

Research article

# Evaluating the Impact of Greenhouse Gas Emission Disclosure on Firm Performance

<sup>1</sup>Hieu Le

<sup>1</sup>University of Economics and Business, Vietnam National University.

Received Date: 13 August 2025

Revised Date: 30 August 2025

Accepted Date: 12 September 2025

Published Date: 18 September 2025

**Abstract:** *The objective of this study is to investigate the relationship between greenhouse gas emission disclosure and firm performance among listed firms in Vietnam. As environmental sustainability becomes increasingly critical, understanding the impact of emission disclosure is necessary for both corporate strategy and stakeholder trust. The study uses secondary data collected from sustainability reports and financial statements of Vietnamese listed firms across different industries for the period 2021–2023. Regression analysis was conducted using feasible GLS models to test the hypothesized relationships. The empirical results show that greenhouse gas emission disclosure has a positive and significant impact on firm performance, indicating that firms disclosing carbon emissions are valued more highly by the market and achieve superior financial outcomes. This study provides empirical evidence on the importance of greenhouse gas emission disclosure in an emerging market context where such practices are relatively new. The findings offer insights for managers, investors, and policymakers in promoting sustainable business practices in emerging economies.*

**Keywords:** *Greenhouse Gas Emission Disclosure, Sustainability.*

## I. INTRODUCTION

Right now, one of the most important strategies for businesses is to combine their business activities with sustainable development. The environment is getting dirtier, and climate change is getting more complicated as businesses grow. Businesses now have a major responsibility to implement and report on activities that promote sustainable development, which are known as ESG activities. This is necessary to deal with climate change and make business sustainable. So, controlling greenhouse gas emissions is an important part of making sure that businesses can keep running in a sustainable way. This means that businesses need to build up their ability to manage greenhouse gas emissions, figure out what risks they pose, and fix problems that come up with emissions (Kurnia et al., 2021). Companies can improve their reputations by being environmentally responsible, like using renewable energy to cut down on greenhouse gas emissions. This can also help the people who are most affected by the company's actions. These benefits encompass augmented revenue and favorable perceptions among employees, customers, and suppliers when the company is regarded as environmentally friendly (Simnett et al., 2009).

Lins et al. (2017) examined the correlation between ESG scores and stock returns of companies during the 2008–2009 financial crisis in the United States, finding that firms with elevated ESG scores attained stock returns surpassing those of low-ESG-score firms by approximately 4%. Investors need disclosure information to make decisions, including disclosures related to greenhouse gas emissions (Saka & Oshika, 2014). Anggraeni (2015) found that carbon emission disclosure impacts firm performance. Hapsoro and Ambarwati (2018) similarly discovered that carbon emission disclosure influences trading volumes. Investors generally respond positively to voluntary carbon emission disclosure because they regard such information as a vital indicator of a company's sustainability (Anggraeni, 2015).

ESG disclosure and greenhouse gas emission disclosure are considered prerequisites for enterprises to conduct a thorough green transition. However, greenhouse gas emission disclosure represents a considerable challenge for Vietnamese businesses, due to the lack of clear methods and the limited capacity to implement carbon accounting practices in reality, constrained by scarce resources and insufficient awareness. One of the most important limitations affecting the quality of information disclosure is whether enterprises genuinely recognize the significance of ESG activities and greenhouse gas emission disclosure or merely comply with legal or stakeholder requirements. Another motivation for disclosure is whether such information attracts greater investor interest than for firms without disclosure. From the investor's perspective, how do ESG activities and greenhouse gas emission disclosure affect firm performance?

In Vietnam, requirements for greenhouse gas emissions accounting are still at an initial stage, with relevant regulations only being issued by the government in 2020. Therefore, research on this issue in Vietnam remains limited. This study aims to



explore the relationship between greenhouse gas emission disclosure and the performance of listed firms in Vietnam, in order to clarify the practical benefits of such disclosure, thereby motivating enterprises to pay more attention to environmental and sustainable development issues.

To achieve the objectives of this research, the rest of the paper is organized as follows. Section 2 summarizes the literature review on ESG, greenhouse gas emission disclosure, firm performance indicators and the relationship between them. Section 3 pinpoints the methodology used to examine the role of greenhouse gas emission disclosure on firm performance. Section 4 presents the results and main findings of the study. Conclusions and limitations are presented in the last section.

