

The Impact of Corporate Sustainability Initiatives and Public Governance on Corporate Carbon Performance: A Case Study of Companies in ASEAN Countries

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ABSTRACT

This study examines the impact of Corporate Sustainability Initiatives (CSI) and Public Governance on corporate carbon performance in ASEAN countries. The research focuses on internal sustainability initiatives represented by green innovation and resource efficiency, as well as external governance factors measured by regulatory quality and government effectiveness. Using a quantitative approach, this study analyzes companies operating in the energy, materials, and industrial sectors across Indonesia, Malaysia, Singapore, Thailand, and the Philippines. Secondary data were obtained from Refinitiv Eikon and the Worldwide Governance Indicators, and the relationships among variables were tested using Structural Equation Modeling with Partial Least Squares (SEM-PLS). The findings indicate that resource efficiency has a positive and significant effect on corporate carbon performance, highlighting the importance of operational efficiency in reducing carbon emissions. In contrast, green innovation does not show a significant effect, suggesting that green innovation in ASEAN firms tends to be symbolic rather than transformational. Furthermore, government effectiveness demonstrates a significant negative relationship with carbon intensity, implying that more effective governance is associated with better carbon performance. Regulatory quality, however, does not show a significant effect. Firm size positively affects carbon performance, while leverage shows no significant effect. Overall, the results emphasize that improving corporate carbon performance in ASEAN requires a combination of substantive internal sustainability initiatives and effective public governance. This study contributes to the sustainability and governance literature by providing empirical evidence from a developing regional context and offers practical insights for policymakers and corporate managers in designing effective strategies to achieve carbon reduction goals.

KEYWORDS Corporate Sustainability Initiatives; Carbon Performance; Green Innovation; Resource Efficiency; Public Governance.



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INTRODUCTION

Growing concerns about climate change are rapidly prompting organizations to prioritize the reduction of carbon emissions. The concept of corporate sustainability, which includes economic, environmental, and social considerations, has emerged as a key determinant of long-term success (Alofaysan et al., 2024). As global environmental issues become more serious each year, international bodies are calling on organizations to take concrete action and transition towards more sustainable business models. In response, various regulations and policy frameworks are being developed and implemented globally (Ambec et al., 2013; Azimi et al., 2023; Chang, 2016; Hwang, 2023). The United Nations, in collaboration with governments, business organizations, and civil society, is driving climate initiatives to accelerate action on climate change, underscoring the indispensable role of multi-stakeholder collaboration in addressing the climate crisis (United Nations, 2023).

At the 28th UN Climate Change Conference (COP28) in 2023, it was emphasized that global efforts must be focused on limiting the rise in global temperature to 1.5°C to prevent the

worst impacts of climate change. Currently, global temperatures have increased by about 1.1°C compared to the pre-industrial era and greenhouse gas emissions are still growing, so it is necessary to reduce emissions by 45% by 2030 and achieve net zero by 2050. In the ASEAN region, this challenge is increasingly complex because around 80% of energy needs still depend on fossil fuels, especially coal, which is a major contributor to energy sector emissions. Rapid economic growth, urbanization, and industrialization have caused greenhouse gas emissions to continue to increase, despite various commitments and policies to encourage renewable energy and emission reduction (Heiss & Johnson, 2016; Kaufmann & Kraay, 2024; Ghazali, 2018). This condition places the corporate sector as a key actor, not only as a contributor to emissions, but also as an agent of change through the implementation of innovations and sustainability initiatives that are integrated into business strategies.

In line with that, Corporate Sustainability Initiatives (CSI) are becoming increasingly relevant as a company's response to pressure from investors, regulators, and the public. While sustainability reporting and carbon reduction targets have become common practice, there is still a gap between real environmental disclosure and performance, with many companies emphasizing the declarative aspect more than substantial operational changes. Therefore, focusing on proactive and measurable initiatives, such as green innovation and resource efficiency, becomes important as they can contribute directly to improving a company's carbon performance. In the context of ASEAN, the difference in the quality of public regulation and the effectiveness of governments in each country affects the extent to which a company's sustainability initiatives can be effective. The diversity of sustainability policies and instruments shows that synergy between corporate strategies and strong public governance is a crucial factor in driving carbon emission reductions and achieving global climate targets in the ASEAN region.

