

Article

Do Carbon Exchanges Make a Difference to Carbon Disclosure and Performance? Evidence from Indonesia

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Abstract

The presence of the Indonesia Carbon Exchange (ICE) puts pressure on management to carry out its active role in reducing the potential of climate change through business strategies such as disclosure and improving carbon performance. This study seeks to prove the significant difference in carbon disclosure and performance after the launch of the ICE, as well as to review the profound differences in the increase in carbon disclosure and performance in the high and low-polluting sectors in the population of companies listed on the Indonesia Stock Exchange for the 2022 and 2024 periods. The two research models used in formulating the results are the Wilcoxon test and the Difference-in-Differences model. The results of this study indicate a significant difference in carbon disclosure and performance after the launch of ICE, which illustrates the changing dynamics of environmental regulations encouraging companies to improve transparency and corporate carbon performance in an effort to maintain their legitimacy. This study shows that there was no significant difference in the comprehensiveness of carbon disclosure or the improvement in carbon performance between high- and low-polluting sectors after the launch of ICE.

Keywords: carbon disclosure; carbon performance; carbon accounting

1. Introduction

Climate issues are a topic that is often discussed and also a public consideration today (Downar et al., 2021; Putra & Lindrianasari, 2024). This is inseparable from the increasingly massive disasters experienced by the community which is a signal that the current climate conditions are not good, such as droughts, floods, landslides, and sea level rise, to the increase in the earth's surface temperature which has reached 1.36 degrees Celsius above the pre-industrial average temperature (Flammer et al., 2021; Siddique et al., 2021). If the current environmental problems are not immediately and appropriately addressed by all levels of society, it will cause an even greater climate threat. In its report, IPCC (2018) explained that if the earth's surface temperature rises to a point of 2 degrees Celsius above the pre-industrial average temperature, it will bring potential climate disasters that could disrupt life on earth such as the potential for sea level rise, the extinction of several species of living things, the spread of invasive species (pests and diseases), and various other climate risks. The magnitude of the threat from climate change has fostered concern and efforts from policy makers in dealing with the growing potential for climate change

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(Siddique et al., 2021), namely by reducing the amount of emissions (also known as carbon emissions) which is the main factor in this environmental phenomenon (Liu et al., 2023).

One of the efforts of policy makers in various parts of the world can be seen from the international commitments or agreements, namely the Kyoto Protocol formulated by the United Nations Framework on Climate Change Conference (UNFCCC) (Ratmono et al., 2021; Zhao et al., 2017). Developed and developing countries have ratified the Kyoto Protocol to provide standards or guidelines for companies and other organizations in efforts to reduce greenhouse gas (GHG) emissions which are the main factors in climate change (Giannarakis et al., 2017b; Lu et al., 2021). In this international agreement, there is one market mechanism that can accommodate countries that ratify this agreement by limiting or reducing the amount of GHG emissions released, and this mechanism is referred to as carbon trading (R. He et al., 2022). Carbon trading is a market-based approach that allows companies and countries to trade carbon permits or credits (Tiwari, 2022). One of the ways that governments or related agencies regulate and control emissions in this carbon trading mechanism is through a cap-and-trade system, where emission limits (caps) are set for all industries (Bohm, 2000; Hepburn, 2007; Uddin & Hortedahl, 2013). Companies can sell carbon incentives when the emissions they produce fall below a set threshold (cap) and buy them when the emissions they produce exceed the set limit (Clarkson et al., 2015; Reyes & Gilbertson, 2012). Another system that can be applied in carbon trading is carbon offset, where offsets are carbon credits generated through corporate projects in reducing or absorbing carbon emissions such as reforestation and the use of renewable energy (Valentika et al., 2024).

Quoting from data published by the Global Carbon Project (2023), Indonesia is the eighth largest emitter-producing country in the world. This encourages governments to address the world's climate problems through the implementation and issuance of legal instruments that oversee environmental protection. The Indonesian government has shown its real action by participating in ratifying the Kyoto Protocol by issuing Law No. 17 of 2004 concerning the Ratification of the Kyoto Protocol to the United Nations Framework Convention on Climate Change (Houten & Wedari, 2023). Through Presidential Regulation No. 98 of 2021, the government seeks to regulate the carbon trading system and develop a sustainable green economy (Lestari et al., 2024).