## II. LITERATURE REVIEW

### A) *ESG and Greenhouse Gas Emission Disclosure*

ESG is a concept that describes factors related to sustainable development through three dimensions: Environment, Social, and Governance. Given the increasingly complex situation of environmental pollution and climate change, ESG disclosure can be considered one of a firm's competitive advantages. According to a special report measuring the Edelman Trust Barometer (2023), as many as 88% of investors believe that companies focusing on ESG initiatives will have better long-term profitability opportunities than those that do not. Previous research has demonstrated a correlation between ESG disclosure and the disclosure of greenhouse gas emissions. Tsang et al. (2023) specifically found that companies that do more ESG-related activities are more likely to voluntarily report their greenhouse gas emissions. This indicates that firms with superior ESG practices are more focused on incorporating climate change considerations into their business strategies to mitigate climate-related risks and capitalize on opportunities, while upholding enduring commitments throughout all operations (Jiang & Tang, 2023).

The Greenhouse Gas Protocol (2004) says that a business's greenhouse gas emissions ought to be broken down into three categories. Scope 1 emissions are direct emissions from sources that the organization controls. For example, chemical emissions from manufacturing operations or agricultural emissions from farming activities. Scope 2 emissions, on the other hand, are emissions that come from the electricity that businesses buy. Although the emissions occur at the facility, they are still attributed to the organizations that consume the energy. Scope 3 emissions are the result of the company's activities, but not from sources controlled by it. Some examples falling into this category include the production and transportation of raw materials, which are then used by firms to produce final goods and services.

### B) *Greenhouse Gas Emission Disclosure and Firm Performance*

A number of earlier studies have shown that disclosing greenhouse gas emissions has a good effect on how well a company does. Being environmentally responsible is a way to give a company an edge over its competitors and make investors more confident (Okpala & Iredele, 2019; Anggraeni, 2015; Luo & Tang, 2016; Matsumura et al., 2014; Qiu et al., 2016). At the same time, proactive environmental strategies can help companies make more money and be worth more as a business (King & Lenox, 2002; Burnett & Hansen, 2008; Clarkson et al., 2011; Hatakeda et al., 2012).

The research conducted by Hardiyansah and Agustini (2021) in Indonesia revealed that carbon emission disclosure positively and significantly influences firm value. Furthermore, it indicated that carbon emission disclosure represents a corporate environmental concern that is favorably regarded by the market, serving as a criterion for investors to evaluate corporate sustainability. In a similar study, Matsumura et al. (2014) looked into how carbon emission disclosure affects the value of businesses in the United States. Their results indicated that, on average, the firm value of companies that disclosed carbon emissions was roughly USD 2.3 billion greater than that of companies that did not disclose emissions. Murray et al. (2006) noted a positive correlation between the extent of environmental disclosure and consistent revenue generation. The study by Magness (2006) showed that investors pay more attention to companies that have previously disclosed environmental information. Therefore, this study proposes the hypothesis that greenhouse gas emission disclosure positively affects firm performance.

## III. METHODOLOGY

### A) *Data Collection and Sample*

This study collected data for the period 2021–2023, as greenhouse gas emission disclosure regulations in Vietnam only took effect from 2021. Financial data was collected from sustainability reports and financial statements of listed companies across different industries. A total of 156 observations were used for analysis.

### B) *Research Design*

To test the hypotheses, this study examined the impact of the greenhouse gas emission disclosure variable (DISC) on firm performance using the following regression model:

$$FP_{it} = \beta_0 + \beta_1 DISC_{it} + \beta_2 SIZE_{it} + \beta_3 LEV_{it} + industry\_effects + year\_effects + \varepsilon_{it}$$

where  $i$  is the specific firm,  $t$  is the disclosure year, FP is the dependent variable reflecting firm performance, which includes Tobin’s Q, ROA and ROE into three separate models. DISC is the independent variable representing greenhouse gas emission disclosure. The control variables include firm size (SIZE) and financial leverage (LEV).  $\varepsilon$  is the error term.

