CHAPTER 1

INTRODUCTION

1.1 Background

Nowadays, the globe encounters ecological challenges related to the operational activities of firms. Stakeholders and investors increasingly regard environmental performance as a critical factor in their considerations. Industrial operations generally exert greater influence on global resources and the atmosphere. Environmental disclosure, including that on carbon emissions, is not thoroughly integrated into existing financial reporting standards (Desai, 2022). Corporate carbon emissions are disclosed to enable stakeholders to assess the environmental impact of business activities (Matthews et al., 2025). The climate change phenomenon has become a common issue happening now, with an effect on the increase in temperature called global warming. This condition brings several consequences to our environment, including human life activity and others.

In this study, researchers will discuss further related to the contribution of industry in ESG rating, especially in environmental aspects, in terms of carbon emissions. The phenomenon highlighted today is global warming due to the rapid industrial activity that impacts the environment and has become an important political and business issue for several countries in the world. Global warming is a condition where the Earth's temperature has increased significantly, which is caused by greenhouse gases. Greenhouse gases have increased due to an increase in industrial activities, such as excessive use of energy and carbon, and the disposal of gases from the production process. The effect of greenhouse gases, including

carbon emissions, has become a crucial subject of discussion in this era, so that the composition of the greenhouse consists of carbon dioxide in the atmospheric layer has increased quickly, reaching more than 30% (Khatib et al., 2023; Siddique et al., 2021). According to the McKinsey report, the social and economic impact of the phenomenon is substantial on human, tangible capital, and natural resources. This condition will result in a decrease in worker productivity and continue to reduce global domestic product (GDP) (McKinsey & Company, 2020).

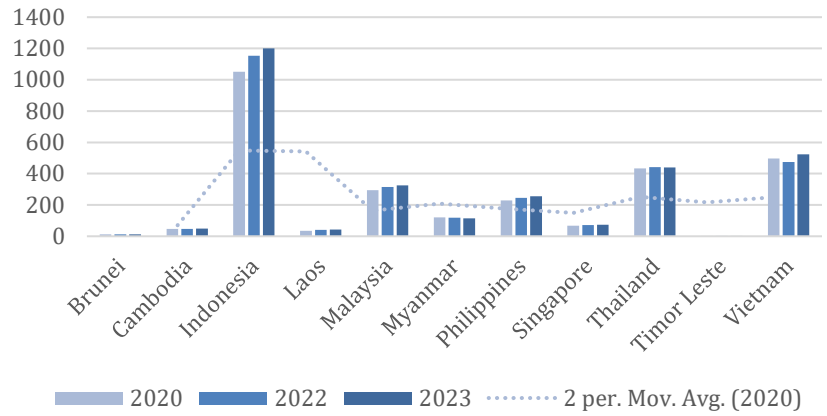
Across the globe, different strategies are implemented to limit the growth of greenhouse gas emissions. International political ideas that become an agreement and are applied globally. First, this commitment was agreed upon globally in Rio de Janeiro, Brazil, in June 1992, aiming to create a new economic era. The ideas born through the Earth Summit aimed to create the scheme of renewable economic maturation. The core principle of sustainable economic growth is to meet the needs of the present population without compromising the interests of future generations, supported by a proper financing framework aligned with the United Nations Framework Convention on Climate Change (UNFCCC). The countries involved in the agreement are concerned with sustainable economic development rather than development that seeks to achieve the highest possible profit. In terms of economic activity, this will have a detrimental impact on the industry by inhibiting the sustainability of development growth (Jangid & Sharma, 2025). To minimize the growing economic losses, the UNFCCC produced a globally recognized environmental agreement referred to as the Kyoto Protocol. Adopted in Kyoto, Japan 1997, the Kyoto Protocol is an international accord requiring Annex 1 nations

to cut greenhouse gas emissions, recognizing fossil fuel consumption since the 1850 Industrial Revolution as a key contributor to climate change and global warming (Desai et al., 2022). In line with the Kyoto Protocol, major pollutants regulated include carbon dioxide, methane, nitrous oxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride.

Another international treaty, the Paris Agreement of 2015, aims to limit global warming and climate change to below 2 °C and preferably under 1.5 ºC relative to pre-industrial levels (Bharali Saikia & Maji, 2024). The Paris Agreement 2015, which came into force on November 4, 2016, is the foundation for mitigation efforts made globally to reduce climate change and global warming. In this agreement, there are several legally binding frameworks related to multilateral cooperation. This agreement also urges various countries to reduce climate impacts. This agreement results in an agreement to limit greenhouse gases by keeping global temperatures under 2°C with an aspirational achievement of 1.5°C. To achieve this goal, the Paris Agreement 2015 instructs countries to provide and update nationally-driven contributions (NDCs) related to agreements also includes a global stocktaking mechanism to evaluate collective progress, ensure transparency and accountability, and encourage more ambitious climate policies over time.