The Indonesia Carbon Exchange was officially launched on 26 September 2023 with the aim of facilitating a carbon trading mechanism between entities. This carbon trading mechanism is an instrument used by the Indonesian government to fulfill the Nationally Determined Contribution (NDC) (Lestari et al., 2024), which is to minimize greenhouse gas (GHG) emissions by 26% and with international assistance of 41% by 2030, and then achieve the net zero emission target by 2060.

The development of the Indonesia Carbon Exchange marks a significant shift in Indonesia's climate governance approach from predominantly command-and-control regulations toward market-based mechanisms. Established under Presidential Regulation No. 98 of 2021 and operationalized through the official launch of IDXCarbon, the Carbon Exchange functions as an institutional platform that enables the trading of carbon units among regulated and voluntary participants. By assigning economic value to carbon emissions and emission reductions, the exchange transforms carbon performance from a purely environmental concern into a measurable economic outcome, thereby strengthening corporate incentives to manage and reduce greenhouse gas emissions (Tsiptsia et al., 2022).

Participation in the carbon trading system is inherently linked to information transparency and accountability (Wu et al., 2024). Firms engaging in carbon trading are required to measure, report, and verify their greenhouse gas emissions in accordance with nationally recognized standards, which are aligned with broader sustainability reporting obligations

(Shideler & Hetzel, 2021). As a result, carbon disclosure becomes a structural prerequisite rather than a purely voluntary practice, serving as a key mechanism that enables market participation, regulatory monitoring, and stakeholder evaluation. This institutional setting positions carbon disclosure as an integral component connecting carbon exchange participation with firms' actual carbon performance.

Moreover, the Indonesian carbon market framework incorporates enforcement mechanisms that, although implemented gradually, reinforce corporate compliance. Regulatory oversight by environmental and financial authorities allows for administrative sanctions, restrictions on market participation, and enhanced supervision in cases of non-compliance or inadequate disclosure. These enforcement features play a critical role in ensuring that carbon disclosure and carbon performance are not merely symbolic responses, but reflect substantive emission management efforts (Bae Choi et al., 2013; Hrasky, 2012). Consequently, the combination of market-based incentives, disclosure requirements, and enforcement mechanisms creates a distinctive institutional environment in which the interrelationship between carbon exchange participation, carbon disclosure, and carbon performance can be meaningfully examined.

The existence of carbon exchanges and various legal instruments related to the environment shows the increasing expectations of the public, especially the government, for companies to participate in building climate-friendly businesses. Y. He et al. (2016) stated that government initiation through environmental policies shows that there are structural reforms in the business environment so as to encourage business people to implement proactive carbon policies. Companies are required to play an active role in mitigating climate change and controlling GHG emissions that are essential for sustainability (Galán-Valdivieso et al., 2019; Luo, 2019; Nyahuna et al., 2023). If an organization is unable to meet the demands and expectations of the community, it can make the company lose its legitimacy (de Grosbois & Fennell, 2022). One of the ways that companies maintain legitimacy behind the increasing pressure on management in a proactive carbon policy is to conduct carbon disclosure (Dharma et al., 2024; Siddique et al., 2021).

Carbon disclosure is a collection of quantitative and qualitative information related to a company's carbon emissions, including historical records and future carbon projections (Dharma et al., 2024). Carbon disclosures containing information on the climate risks incurred by companies can improve corporate governance in terms of risk mitigation, ultimately making a positive contribution to the long-term value of the company (Flammer et al., 2021). The comprehensiveness of carbon disclosure demonstrates the company's seriousness in meeting the expectations and demands of the community and the government in building a transparent business, regulatory compliance, and commitment to sustainability (Kurnia et al., 2020; Liu et al., 2023). In terms of legitimacy, Jiang et al. (2023) state that the disclosure of environmental activities such as carbon disclosure can maintain, recover, and gain recognition or legitimacy from society and the government.