**Table 1: Definition of the variables**

Variable	Measure	Source
<b>Dependent variables</b>		
Tobin’s Q	$\frac{\text{Market Value of Equity} + \text{Book Value of Debt}}{\text{Total Assets}}$	Kurnia et al. (2021)
ROA	$\frac{\text{Net income}}{\text{Total Assets}}$	Oikonomou et al. (2012)
ROE	$\frac{\text{Net income}}{\text{Shareholder's Equity}}$	Oikonomou et al. (2012)
<b>Independent variable</b>		
DISC	DISC increases by 1 for each item disclosure out of 7 greenhouse gas emissions accounting items (Appendix 1)	Choi et al. (2013)
<b>Control variables</b>		
SIZE	$\text{Ln}(\text{Total Assets})$	Jadiyappa et al. (2021)
LEV	$\frac{\text{Total Debt}}{\text{Total Assets}}$	Aydoğmuş et al. (2022)

In this study, the basic regression models employed include Ordinary Least Squares (OLS), the Fixed Effects Model (FEM), and the Random Effects Model (REM). The Hausman test will be used to select between FEM and REM when analyzing the relationship between greenhouse gas emission disclosure and firm performance. To choose between the OLS and REM models, the Breusch-Pagan Lagrange Multiplier (BPLM) test will be conducted. The Wooldridge and Breusch-Pagan tests will also be used to look for multicollinearity and heteroskedasticity (Gujarati, 2003). If these tests are of statistical significance, we will use the Feasible Generalized Least Squares (FGLS) model. We used Python to do the data analysis.

**IV. RESULTS AND DISCUSSION**  
**Table 2: Pairwise correlation and VIF**

	DISC	LEV	SIZE	VIF
DISC	1			3.16
LEV	-0.136***	1		2.41
SIZE	-0.182***	0.415***	1	2.36

Notes: \*\*\* $p < 0.01$

Table 2 shows how the variables in the model are related to each other. The negative correlation between leverage (LEV) and the dependent variables Tobin’s Q and ROA suggests that as firms increase their debt, the market perceives them less favorably, resulting in lower returns on total assets. This result aligns with Aydogmuş et al. (2022), who identified a negative correlation between leverage and Tobin’s Q and ROA. There is also a negative correlation between leverage and greenhouse gas emission disclosure, which means that the more debt a company has, the less likely it is to report its greenhouse gas emissions. This finding aligns with Matsumura et al. (2014), which indicated that increased leverage correlates with diminished carbon disclosure levels. In general, the correlation coefficients and VIF statistics show that the dataset used for the model doesn’t have any serious problems with multicollinearity.

**Table 3: Model choice testing**

Model comparison	Test	P-value	Result
OLS and FEM	F test	0.000	FEM model preferred
OLS and REM	BPLM test	0.000	REM model preferred
FEM and REM	Hausman test	0.000	FEM model preferred
Autocorrelation	Wooldridge test	0.000	Autocorrelation exists

Heteroskedasticity	Breusch-Pagan test	0.000	Heteroskedasticity exists
--------------------	--------------------	-------	---------------------------

The Wooldridge test for autocorrelation and the Breusch-Pagan test for heteroskedasticity both have p-values less than 1%, which means that there is both autocorrelation and heteroskedasticity in the data. These findings indicate that the Feasible Generalized Least Squares (FGLS) model is the most appropriate method for analyzing the effect of greenhouse gas emission disclosure on corporate performance.

**Table 4: FLGS Results**

	<b>Model 1</b>	<b>Model 2</b>	<b>Model 3</b>
	Tobin's Q	ROA	ROE
DISC	0.112***	0.034***	0.018***
SIZE	0.154***	0.018***	0.126***
LEV	-0.465***	-0.15***	-0.031***
Industry effects	Yes	Yes	Yes
Year effects	Yes	Yes	Yes
Observations	156	156	156

Notes: \*\*\*p<0.01

The regression results in Table 4 show that disclosing greenhouse gas emissions has a positive effect on Tobin's Q, ROA, and ROE, with correlation coefficients of 0.112, 0.034, and 0.018, respectively. This demonstrates that firms revealing greenhouse gas emissions attain superior market valuations and yield enhanced returns on total assets and equity. These results align with the research conducted by Hardiyansah and Agustini (2021) and Saka and Oshika (2014), which demonstrated that carbon emission transparency positively and significantly influences firm value. Matsumura et al. (2014) examined the correlation between voluntary carbon emission disclosure and firm value, questioning the rationale behind firms' voluntary disclosures when the market typically views such actions as a cost or legal obligation. The authors found that the average firm value of companies in the United States that choose to disclose their greenhouse gas emissions is significantly greater than that of companies that do not disclose their emissions.