Along with increasing demands from stakeholders including investors, consumers, and the government to run environmentally friendly businesses, companies are required to innovate in their operations. One of the strategic approaches that is starting to be widely adopted is green innovation, which is innovation that leads to the development of products, processes, and systems that have a minimal impact on the environment. Green innovation not only plays a role in creating cost efficiency, but also supports the achievement of carbon emission reduction targets (Huang et al., 2024). Green Innovation refers to the development of products, processes, or practices that aim to reduce environmental impact and improve sustainability (C. Li & Qi, 2024). This innovation has a significant impact on the company's carbon performance, especially in the context of reducing greenhouse gas emissions. Green Innovation helps companies identify and implement new technologies that are more efficient in resource and energy use. By adopting clean technologies, companies can reduce their carbon emissions. Innovation in the production process often includes the implementation of better energy efficiency practices. By reducing energy consumption, companies can lower the carbon emissions associated with energy use. Green Innovation can help companies manage waste more effectively, reduce emissions associated with waste disposal and increase resource savings. Companies that adopt Green Innovation are often better equipped to comply with strict environmental regulations and standards. This not only helps them avoid fines but also improves their reputation and competitiveness in the market. Green Innovation can improve the company's image in the eyes of consumers, investors, and other stakeholders. This positive

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reputation can have an impact on a company's performance and lead to an increase in demand for more sustainable products. Further, environmental regulations not only enforce compliance but also actively facilitate Green Innovation through mechanisms such as R&D subsidies and carbon taxes, which are known for their respective "incentive" and "compulsive" effects (Horbach et al., 2012). Companies tend to increase investment in patent research and development when the cost savings from regulatory compliance and the benefits of Green Innovation outweigh R&D spending, with the ultimate goal of maximizing long-term profits (Huang et al., 2024b).

In addition to Green Innovation, efforts to improve resource efficiency are also an important factor in supporting better carbon performance. Resource efficiency includes the optimal management of inputs such as energy, water, and raw materials so as to produce maximum output with the minimum possible emissions. This practice not only contributes to the reduction of a company's carbon footprint, but it can also increase productivity and profitability. However, the influence of green innovation and resource efficiency on a company's carbon performance is not always linear. Recent research confirms the importance of resource efficiency as a driver of sustainability. A study by (Saikia, 2024) found that companies that implement resource efficiency practices have lower carbon emission intensities and better environmental performance. The study shows that supply chain optimization, material reuse, and waste reduction are significantly associated with a reduction in greenhouse gas emissions. Furthermore, research by (Sarkodie & Adams, 2018) reveals that investments in technologies that improve energy efficiency, such as smart energy management systems, contribute greatly to the achievement of companies' climate targets in the industrial sector. They argue that resource efficiency is a strategy that is easier to implement and provides immediate financial benefits, making it a logical first step for companies, especially in developing countries.

External factors have a very important role in encouraging or hindering the achievement of a company's carbon performance, one of which is public governance. Public governance includes the quality of regulations, the effectiveness of public policies, and the government's capacity to create an environment conducive to the implementation of sustainable business practices. Strong public governance can encourage companies to be more compliant and proactive in managing carbon emissions through the implementation of strict environmental policies, such as carbon taxes, emissions trading systems, and incentives for the use of low-carbon technologies. Conversely, weak public governance can reduce the effectiveness of environmental policies and weaken the incentive for companies to invest in emissions reductions. In the context of global climate change, the role of public governance is crucial because the government functions as a key actor in designing regulations, overseeing compliance, and creating incentives that affect companies' behavior towards the environment.