The launch of a carbon exchange makes transparency on carbon information increasingly important in building and increasing the legitimacy of companies. Thus, with the launch of the Indonesia Carbon Exchange, which is an emissions trading scheme as well as a legal instrument related to the environment, it should encourage management motivation to increase the disclosure of corporate carbon information. The regulatory pressures of this carbon trading scheme suggest that the legitimacy of a company increasingly depends on their compliance with a legal framework designed to address environmental degradation and promote more transparent business in the company's operations (M. Li et al., 2024). Cowan and Deegan (2011) who analyzed the response to corporate emissions disclosure with the National Pollutant Inventory (NPI) and NGER Act 2007 regulations in Australia from the perspective of legitimacy theory, showed that there was a significant increase in

annual report emissions disclosures which showed that environmental regulations can encourage changes in corporate environmental disclosure practices for the better. However, Luo (2019) stated that carbon disclosure will not necessarily foster the legitimacy of the company, in a condition such as when the amount of carbon emissions disclosed by the company is so high that it can actually threaten the legitimacy of the company (Nyahuna et al., 2023). Therefore, in addition to increasing the comprehensiveness of carbon information disclosure, it is also necessary to reduce the amount of emissions disclosed by improving carbon performance (Qian & Schaltegger, 2017).

Carbon performance is a managerial success in taking steps or processes in reducing emissions in the air as stated in the quantitative information (Velte et al., 2020). Houten and Wedari (2023) explain that the lower the carbon emissions produced are, the better the company's carbon performance is. Good carbon performance indicates that the company's efforts in dealing with the environmental impact they generate from their operational activities (Haque & Ntim, 2020) are acceptable to the public who in recent periods have shown increased concern over environmental conditions. Companies that succeed in meeting public expectations in reducing the negative impact of their operations in the form of emissions that are the source of current climate problems can strengthen their existence in the surrounding environment (Giannarakis et al., 2017a; Khanifah et al., 2020). Thus, the suitability of corporate activities in the social construct and the demand for more attention to climate problems can build the company's legitimacy (Hardiyansah et al., 2021; Y. He et al., 2016).

The launch of regulations and environmental mechanisms such as carbon exchanges should be responded to by companies to improve their carbon performance, so that the existence of this emissions trading scheme can be used by companies to increase their competitiveness such as selling their carbon credits on the carbon exchange and obtaining economic resources that support the company's activities (Haque & Ntim, 2020). Qian (2013) mentioned that the reason that the companies with the highest pollution levels registered under the Australian NGER Act during 2009 and 2010 in improving carbon performance was not only due to regulatory compliance, but also to maintain legitimacy in the eyes of the public and stakeholders. Klaus et al. (2022) also revealed that the increasing public attention to corporate ESG issues is driving the companies' environmental performance, especially in reducing carbon emissions. This shows that there is pressure and demands from various parties such as investors and also the government through its regulations to encourage environmental performance, especially on the better carbon performance of a company. However, the results of research from Shevchenko (2020) actually prove that the presence of legal instruments, namely penalties given to a company that violates environmental regulations, does not necessarily encourage them to improve their performance in environmental aspects.

The existence of a research gap in the form of differences in research results that discuss how environmental regulations or mechanisms encourage companies to improve carbon disclosure and performance motivates us to analyze carbon disclosure and performance before and after the launch of the Carbon Exchange in Indonesia. Previous research that often looks at the direct impact of a company's carbon disclosure and performance on the financial aspects of companies in Indonesia (Houten & Wedari, 2023; Kurnia et al., 2020; Lestari et al., 2024; Utomo et al., 2020) or vice versa (Dharma et al., 2024; Ika et al., 2024; Wahyuningrum et al., 2024) also motivated this study to provide initial empirical evidence on how public companies in Indonesia responded to the initial phase of the launch of the Indonesia Carbon Exchange (ICE). While the relatively short observation period (one year before and after the launch) may not fully reflect the policy's impact, this analysis is

expected to illustrate companies' initial tendencies to adapt to the newly introduced carbon trading mechanism.

