signaling theory. This is further supported by research conducted by Zhou et al. (2024) which found that an increase in sales is a key indicator of a company's operational performance, impacting financial projections and the sustainability of growth. Companies that demonstrate significant sales growth are perceived as having strong competitiveness in the market and the ability to adapt their business strategies effectively. This increases investor confidence, which in turn can drive the rise in firm value (Ichwanudin et al., 2025). Increased sales indicate that the company's products or services are well-received in the market, which suggests optimism regarding the company's prospects (Kwon & Boger, 2021). This market confidence significantly influences the perception of firm value, as investors tend to prefer investing in companies with stable sales growth performance. Additionally, sales growth enables companies to foster more innovation, expand their market reach, and increase profit margins, all of which can contribute to enhancing firm value. Thus, good sales performance not only impacts operational performance but also becomes a crucial factor in increasing firm value in the eyes of investors and the market overall. Therefore, companies that consistently achieve sustained sales growth will find it easier to attain long-term stability, which is reflected in an increase in firm value.

The Effect of Corporate Profitability in Moderating the Relationship Between Carbon Emission Disclosure and Firm Value

In this study, it was found that corporate profitability negatively moderates (weakens) the relationship between carbon emission disclosure and firm value. The findings demonstrate that companies with high profitability tend not to experience significant increases in firm value, even when they disclose carbon emissions transparently. This is due to investors' perception that companies with strong profitability (as measured by return on assets) do not gain substantial additional benefits from carbon emission disclosure activities. In other words, carbon emission disclosure does not provide a significant new signal to the market, particularly regarding the company's prospects, which are already considered financially stable. These results are inconsistent with previous studies conducted by Rahmianingsih & Malau (2022) and Maharani et al. (2024) which found that corporate profitability, measured by return on assets (ROA), positively and significantly moderates the relationship between carbon emission disclosure and firm value. This study also has practical implications for corporate management in formulating sustainability reporting strategies. Companies with high profitability need to understand that disclosing carbon emissions alone is insufficient to increase market value. Therefore, sustainability communication strategies should be combined with other more innovative and impactful approaches, such as achieving measurable emission targets and involving stakeholders actively in the company's environmental policies (Walters & Helman, 2023).

From a regulatory perspective, this result suggests that sustainability reporting policies should be adjusted to be more adaptable to the characteristics of companies. Regulations that encourage comprehensive and standardized carbon emission disclosure (well-managed regulations) will be more effective if accompanied by incentives for companies that do not yet have high profitability positions, as the signaling effect will be greater (Surindro & Trisnawati, 2024). On the other hand, for companies with high profitability, regulatory approaches can focus on improving the quality and depth of the information reported, which should not only be about quantity but also about the company's strategy in emphasizing emissions and demonstrating how the company actively manages, reduces, and mitigates the environmental impact of its operations measurably and transparently. This should be integrated into the company's long-term business model. (Widyastuti et al., 2023)

The Effect of Sales Growth in Moderating the Relationship Between Carbon Emission Disclosure and Firm Value

The results of this study indicate that a company's sales growth does not moderate the relationship between carbon emission disclosure (CED) and firm value. This finding suggests that although a company experiences increased sales growth, this is not sufficient to strengthen or weaken the impact of carbon emission disclosure on firm value. These results are inconsistent with research conducted by Fortune (2018) and Choiriah (2021) who found that sales growth positively and significantly moderates the

relationship between carbon emission disclosure and firm value. When a company successfully increases its sales, this does not automatically strengthen the relationship between carbon emission disclosure and firm value. Instead, greater attention is placed on the company's consistency and transparency in reporting its carbon footprint. This suggests that firm value is not solely determined by financial performance, but also by the company's demonstration of its commitment to environmental issues (Sari et al., 2024). According to the findings of this study, it is evident that investors and stakeholders do not always directly associate increased sales with the reliability or significance of carbon emission disclosure when evaluating a company's performance or prospects (Wahyuningrum et al., 2022). This suggests that the market places more emphasis on the quality of the environmental information disclosed transparently, rather than on the company's existing sales growth performance. When a company discloses its carbon emissions data, the market's response to this information is more determined by the perception of the company's environmental commitment and its consistency with existing sustainability practices.

On the other hand, the influence of sales growth as a moderating variable in this study illustrates that sales growth does not always reflect operational efficiency or the success of the company's sustainability strategies. Increases in sales may be driven by external factors, such as market conditions or temporary demand, without reflecting the company's commitment to environmental responsibility. Therefore, it can be assumed that stakeholders (investors) do not place significant value on the correlation between the company's sales performance and the quality of its environmental disclosure (Bedi & Singh, 2024).

Conclusion

Based on the research on "The Effect of Carbon Emission Disclosure on Firm Value with Corporate Characteristics as a Moderating Variable," it can be concluded that there is a negative and significant effect of Carbon Emission Disclosure (CED) on Firm Value in the manufacturing industry in Southeast Asia, including the Philippines, Indonesia, Malaysia, Thailand, and Vietnam. This suggests that the level of openness and transparency regarding carbon emissions has not been fully appreciated by the capital market, and is more likely associated with potential environmental risks, compliance costs, and a decline in future profitability.

On the other hand, Corporate Profitability, measured by Return on Assets (ROA), has a positive and significant effect on Firm Value, suggesting that companies in this region that efficiently manage assets to generate profits tend to receive higher market valuations. Additionally, Sales Growth also has a positive and significant effect on Firm Value, reflecting better growth prospects in the eyes of investors and supporting an increase in market value, in line with signaling theory. However, high profitability negatively moderates the relationship between CED and Firm Value, where carbon emission transparency no longer adds significant value for investors when a company has already demonstrated strong financial performance. This suggests that, in developing countries such as those in Southeast Asia, carbon emission disclosure does not provide a meaningful new signal, unlike in developed countries.

Furthermore, Sales Growth does not significantly moderate the relationship between CED and Firm Value, suggesting that the contribution of carbon emission disclosure to the increase in firm value is independent and not influenced by sales growth levels. Therefore, the findings emphasize the importance for manufacturing companies in Southeast Asia to develop a more strategic and integrated environmental disclosure system, which aligns with the company's overall sustainability practices. Carbon emission disclosure should not merely complement financial reports, but should be part of a proactive environmental responsibility strategy that adds value to the company.

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