In the ASEAN region, companies' carbon performance shows significant variation, which is largely influenced by differences in the level of regulatory quality and government effectiveness in each country. Some countries such as Singapore have implemented relatively strict environmental policies, including a carbon tax and an emissions trading system, thus encouraging companies to improve energy efficiency and adopt environmentally friendly technologies. However, other countries such as Indonesia and Vietnam still face challenges in implementing comprehensive carbon policies, given their high dependence on fossil-based

energy and limited supporting infrastructure. This inequality shows that uneven public governance in ASEAN can create institutional environmental differences that have a direct impact on companies' ability and willingness to improve their carbon performance.

The quality of public governance also plays a role as a contextual factor that influences the relationship between a company's sustainability initiatives and carbon performance. The two main dimensions of public governance that are often used in the literature are Regulatory Quality and Government Effectiveness. Regulatory Quality reflects the government's ability to formulate and enforce regulations that support ethical and sustainable business practices, while Government Effectiveness refers to the quality of public services, the competence of state apparatus, and the consistency of policy implementation. Clear and consistent regulations will make it easier for companies to integrate sustainability initiatives into their business strategies. On the other hand, the effectiveness of the government determines the extent to which the policy is actually implemented and supervised optimally, thus having a direct effect on the success of reducing the company's carbon emissions.

The differences in the level of regulatory quality and government effectiveness in ASEAN countries provide research opportunities to understand how institutional context affects the effectiveness of sustainability initiatives. In countries with strong public governance, companies tend to operate in an environment that supports green innovation and resource efficiency, resulting in better carbon performance. In contrast, in countries with weak public governance, companies often face structural and institutional barriers to implementing sustainability initiatives substantively. This condition confirms that the success of reducing carbon emissions depends not only on the company's internal commitments, but also on the institutional ecosystem that supports socially and economically sustainable business practices.

Although sustainability and carbon emissions issues have been widely discussed in the global literature, research on the impact of Corporate Sustainability Initiatives on corporate carbon performance in the ASEAN region is still relatively limited. Most previous studies were conducted in developed countries with a mature environmental regulatory framework, so the results could not necessarily be generalized to the context of ASEAN which has different economic and institutional characteristics. In addition, many previous studies have used declarative sustainability variables, such as CSR or sustainability reporting, which do not always reflect a real impact on emissions reductions. Therefore, this study is here to fill the literature gap by examining the influence of green innovation, resource efficiency, and public governance on corporate carbon performance in ASEAN. The results of this study are expected to make a theoretical and practical contribution in understanding how a combination of internal corporate initiatives and external institutional factors can drive the achievement of better and sustainable carbon performance in the ASEAN region.

The primary objective of this study is to analyze the impact of Corporate Sustainability Initiatives (green innovation and resource efficiency) and Public Governance (regulatory quality and government effectiveness) on the carbon performance of companies in key ASEAN countries. The research aims to determine which internal initiatives are most effective in this regional context and to what extent the quality of public governance influences corporate environmental outcomes. By achieving this objective, the study seeks to make significant theoretical contributions to the institutional and stakeholder theory literature by providing empirical evidence from a developing regional context.

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The contributions of this research are twofold. Theoretically, it enriches the sustainability and governance literature by offering a contextualized understanding of the drivers of carbon performance in ASEAN. It tests the applicability of theories developed in Western contexts within a different institutional setting. Practically, the findings offer valuable insights for two main audiences. For corporate managers, the results highlight the relative importance of resource efficiency over green innovation in the short term, guiding strategic investment decisions. For policymakers, the study underscores the critical role of government effectiveness not just the quality of laws on paper—in translating corporate intentions into actual carbon reductions. The benefits of this research are thus aimed at facilitating more effective strategies for achieving carbon reduction goals in the ASEAN region.