This study also conducted an in-depth analysis to prove that companies included in the high-polluting sector have better carbon disclosure and performance after the existence of a carbon trading mechanism through Indonesian Carbon Foam compared to companies that fall into the low-polluting sector category. This is based on a review of previous research such as [Peng et al. \(2015\)](#) which reported that Chinese companies that are in high-emission industries tend to be better at disclosing carbon emissions in terms of quality and quantity. [Liu et al. \(2023\)](#) It also proves a similar result where companies with higher carbon emissions have a tendency to disclose more information as part of the process of communicating and maintaining their legitimacy in accordance with institutional pressures. Disclosures made by companies in the industrial intensive sector are not only symbolic, but also substantial in the company's environmental performance ([Bae Choi et al., 2013](#); [Hrasky, 2012](#)).

Reviews from previous research by [Shi et al. \(2024\)](#) of emissions trading schemes in China have even succeeded in encouraging a reduction in the environmental intensity of high carbon companies by about 22.4%. This shows that the emergence of emission trading schemes has a different effect on the heavy pollutant industry than on light pollutants, where the pressure exerted by stakeholders through carbon trading schemes will be greater on industrial sectors that produce large emissions than sectors that are classified as smaller in emission production ([Herold, 2018](#); [Patten, 2002](#)). Thus, the company's response in disclosing and also improving its environmental performance will also differ in each industry ([J. Wang & Zhang, 2019](#)). These studies show that the impact of environmental policies will result in different responses between high and low pollution sectors/groups. However, not all studies directly compare high-polluting and low-polluting in the context of ETS or carbon exchanges in developing countries such as Indonesia. This is what drives a more in-depth analysis of carbon disclosure and performance in both sectors.

This approach allows for a more in-depth analysis of the legitimacy dynamics between sectors, taking into account that high-polluting sectors face greater social and regulatory pressures than low-polluting sectors. Furthermore, the study contributes to the environmental accounting literature by extending the application of legitimacy theory to the context of emerging markets, where regulatory structures and green cultures are still in the early stages of formation. Empirically, this study provides preliminary evidence of how companies in Indonesia respond to newly formed carbon market mechanisms, as well as how these legitimacy pressures interact differently among industrial sectors. Thus, these findings not only provide a basis for future comparative studies of the effectiveness of environmental policies in developing countries, but also enrich understanding of the evolution of corporate legitimacy behavior in a growing institutional context.

While the observation window focuses on one year before and after the launch of the Indonesia Carbon Exchange, this design intentionally captures the immediate corporate response following the introduction of a major environmental market reform. Similar short-window comparative designs have been adopted in prior environmental and regulatory studies to document early behavioral adjustments before long-term policy impacts fully materialize. Likewise, [Cowan and Deegan \(2011\)](#) investigated corporate disclosure reactions to Australia's first national emission reporting scheme using a short pre/post observation period to examine early adaptive behavior. Their study demonstrated that limited-period observations can still provide valid empirical insight into regulatory adaptation dynamics, particularly during the initial phase of policy enforcement. Therefore, this study's methodological choice emphasizes the short-term legitimacy adaptation phase rather than the

mature implementation effects, positioning it as an early empirical contribution within Indonesia's evolving carbon market landscape.

In addition, the results of this study are expected to provide a new perspective from the perspective of legitimacy theory, where the launch of the Indonesia Carbon Exchange is seen as a form of institutional pressure that encourages companies to adjust their sustainability practices to maintain social and regulatory legitimacy. In this context, increased carbon disclosure and performance not only reflect compliance with new environmental policies, but also become a symbolic as well as a substantive strategy for companies to demonstrate their commitment to national decarbonization goals and growing public expectations. With this research, it is hoped that policy makers can assess the company's response to the Carbon Exchange policy and assess the government's success in its efforts to target net zero emissions. For company management, this research is an illustration for companies of how efforts in carbon disclosure and performance can be a means to achieve legitimacy.