The correlation of the firm size variable indicates a positive influence on the relationship between carbon emission disclosure and Tobin's Q, ROA, and ROE, with correlation coefficients of 0.154, 0.018, and 0.126, respectively. This means that bigger companies are more likely to want to share information about their greenhouse gas emissions. This finding aligns with prior research, including Luo et al. (2013), which indicated that larger firms possess heightened awareness of environmental responsibilities, thereby increasing their willingness to voluntarily disclose information.

## V. CONCLUSION

### A) Implications

The research outcomes underscore the significance of ESG initiatives and greenhouse gas emission transparency for corporate performance. In developed countries, awareness of ESG practices and greenhouse gas emission disclosure has been elevated and continues to expand broadly. Meanwhile, in developing countries such as Vietnam, ESG activities and emission disclosure have only recently attracted attention in the past few years. Therefore, this study is significant in addressing the importance of investing time and resources to disclose greenhouse gas emissions. The disclosure information is only truly of high quality if firms proactively disclose it, rather than merely complying with a regulation. Only when managers clearly recognize that the benefits of implementing ESG activities and greenhouse gas emission disclosure outweigh the associated costs will they be willing to invest time and resources into sustainable development activities.

The results of this study demonstrate that greenhouse gas emission disclosure helps firms enhance their reputation, receive higher evaluations from the market, and thereby attract more potential investors. At the same time, when companies improve their image and brand through social responsibility activities, this may increase customer loyalty to the brand, thereby generating greater profits for shareholders. Recognizing these benefits, this study contributes to encouraging managers to develop plans and strategies to better implement ESG activities in the near future. To improve the overall process, greenhouse gas inventory methodologies will require a long-term journey of cooperation between government and businesses, but the immediate priority is for enterprises to understand the importance of greenhouse gas inventory and disclosure. When awareness of the significance of greenhouse gas inventory and disclosure is improved, more initiatives to reduce greenhouse gas emissions will emerge, thereby promoting sustainable development and contributing to mitigating global climate change.

### B) Limitations and Future Research

This study was conducted at a time when Vietnamese enterprises had only begun disclosing greenhouse gas emissions in 2021; therefore, the number of observations collected was still quite limited compared to the total number of currently operating firms. Additionally, the accuracy of the disclosed emissions data in annual reports and sustainability reports may not be correct since companies may still lack experience in greenhouse gas emissions disclosure. In the future, studies with a longer time horizon may yield clearer results. Moreover, this research could also be extended to other countries, especially those developing economies similar to Vietnam, to provide a more comprehensive perspective on the impact of greenhouse gas emission disclosure on corporate performance.

**Table 1: Greenhouse gas emissions accounting**

Item	Definition
GHG1	Description of the methodology used to calculate greenhouse gas emissions (e.g. greenhouse gas protocol or ISO)
GHG2	Existence external verification of the quantity of greenhouse gas emission – if so, by whom and on what basis
GHG3	Total greenhouse gas emissions – metric tonnes CO <sub>2</sub> -e emitted
GHG4	Disclosure of Scopes 1 and 2, or Scope 3 direct greenhouse gas emissions
GHG5	Disclosure of greenhouse gas emissions by sources (e.g. coal, electricity, etc.)
GHG6	Disclosure of greenhouse gas emissions at the facility or segment level
GHG7	Comparison of greenhouse gas emissions with previous years

Source: Choi et al., 2013

**VI. REFERENCES**

[1] Anggraeni, D. Y. Carbon Emission Disclosure, Environmental Performance, and Firm Value. *Jurnal Akuntansi Dan Keuangan Indonesia*, 12(2) (2015) 188-209.

[2] Aydođmuş, M., Gülay, G., Ergun, K. Impact of ESG performance on firm value and profitability. *Borsa Istanbul Review*, 22 (2022) S119-S127.

[3] Burnett, R.D., Hansen, D.R. Ecoefficiency: defining a role for environmental cost management. *Accounting, Organizations and Society*, 33(6) (2008) 551-581.

[4] Choi, B.B., Lee, D., Psaros, J. An analysis of Australian company carbon emission disclosures. *Pacific Accounting Review*, 25(1) (2013) 58-79.

[5] Clarkson, P.M., Li, Y., Richardson, G.D., Vasvari, F.P. Does it really pay to be green? Determinants and consequences of proactive environmental strategies. *Journal of Accounting and Public Policy*, 30(2) (2011) 122-144.

[6] Edelman 2023 Edelman Trust Barometer Global Report, (2023).

[7] Greenhouse Gas Protocol, GHG Protocol Corporate Accounting and Reporting Standard, (2004).