METHOD

The objects of this research included Resource Efficiency, Green Innovation, Public Governance, and Corporate Carbon Performance, with analysis units in the form of companies in ASEAN countries, namely Indonesia, Malaysia, Singapore, Thailand, and the Philippines engaged in the material, energy, and industrial sectors. This research uses company data sourced from Refinitiv Eikon for the 2023 period. The research population includes all public companies in the five ASEAN countries, while the sample was selected using purposive sampling techniques based on certain criteria, including companies listed on Refinitiv Eikon, publishing financial statements for 2023, and having data related to research variables such as environmental innovation, resource use, greenhouse gas emissions, regulatory quality, government effectiveness, leverage, and company size.

The research method used is a quantitative approach with the aim of examining the relationship and influence between the variables of Corporate Sustainability Initiatives and Public Governance on the company's carbon performance. The data used is secondary data obtained from the company's annual report and Refinitiv Eikon's database. Data collection techniques are carried out through field research with analysis of the content of company reports and literature research through the study of journals, books, and other supporting literature to strengthen the theoretical foundation of the research.

The research variables consist of dependent variables, independent variables, and control variables. The dependent variable in this study is the company's carbon performance as measured through total Scope 1 and 2 CO₂e emissions or the intensity of carbon emissions to revenue. Independent variables include Green Innovation, Resource Efficiency, Regulatory Quality, and Government Effectiveness, while control variables consist of firm size and leverage. All variables are operationalized in the form of ratios or indices in accordance with the indicators used by Refinitiv Eikon and the World Governance Indicators.

The data analysis technique used was multivariate dependency analysis using the Structural Equation Modeling method based on Partial Least Squares (SEM-PLS) using SmartPLS 4 software. The analysis was carried out through the evaluation of the structural model (inner model) which included tests of significance, path coefficients, and R-square values, as well as effect size testing to assess the strength of influence between variables. In addition, statistical testing was carried out with a t-test to test hypotheses regarding the direct influence of Green Innovation, Resource Efficiency, Regulatory Quality, and Government Effectiveness on the carbon performance of companies in ASEAN countries.

RESULT AND DISCUSSION

Data Aggregate SEM-PLS Analysis

The results of the SEM-PLS analysis provide treasures related to the relationship between Resource Efficiency, Green Innovations, Regulatory Quality, and Government Effectiveness with the carbon performance value of companies in 5 countries in Asean (Indonesia, Singapore, Malaysia, Philippines, and Thailand). Hypothesis testing in this study was carried out using path coefficient, t-value, and p-value values. To assess the significance and prediction in hypothesis testing, it can be seen from the path coefficient and t-value values (Hair, Tomas, et al., 2022).

Table 1 Hypothesis Testing

Path	Coefficin	T statistics	P values	Verdict
GI > CCI	0.015	0.484	0.629	Rejected
Government Effectiveness -> CCI	-0.227	1.976	0.048	Accepted
LEV -> CCI	-0.064	1.803	0.071	Rejected
RE -> CCI	0.533	17.447	0.000	Accepted
Regulatory Quality -> CCI	0.125	1.073	0.283	Rejected
SIZE -> CCI	0.278	7.34	0.000	Accepted

The results of the hypothesis test in table 6 are presented as follows:

1. The influence of GI on CCI in ASEAN companies showed a positive but not significant coefficient, shown by a *t-statistical value* of 0.484 and a *p-value* of 0.629 so that the hypothesis was rejected.
2. The influence of Government Effectiveness on CCI in ASEAN companies shows a negative but significant coefficient, shown by a *t-statistical value* of 1.976 and a *p-value* of 0.048 so that the hypothesis is declared accepted.
3. The effect of LEV on CCI on ASEAN companies showed a negative but not significant coefficient, shown by a *t-statistical value* of 1.803 and a *p-value* of 0.071 so that the hypothesis was rejected.
4. The effect of RE on CCI in ASEAN companies showed a positive and very significant coefficient, shown by a *t-statistical value* of 17,447 and a *p-value* of 0.000 so that the hypothesis was declared accepted.
5. The effect of Regulatory Quality on CCI on companies in ASEAN showed a positive but not significant coefficient, shown by a *t-statistical value* of 1.073 and a *p-value* of 0.283 so that the hypothesis was rejected.
6. The effect of SIZE on CCI on companies in ASEAN shows a positive and significant coefficient, shown by a *t-value* of 7,340 and a *p-value* of 0,000 so that the hypothesis is declared accepted.