The study concerns the impact of greenhouse gases on ecological degradation, including climate alteration and rising global temperatures. Carbon emissions are a significant problem in all countries worldwide, including those in Southeast Asia. This study is driven by the need to investigate Southeast Asian countries, where a research gap exists for several reasons. Firstly, the region offers an opportunity to

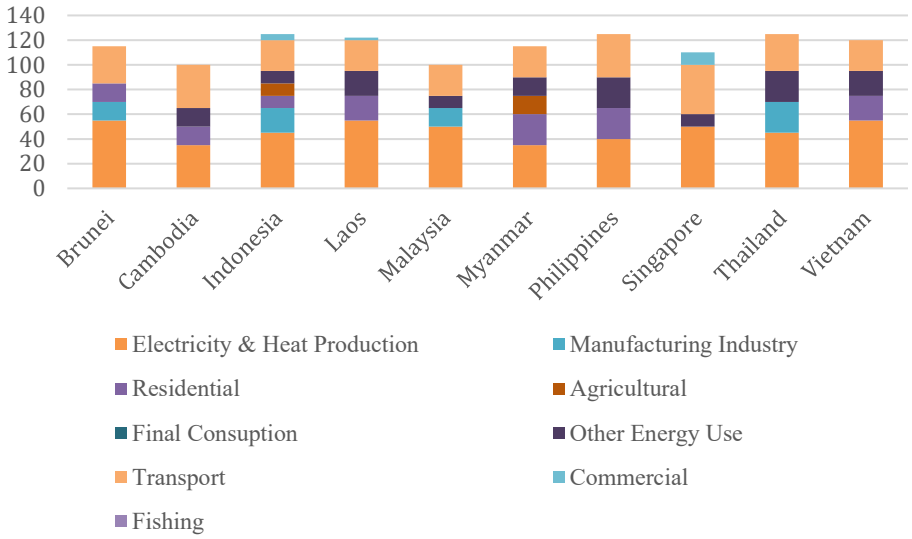
present diverse evidence from multiple industrial nations that significantly contribute to GHG emissions in relation to the climate change crisis. The ASEAN Center for Energy (ACE) states that there is an increase in energy-related GHG emissions by 34-147% from 2017 to 2040.



Source: Processed by Researcher, EDGAR EU

Figure 1. GHG Emissions (Mt CO2 eq)

The picture above illustrates the greenhouse gas (GHG) emissions across ASEAN countries for 2020, 2022, and 2023. The data highlights Indonesia as the largest contributor, with emissions consistently exceeding 1000 Mt CO2 eq and showing an increasing trend. Other significant emitters include Vietnam, Thailand, and Malaysia, while countries such as Brunei, Timor Leste, and Laos emit relatively little. Findings reveal that, despite stable emissions in several ASEAN countries, the continued increase in Indonesia and Vietnam emphasizes the pressing challenge of balancing economic development with environmental responsibility. The trend emphasizes the urgency to strengthen environmental policies, adopt cleaner technologies, and promote regional cooperation in achieving emissions reduction targets (Triani et al., 2023).



Source: Processed by Researcher, ASEAN State of Climate Change Report

Figure 2. Emission Contributions

Regarding the illustration above, across ASEAN, the emissions landscape is dominated by electricity and heat production (40-55 %), with transport and manufacturing/construction following at 20-3-% and 10-20 % respectively. This pattern is consistent with decarbonization roadmaps, which identify these three sectors as the largest regional emitters, such as electricity/heat, industry, and transportation (Lau, 2022). Given the region's continued economic and industrial expansion, the power sector is projected to drive up regional emissions by 35% unless clean energy investment increases dramatically, a target that would require quintupled funding levels. Together, these fundings underscore the critical importance of accelerating sustainable energy transformation and low-carbon solutions in both power generation and transport to meet regional and global climate goals.

In 2022, the overall dominating type of greenhouse gas emissions across the Southeast Asian business sector is CO2 gases, which contribute 78.50% to total emissions across all business sectors. Based on research conducted Khatib et al. (2023) and Desai et al. (2022) investigating the scope of carbon emissions calculated through greenhouse gas (GHG) intensity. The GHG components are divided into three categories: scope 1 emissions, which arise from direct sources; scope 2 emissions, generated through indirect energy use; and scope 3 emissions, which come from other indirect activities throughout the value chain. First, scope 1 emissions refer to the direct release of greenhouse gases from sources that are owned or controlled by an organization, such as fuel combustion from boilers and furnaces, as well as carbon emissions from electric vehicles in specific regions, which may differ depending on the boundaries set in emissions accounting.