2. Literature Review and Study Hypothesis

2.1. Literature Review

2.1.1. Legitimacy Theory

Legitimacy is the perception or assumption of the conformity of an entity's actions with the system of norms, values, beliefs, and meanings formed or constructed by social constructs (de Grosbois & Fennell, 2022). In the business context, Ganda (2018) said that the theory of legitimacy highlights that it is important for companies to be responsible in every action in overcoming problems faced by society in addition to considering their own interests. When the company's values are contrary to the social values of the community, it fosters a legitimacy gap that threatens the sustainability of the company (Bae Choi et al., 2013; de Grosbois & Fennell, 2022; Solikhah et al., 2020). To respond to this, companies need to take steps to reduce the legitimacy gap that occurs to maintain positive public perception and also public acceptance of the company (Bui et al., 2020; Kurnia et al., 2020). One of the efforts that companies can make in improving their image and maintaining, restoring, and gaining the recognition or legitimacy of the company in the minds of the public is through environmental activities (Putra & Lindrianasari, 2024; Rohani et al., 2021), such as carbon disclosure (Siddique et al., 2021).

Legitimacy theory states that public pressure from various stakeholders in the social, political, and regulatory environments makes companies disclose their information through a disclosure process contained in annual reports (Peters & Romi, 2013). Carbon disclosure is a tool for companies in filling the legitimacy gap arising from changes in social constructs and environmental regulations (Qian & Schaltegger, 2017; Solikhah et al., 2020). In addition to disclosure, the company's performance in controlling emissions is also a consideration for management in realizing legitimacy in the surrounding environment. Siddique et al. (2021) revealed that carbon performance shows the company's efforts and commitment to maintaining legitimacy and to meeting the expectations of various stakeholders, especially in realizing the global goal of reducing carbon emissions.

2.1.2. Carbon Disclosure

Carbon disclosure is a collection of quantitative and qualitative information about a company's carbon emissions, including historical records and future carbon projections (Lestari et al., 2024; Putra & Lindrianasari, 2024). Although this disclosure is still voluntary, the initiation of this reporting actually shows that the company has a positive initiative in building an accountable and environmentally conscious business (Kılıç & Kuzey, 2018). Carbon disclosure is considered to be able to describe a company's ability and readiness to deal with climate change issues (Liu et al., 2023). Qian and Schaltegger (2017) stated

that comprehensive carbon disclosure can help increase management's visibility of the company's efforts to reduce the environmental impact caused, namely carbon emissions. Luo (2019) explains that the reported information reflects management's commitment to carbon mitigation and allows stakeholders to assess the effects of carbon emissions on the environmental conditions around the company. In the context of legitimacy, companies conduct environmental information disclosure in response to pressure from stakeholders to obtain and maintain their operating permits in community environments (Liu et al., 2023). Companies that proactively engage in carbon disclosure aim not only to comply with regulations but also to leverage transparent practices to foster a positive corporate image, in line with the expectations of different walks of life (Liu et al., 2023).

2.1.3. Carbon Performance

Carbon performance is the success of management in managing carbon emissions generated in their activities (Lestari et al., 2024; Velte et al., 2020). Carbon performance aimed at reducing carbon emissions is an important aspect of corporate social responsibility (Ganda, 2022). By reducing carbon emissions arising from its activities, it can prevent companies from negative perceptions of pollution and regulatory sanctions that threaten the company's image. Thus, companies that are able to effectively manage their carbon emissions not only meet stakeholder expectations but also strengthen their competitiveness in an increasingly sustainability-oriented business environment (Siddique et al., 2021). The company's success in reducing carbon emissions shows that they are able to meet people's expectations of environmental concern, thus strengthening their legitimacy in the eyes of the public (Haque & Ntim, 2020). This is also confirmed by Luo (2019) who also emphasizes that companies that actively improve carbon performance will face the risk of smaller legitimacy gaps when faced with various environmental regulations that make oversight transparent in carbon management. Houten and Wedari (2023) explained that carbon performance can be seen in terms of carbon intensity, where the lower the carbon emissions produced per sale indicates that the company's carbon performance is better.

2.2. Study Hypothesis

Stakeholder concerns about environmental issues, such as global warming, prompt companies to disclose carbon emission information (Kurnia et al., 2020). The need for carbon information is becoming bigger with the launch of carbon trading schemes. From the management side, this information can be a strategic tool in making decisions to review the company's operational risks—activities that produce large emissions (Downar et al., 2021)—as it can negatively affect the company's cap or limit on the amount of emissions as applicable to emissions trading schemes (Brouwers et al., 2016; Busch et al., 2022). This suggests that the regulatory pressures created by emissions trading schemes require companies to disclose comprehensive data on their carbon performance as a form of regulatory compliance (Heindl & Löschel, 2012). From the external stakeholder side, the launch of an emissions trading scheme can lead to an increase in stakeholder expectations, encouraging companies to provide an actual picture of their emissions (Houten & Wedari, 2023).