Effect Size Analysis

In the inner test of the model, f-square testing is used to assess the strength of the influence of the predictor on endogenous variables. According to Hair et al. (2019), the f^2 value of 0.02 is categorized as small, 0.15 medium, and 0.35 large. These tests provide objective information about the contribution of each variable to the Company's Carbon Performance. The full value of each of the securities is presented in the table below.

Tabel 2. Size Effect (F-Square)

	f-square
GI > CCI	0.000
Government Effectiveness -> CCI	0.007
LEV -> CCI	0.005
RE -> CCI	0.427
Regulatory Quality -> CCI	0.002
SIZE -> CCI	0.080

The results of the f-square test on companies in ASEAN countries show that most variables have a very small contribution to the change in Corporate Carbon Intensity (CCI), except for Renewable Energy (RE) which has a big influence. Based on the guidelines of Hair et al. (2019), the value of f^2 RE \rightarrow CCI of 0.427 indicates the strength of the effect and is the only truly substantively significant predictor in increasing or decreasing the company's carbon intensity. Meanwhile, the SIZE variable showed a small influence with a value of 0.080, still below the threshold of the medium effect category (0.15). Other variables, such as Government Environment (0.007), Leverage (0.005), Regulatory Quality (0.002), and Green Innovation (0.000) contributed very minimally, suggesting that these factors do not have meaningful predictive power in explaining CCI variation in the ASEAN region. These findings underscore the importance of using renewable energy as a key factor in reducing a company's carbon footprint compared to other financial and institutional contexts.

The structural model is evaluated through the determination coefficient (R^2) as well as the predictive value Q^2 . According to Hair et al. (2019), an R^2 of 0.50 indicates a model with a moderate level of explanation. A value of $Q^2 > 0$ indicates that the model has predictive relevance, while a $Q^2 \leq 0$ indicates the absence of predictive ability. The calculation results for all variables are shown in the table below.

Table 3 Coefficient of Determination (R Square)

	R-square	R-square adjusted
CCI	0.491	0.486

The results of the structural model evaluation showed that the R^2 value of 0.491 and the adjusted R^2 of 0.486 indicated that the model had a moderate ability to explain the variation in Corporate Carbon Intensity (CCI) according to the criteria of Hair et al. (2019). This means that about 49% of CCI changes in companies in ASEAN countries can be explained by predictive variables in the model, while the rest is influenced by other factors outside the study. Since the R^2 value is close to 0.50, the model is considered quite robust in the context of socio-empirical research. In addition, a positive Q^2 value confirms that the model has predictive relevance, so that it is able to provide meaningful predictions of the behavior of endogenous variables.

Tabel 4 Predictive Relevance (Q2)

	SSO	SSE	Q² (=1-SSE/SSO)
CCI	638	337.797	0.471
GI	638	638	0
Government Enviroment	638	638	0

LEV	638	638	0
RE	638	638	0
Regulatory Quality	638	638	0
SIZE	638	638	0

The results of the predictive relevance (Q^2) test showed that only the endogenous variable CCI had predictive ability, indicated by a Q^2 value of 0.471, which indicates strong predictive relevance because it is well above zero. Thus, the model is proven to be able to predict the behavior of Corporate Carbon Intensity, but does not measure predictability on independent variables because it is a predictor, not a predicted variable.

The criteria for hypothesis acceptance were based on a p-value of < 0.05 and a t-statistic ≥ 1.96 (Hair et al., 2019). This test was conducted to assess the significance of the direct relationship and interaction to the Company's Carbon Performance. Complete results regarding the path coefficient and its significance are shown in the table below.