The second category, known as Scope 2, accounts for indirect emissions resulting from an organization's consumption of purchased energy, such as electricity, steam, heating, and cooling. Scope 2 emissions are the pollution created at the power plant to produce the electricity and heating that a firm uses. Third, Scope 3 emissions relate to various types of greenhouse gases that are emitted due to operations, but over which the company does not have a direct controlling role or ownership. This includes the impact on our main business operations: making and selling products, traveling for work, and obtaining the raw materials and energy needed for production (Bharali Saikia & Maji, 2024; Wei et al., 2020).

In short, these issues and new ideas are key to understanding the link between our firm’s actions and its environmental and social impact. Firms must be open and

honest about their carbon footprint. Ultimately, this effort boosts the firm's value and builds trust with consumers, investors, and the community. According to legitimacy theory, the firms must be perceived by the surrounding communities, which can be identified by the response of the communities in the firm's environment, and what the company is looking for from the community (Deegan, 2019). The interpretation of legitimacy theory can be seen in the link between a firm's operations and society, specifically in the profits generated from the business activities. Social community always pays attention to environmental conditions on a firm's operation, which means a firm with a higher profit must have a high expectation of contribution to the environment. Lastly, a firm that has a good concern for environmental sustainability has a good perception from the stakeholder perspective.

The study looks at what drives firms in Southeast Asia to be transparent about their carbon footprint at the manufacturing firm. The analysis examined the link between carbon emissions reporting and key financial characteristics, including firm size, profitability, debt financing, and capital expenditure. Asset size is used to measure how the firms perform their operational activities in the utilization of the resources by the firms efficiently and effectively. It relates to a firm's size; larger firms typically have more resources at their disposal. Moreover, this is associated with the operational activity that affects the environment. According to Desai (2022), a firm's size has a significant positive effect on its willingness to disclose carbon productivity data.

Profitability simply measures how good a firm is at making money from what it does. The firm has higher and healthier financial conditions, is more likely to disclose its carbon emissions or environmental performance, which means this initiative helps a firm to get a positive perspective from internal and external stakeholders, as well as the implementation of legitimacy theory in making a profit. Then, refers to the literature that states high profitability is more available in resource-rich areas, and is financially more transparent about carbon emissions to the public. Referring to the condition above, the firm that has the worst profitability and does not have enough resources tends to focus on achieving financial and economic benefits; moreover, there is an obstacle in implementing carbon emissions prevention and reporting (L. Luo, 2019).

Debt financing is an indicator that measures the total funds from creditors in financing a firm's assets during the business operation. The firm relies heavily on debt financing/highly leveraged, which can give certain benefits in terms of cost of capital and shareholder return. While the lower debt financing/lower leverage indicates easy maintenance of financial flexibility, lower fixed obligations, and stronger resilience during the downturns (Nkansah, 2025). The level of debt financing also influences the risk level of the firms, which means the highest level of debt financing tends to be associated with higher risk, and the opposite with the firms with the lowest debt financing (Li et al., 2020). The leverage level and utilization could be among the considerations in making a decision and taking action, as proven by the effectiveness of the debt financing. Then, the leverage expected affects how the firms disclose their carbon emissions. According to Desai

(2022), the level of leverage can be a determinant of the carbon emission disclosure, and another research from Wahyuningrum et al. (2024) found that the debt financing has a negative relationship with the carbon emissions disclosure practiced in Indonesia.

The legitimacy theory is implemented in the firm's operations, especially in the analysis of the carbon emissions disclosure. The implementation of the theory aligns with how the firm meets with social expectations of the communities and gains a positive perspective from the stakeholders. A firm that has a good system to meet responsibilities related to environmental disclosure by generating its assets (Deegan, 2019). According to the Karim et al. (2021), higher capital expenditure is associated with greater disclosure of carbon emissions. The study states that the firm has implemented an environmental initiative, specifically focusing on the renewal of certain equipment related to both business operations and environmental considerations.

This study tries to explore the contingency approach to explore the association between carbon footprint disclosure and its drivers, highlighting the environmental performance role. This research applies a moderating variable that refers to the previous research in investigating firm size (Desai, 2022; L. Luo, 2019), profitability (Desai, 2022; Wahyuningrum et al., 2024; Siddique et al., 2021), debt financing (Desai, 2022; Wahyuningrum et al., 2024; Nkansah, 2025), and capital expenditure (Karim et al., 2021) on environmental performance, as well as the effect of the environmental performance on the carbon emission disclosure. This study provides theoretical and empirical evidence to imply a connection between

several variables and environmental performance. In this era, environmental performance has become an important issue related to a firm's focus (Bassetti et al., 2021). The research believes that environmental performance gives a perspective on the firm to disclose the environmental factors (Shahab et al., 2020). Firms are likely to report their environmental performance when they follow the environmental rules to gain a positive image in society, and it also works if the firm does badly in environmental performance to get a positive perspective. However, the study utilizes the environmental performance to strengthen the relationship between carbon emissions disclosure and its drivers.