[8] Gujarati, D. Basic econometrics. McGraw-Hill. (2003).

[9] D., Ambarwati. Antecedents And Consequences Of Carbon Emissions’ Disclosure: Case Study Of Oil, Gas And Coal Companies In Non-Annex 1 Member Countries. *Journal of Indonesian Economy and Business*, 33(2) (2018) 99-111.

[10] Hardiyansah, M., Agustini, A. T. Carbon Emissions Disclosure and Firm Value: Does Environmental Performance Moderate This Relationship. *Jurnal Ekonomi Dan Bisnis Islam (Journal of Islamic Economics and Business)*, 7(1) (2021) 51-71.

[11] Hatakeda, T., Kokubu, K., Kajiwara, T., Nishitani, K. Factors influencing corporate environmental protection activities for greenhouse gas emission reductions: the relationship between environmental and financial performance. *Environmental Resource and Economics*, 53 (2012) 455-481.

[12] Istikhroh, S., Suhardiyah, M. The Role of Corporate Social Responsibility Disclosure in Improving the Effect of Return on Equity on Firm Value. *Majalah Ekonomi*, 21(2) (2016) 275-285.

[13] Jadyappa, N., Joseph, A., Sisodia, G., Krishnankutty, R., Shrivatsava, S. Corporate social responsibility and cash holdings in India: Evidence from a natural experiment. *Finance Research Letters*, 39 (2021) 101581.

[14] Jiang, Y., Tang, Q. Mandatory carbon reporting, voluntary carbon disclosure and ESG performance. *Pacific Accounting Review*, 35(4) (2023) 534-561.

[15] King, A., Lenox, M. Exploring the locus of profitable pollution reduction. *Management Science*, 48(2) (2002) 289-299.

[16] Kurnia, P., Nur Dp, E., Putra, A. Carbon Emission Disclosure and Firm Value: A Study of Manufacturing Firms in Indonesia and Australia. *International Journal of Energy Economics and Policy*, 11 (2021) 83-87

[17] Lins, K.V., Servaes, H., Tamayo, A. Social Capital, Trust, and Firm Performance: The Value of Corporate Social Responsibility during the Financial Crisis. *The Journal of Finance*, 72(4) (2017) 1785-1824.

[18] Luo, L., Tang, Q. Does National Culture Influence Corporate Carbon Disclosure Propensity? *Journal of International Accounting Research*, 15(1) (2016)17-47.

[19] Luo, L., Tang, Q., Lan, Y. Comparison of Propensity for carbon disclosure between developing and developed countries. *Accounting Research Journal*, 26(1) (2013) 6-34.

[20] Magness, V. Strategic Posture, Financial Performance and Environmental Disclosure. *Accounting, Auditing & Accountability Journal*, 19(4) (2006) 540-563.

[21] Matsumura, E. M., Prakash, R., Vera-Muñoz, S. C. Firm- Value Effects of Carbon Emissions and Carbon Disclosures. *The Accounting Review*, 89(2) (2014) 695-724.

[22] Sinclair, D., Power, D., Gray, R. Do financial markets care about social and environmental disclosure? Further evidence and exploration from the UK. *Accounting, Auditing & Accountability Journal*, 19(2) (2006) 228-255.

[23] Oikonomou, I., Brooks, C., Pavelin, S. The Impact of Corporate Social Performance on Financial Risk and Utility: A Longitudinal Analysis. *Financial Management*, 41(2) (2012) 483–515.

[24] Okpala, O. P., Iredele, O. O. Corporate Social and Environmental Disclosures and Market Value of Listed Firms in Nigeria. *Copernican Journal of Finance & Accounting*, 7(3) (2019) 9-28.

[25] Qiu, Y., Shaukat, A., Tharyan, R. Environmental and Social Disclosures: Link with Corporate Financial Performance. *The British Accounting Review*, 48(1) (2016) 102-116.

- [26] Saka, C., Oshika, T. Disclosure effects, carbon emissions and corporate value. *Sustainability Accounting, Management and Policy Journal*, 5(1) (2014) 22-45.
- [27] Simnett, R., Nugent, M., Huggins, A. Developing an International Assurance Standard on Greenhouse Gas Statements. *Accounting Horizons*, 23(4) (2009) 347-364.
- [28] Tsang, A., Frost, T., Cao, H. Environmental, Social, and Governance (ESG) disclosure: A literature review. *The British Accounting Review*, 55(1) (2023) 101149.