This subchapter discusses the results of research based on empirical tests that have been carried out by linking them to the theory used and the findings of previous research. The discussion was directed to provide a comprehensive understanding of the influence of Corporate Sustainability Initiatives represented by Green Innovation and Resource Efficiency, as well as Public Governance factors which include Regulatory Quality and Government Effectiveness on Corporate Carbon Performance in ASEAN countries.

The Influence of Green Innovation on the Company's Carbon Performance

The results of the SEM-PLS test showed that Green Innovation did not have a significant effect on the company's carbon performance in the ASEAN region even though it had a positive coefficient direction ($\beta = 0.015$; p-value = 0.629). These results indicate that the adoption of green innovations by companies has not shown an actual impact on reducing carbon emissions in the context of ASEAN.

In the framework of Institutional Theory, this indicates that coercive, normative, or cognitive isomorphism pressures related to green innovation are still weak in the ASEAN region. The company adopted these innovations to gain formal legitimacy to look "green" in the eyes of the public and regulators, but has not yet reached the stage of operational transformation that actually results in a reduction in carbon emissions. Within the framework of Institutional Theory, this phenomenon shows that green innovation in many companies tends to be symbolic and has not been internalized as a core business process. When regulatory, normative, and cognitive pressures are not yet strong, companies tend to adopt green innovation as a matter of formal legitimacy, rather than as a substantial operational transformation. The results of this study are different from the findings of Ju & Jin (2024) which proves that green innovation has a significant effect on carbon performance in Chinese manufacturing companies. This difference is caused by differences in technological maturity, funding capacity, and the strength of environmental law enforcement. The Li et al. (2024) study also confirms that green innovation policy reforms in China significantly improve the company's carbon performance, a condition that has not yet been evenly distributed in ASEAN countries. The research of Orazalin et al. (2024) even shows that climate initiatives based on internal management and governance processes are much more influential than the adoption of

technological innovations alone, which supports the results of this study that innovations without systemic transformation have not provided real environmental outcomes. These results are in line with research that highlights the symbolic adoption of sustainability in developing countries, such as the Li & Wang (2021) study which found that spending on green innovation at the outset is often just a cost with no direct impact on the environment, especially when law enforcement is weak.

The connection with stakeholder theory implies that the pressure from stakeholders (investors, consumers, or NGOs) demanding real carbon performance (not just reporting) is not strong enough. Despite the increase in ESG awareness in ASEAN, market and public pressures may still be focused on disclosure or public commitments, and have not been intensively demanding measurable emission reduction metrics from Green Innovation. For companies, the cost of undertaking transformative green innovations (e.g., replacing low-carbon production machines) far outweighs the short-term benefits of simply appeasing stakeholders with declarative initiatives. This insignificance shows that Green Innovation has not succeeded in becoming a strategy to effectively manage the expectations and demands of stakeholders related to emission reduction.

The Effect of Resource Efficiency on Corporate Carbon Performance

Resource Efficiency was proven to have a positive and significant effect on the company's carbon performance with the highest coefficient in the model ($\beta = 0.533$; $p\text{-value} = 0.000$). These findings show that operation-based internal efficiency is a key determinant of carbon emission reduction. These results are in line with Corporate Culture Theory which states that Resource Efficiency (waste reduction, energy optimization, material reuse) is an initiative that is highly dependent on the company's internal culture. Energy efficiency, raw material use, and waste management capabilities are strategic resources that directly affect environmental performance. These significant findings confirm that companies with a disciplined organizational culture, emphasis on cost efficiency, and strong internal accountability will more easily integrate Resource Efficiency principles into their day-to-day operations. A culture that supports the efficient use of resources encourages employees at all levels to minimize the use of inputs (energy, water, materials) which ultimately directly and significantly reduces the intensity of carbon emissions.

These findings also reinforce the results of Haque (2022) research which found that resource-efficiency-based sustainability initiatives contribute directly to reducing emission intensity. Research by Issa & In'airat (2024) also proves that real initiatives such as energy efficiency and supply chain optimization have a significant impact on reducing carbon emissions. Unlike green innovation, which is long-term and based on technology investment, resource efficiency produces a direct impact because it is directly related to energy and fossil fuel consumption.