According to the phenomena and research gap described above, supported by the results of several supporting articles that form the basis for the researchers to analyse and investigate the determinants of carbon emission disclosure and environmental performance as a moderating variable. The following is a suitable title for the research: **Financial Characteristics and Carbon Emissions Disclosure: The Moderating of Environmental Performance (Evidence on Manufacture Firms of the Southeast Asian Firms in 2020-2024)**

1.2 Research Questions

Guided by this background, our research addresses the following questions below:

1. Does the influence of firm size on carbon emissions disclosure?
2. Does the influence of profitability on carbon emissions disclosure?
3. Does the influence of debt financing on carbon emissions disclosure?
4. Does the influence of capital expenditure on carbon emissions disclosure?
5. Does the environmental performance moderate the relationship between firm size and carbon emissions disclosure?
6. Does the environmental performance moderate the relationship between profitability and carbon emissions disclosure?
7. Does the environmental performance moderate the relationship between debt financing and carbon emissions disclosure?

1.3 Objective of the Research

Regarding the problem statement above, here are several objectives of this research:

1. To investigate the influence of firm characteristics, such as firm size, on carbon emissions disclosure as an influencing factor.
2. To investigate the influence of profitability on carbon emissions disclosure as an influencing factor.
3. To investigate the influence of debt financing on carbon emissions disclosure as an influencing factor.

4. To investigate the influence of capital expenditure on carbon emissions disclosure as an influencing factor.
5. To examine the environmental performance in moderating the relationship between firm size and carbon emissions disclosure.
6. To examine the environmental performance in moderating the relationship between profitability and carbon emissions disclosure.
7. To examine the environmental performance in moderating the relationship between debt financing and carbon emissions disclosure.

1.4 Contributions of the Research

Several contributions of this research are as follows:

1. Theoretical Benefits

   This research contributes to the understanding of the impact of ESG practices, particularly on the environmental aspect related to carbon emission performance, on the firm performance of Southeast Asian companies. Hopefully, the findings will provide a constructive understanding of renewable business strategies in developing countries like Indonesia, with the region's rapidly evolving economic environment.

2. Practical Benefits

   a. For Researchers or Students

      The study is expected to expand the understanding of the literature for researchers or students about factors that affect carbon emission disclosure of firms, by firm attributes moderated by environmental performance contributions.

b. For Companies

The findings of the study are expected to provide useful insight into making decisions regarding carbon emission disclosure policies. This finding could become the standard during established business activity in retaining the firm's performance.

c. For Government

The findings of this study are expected to become a reference and guideline for formulating regulations to ensure the implementation of environmental initiatives, such as disclosing carbon emissions practices.

d. For Investor

The findings of the study are expected to become the basis for decision-making related to investment decisions by the investors. The investors can forecast which firm has good transparency in disclosing its carbon emissions and the firm's reputation.

1.5 Scope of the Research

This research examines the factors that influence carbon emission reporting among manufacturing firms in Southeast Asia, such as Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Moreover, it includes the role of environmental performance as a key moderating factor. The factors are being investigated, such as firm size, profitability, debt financing, capital expenditure, growth, and capital intensity. It emphasizes the analysis of GHG emission intensity, calculated as GHG emissions (scope 1 and scope 2) per million-dollar sales revenue, namely carbon emission disclosure as the dependent variable. The object

of this research was collected from Refinitiv Eikon, annual reports, and Yahoo Finance during 2020-2024.

1.6 Outline of the Research

This study consists of five chapters, each of which contains a subsection with the following:

CHAPTER I INTRODUCTION

This chapter is divided into six parts: the background, problem statement, objectives, contributions, scope, and overall outline of the research

CHAPTER II LITERATURE REVIEW

This chapter contains a theoretical foundation, previous research, hypothesis development, and research framework.

CHAPTER III RESEARCH METHOD

This chapter walks through the research design, including the population and sample, data types and sources, how variables were measured, and the methods used to collect and analyze data.

CHAPTER IV RESULTS AND DISCUSSION

This chapter compiles the findings of the data analysis, the discussion, and the description of the research hypothesis, whether the acceptance or rejection, and compares the findings with the previous research.

CHAPTER V CONCLUSION

This section elaborates on the summary of the study, limitations, research implications, and recommendations for future research.