Although driven by internal culture, these results also have a positive impact on Stakeholder Theory. Resource Efficiency is a sustainability initiative that provides a win-win: reducing internal operational costs and simultaneously reducing emissions (Carbon Performance) that are demanded by environmental stakeholders and governments. Thus, this initiative not only meets the interests of shareholders (profitability) but also provides a tangible response to the expectations of external stakeholders (environmental and social).

The Influence of Regulatory Quality on Corporate Carbon Performance

Regulatory Quality did not show a significant effect on the company's carbon performance ($\beta = 0.125$; p -value = 0.283). This indicates that the quality of policy formulation is not sufficient to encourage changes in corporate behavior towards emissions management. From the perspective of Institutional Theory, regulations will not be effective if they are not accompanied by law enforcement, adequate sanctions, and coordination between public institutions. This condition shows that regulations in ASEAN are still declarative and administrative. These findings contradict Delmas & Toffel (2008) who assert that the quality of public institutions encourages companies to adopt more aggressive environmental strategies. Handoyo & Anas (2024) found that regulatory quality has an influence on environmental performance, but the effect varies greatly between ASEAN countries, depending on the strength of local supervision.

These results underscore the important role of the government as a key stakeholder. When Regulatory Quality is insignificant, it shows that the structural power of governments (through regulation) in forcing changes in environmental behavior is weak. Although the government has the highest legitimacy, the lack of influence from Regulatory Quality shows that the power of government stakeholders is not translated effectively on the ground. Companies do not consider the quality of these regulations to be a serious threat to their legitimacy or operations, so the demands of these stakeholders can be ignored or responded to in a minimalist manner.

The Effect of Government Effectiveness on Corporate Carbon Performance

Government Effectiveness has a negative and significant effect on carbon performance ($\beta = -0.227$; p -value = 0.048). The direction of the negative relationship suggests that high government effectiveness correlates with the low intensity of corporate carbon emissions. In Stakeholder Theory, the government plays the role of the main actor that puts pressure on legitimacy against companies. Effective governments are able to oversee environmental policies, enforce regulatory compliance, and encourage transparency in ESG reporting. Government Effectiveness measures the quality of public services, bureaucratic competence, and policy implementation in the field. Effective government is seen as the most powerful key stakeholder. These results are in line with Khatib & Al Amosh (2023) and Handoyo (2024) who found that the effectiveness of governments in developing countries is a major determinant of a company's environmental performance. The effectiveness of the government strengthens the legitimacy and expectations of all stakeholders. When governments act effectively, the pressure on companies to improve Carbon Performance increases, forcing companies to seriously invest in reducing emissions in order to maintain legitimacy and avoid conflicts with key stakeholders (government and society).

The Influence of Firm Size on Corporate Carbon Performance

Firm Size has a positive and significant effect on the company's carbon performance ($\beta = 0.278$; p -value = 0.000). Large companies have greater resources, technology, and access to funding to invest in green projects. The results show that firm size has a positive effect on a company's carbon performance, meaning that companies with larger sizes tend to have lower The Impact of Corporate Sustainability Initiatives and Public Governance on Corporate Carbon Performance: A Case Study of Companies in ASEAN Countries

carbon emission intensity or have better ability to manage emissions. These findings are consistent with the argument in Stakeholder Theory, which states that large companies face stronger external pressure from stakeholders such as regulators, institutional investors, the media, and the wider community. Large companies have higher public visibility and are therefore more motivated to adopt substantive sustainability practices in order to maintain legitimacy.

From the perspective of Institutional Theory, large companies are also more responsive to coercive and normative pressures, such as emission regulations, ESG reporting standards, and industry expectations that require companies to demonstrate good environmental performance. These pressures have led large companies to invest more in green innovations, energy management systems, resource-efficiency technologies, and better sustainability reporting than smaller companies.

These findings are in line with previous research by Haque & Ntim (2022), Issa & In'airat (2024), and Orazalin et al. (2024), which showed that large companies are more likely to have more mature emissions reduction programs. In addition, Handoyo, Yudianto & Dahlan (2024) also found that the size of companies in ASEAN has a significant effect on the company's ability to reduce emissions due to stronger financial and technical capacity. Thus, firm size remains an important factor that explains the variation in companies' ability to achieve better carbon performance, especially in the energy-intensive industrial sector in the ASEAN region.

The Effect of Leverage on a Company's Carbon Performance

Leverage has no significant effect on the company's carbon performance ($\beta = -0.064$; p -value = 0.071). This shows that creditor pressure in environmental risk management is still relatively weak. In many cases, creditors have not considered carbon risk as a key factor in financing decisions. This reflects the weak integration of ESG in financing decisions in ASEAN countries. The results show that leverage has a negative effect on a company's carbon performance, meaning that companies with high levels of leverage tend to have a greater intensity of carbon emissions. Companies with large debt burdens usually face financial pressure, so management's focus is more directed towards achieving short-term profitability targets than investing in environmentally friendly technologies that require high costs.

From the perspective of Stakeholder Theory, companies with high leverage ratios usually have great pressure from creditors who are more demanding of financial stability and debt repayment capabilities than long-term investments that do not generate direct cash flow. Because environmental initiatives such as green innovation, energy efficiency, and low-carbon technologies require significant costs, the management of companies with high leverage will tend to delay or reduce investment in sustainability programs. As a result, the company's focus shifts to fulfilling the demands of certain stakeholders (creditors), and ignoring the interests of other stakeholders such as the public, government, and ESG investors. Thus, leverage can weaken a company's commitment to environmental responsibility because short-term financial priorities are more dominant.

From the perspective of Institutional Theory, high-leverage firms have a lower ability to respond to coercive and normative pressures related to the environment. Coercive pressures in the form of carbon emission regulations, ESG reporting standards, and emission reduction obligations often require significant investment and structural change. Companies that are

under financial pressure tend to be unable to meet these demands substantively and prefer a symbolic compliance approach, such as focusing only on reporting without a real increase in carbon performance. Normative pressures, such as public expectations and industry standards regarding sustainability practices, are also more difficult for companies with high debt burdens to meet due to limited financial and operational resources. These findings are consistent with the research of Al-Fakir Al Rabab'a et al. (2023), which found that companies with high leverage have worse carbon performance due to limited financial flexibility. These findings are also confirmed by research by Sarkodie & Adams (2018) which shows that companies with high capital structures tend to reduce environmental investment due to priority on repayment of obligations.

In the context of ASEAN, these findings are particularly relevant as many companies in the energy, materials, and industrials sectors still rely on large amounts of debt-based funding. This condition makes companies reluctant to take additional risks through low-carbon technology investments that require high capital. Thus, leverage emerges as a factor that significantly weakens a company's ability to reduce carbon emissions.

CONCLUSION

This study aims to analyze the influence of Corporate Sustainability Initiatives which include Green Innovation and Resource Efficiency as well as external factors of the company in the form of Public Governance, represented by Regulatory Quality and Government Effectiveness, on the company's carbon performance in resource-intensive sectors in ASEAN countries (Indonesia, Malaysia, Singapore, Thailand, and the Philippines). The results of the SEM-PLS analysis show that Green Innovation and Resource Efficiency have a positive effect on carbon performance, which indicates that the application of environmentally friendly innovations and the efficiency of using energy, water, and materials can reduce the intensity of corporate carbon emissions, in line with Institutional Theory and Stakeholder Theory. In addition, the quality of good public governance has been shown to drive improved carbon performance through effective environmental regulation and consistent policy enforcement. The control variable showed that firm size had a positive effect because large companies were more able to invest in green technology, while leverage had a negative effect because limited financial flexibility hindered environmental investment. Thus, these findings confirm that the improvement in corporate carbon performance in the ASEAN region is the result of synergy between the company's internal initiatives and quality public governance support.

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