In the context of legitimacy, organizations disclose environmental information in response to social, environmental, political, and economic pressures to obtain, maintain, or improve their permits to operate in the community environment (Cho & Patten, 2007; Liu et al., 2023). When an industry has great potential to generate emissions, it encourages companies to disclose information describing their efforts in addressing and implementing good environmental performance, as evidence that the company's activities have complied with applicable norms (Damas et al., 2021; O'Donovan, 2002). Jiang et al. (2023) also mention that carbon disclosure can maintain, recover, and gain recognition or legitimacy

from society and governments. [Hrasky \(2012\)](#), who examined the disclosure strategies of Australia's Top 50 ASX companies in 2005 and 2008, found that there is an increase in the disclosure of GHG emissions information in line with the increasing need for legitimacy in the face of increasing public awareness of climate change. The results of the previous research can be implied in the context of the Indonesia Carbon Exchange, namely the comprehensiveness of disclosure in the form of exposure to carbon information as the appropriate response for companies to face public pressure from stakeholder groups in the social, political, and regulatory environments ([Datt et al., 2019](#); [Peters & Romi, 2013](#)). Thus, there will be significant differences in the aspect of carbon disclosure after the launch of the emissions trading scheme contained in the Indonesia Carbon Exchange.

H₁: *There is a significant difference in carbon disclosure after the launch of the Indonesia Carbon Exchange.*

The launch of an emissions trading scheme through the Carbon Exchange can be a catalyst for improved carbon performance in various corporate sectors. This carbon trading scheme establishes a market-based framework within which companies can buy and sell carbon credits ([C. Li et al., 2022](#)). The existence of an emissions trading scheme contained in the launch of the Carbon Exchange encourages companies to improve their performance in reducing the intensity of emissions produced to avoid the potential for companies to exceed the emission limits set in the scheme ([Jiang et al., 2025](#)). In the economic aspect, companies that keep their emission intensity below the cap do not need to buy carbon credits to meet the emission limits in the applicable emissions trading scheme, they can instead sell their carbon credits, which can ultimately have a positive impact in the form of increasing capital resources for the company ([Cong & Lo, 2017](#)). The economic pressures of these schemes ultimately encourage companies to invest in carbon reduction technologies and strategies to maintain lower emission levels ([Lewandowski, 2017](#)), and this has more value for stakeholders who care about the company's environmental aspects. Thus, improvements in carbon performance are often associated with improvements in better economic performance ([Rohani et al., 2021](#)).

According to the theory of legitimacy ([Suchman, 1995](#); [Deegan et al., 2002](#)), the organization will try to ensure that all its actions and policies do not conflict with the prevailing social values and norms in order to continue to gain public support and trust. The emergence of emissions trading schemes in a country's business climate sends a strong signal to the industry in reviewing the performance of companies in controlling carbon emissions as part of the new norm in the economic and social system. Thus, the aspect of company legitimacy is a strong driver for management to implement a proactive carbon strategy in maintaining its legitimacy ([Haque & Ntim, 2020](#); [Siddique et al., 2021](#); [Zheng et al., 2021](#)). [Downar et al. \(2021\)](#) have proven that companies are working to reduce carbon intensity as a response to legislation requiring companies in the UK to disclose carbon information. The results of these findings can be implicated in the context of the launch of the Indonesia Carbon Exchange, where carbon intensity that indicates carbon performance is becoming increasingly important because companies that are able to reduce emissions not only show their commitment to sustainability but also align with the environmental targets set by the government ([Ratmono et al., 2021](#)). These efforts build better relationships with policy makers and improve the company's image in the market, ultimately cementing their legitimacy in a business ecosystem that is increasingly driven towards sustainability ([Houten & Wedari, 2023](#)). Thus, that government regulations (such as the emissions trading scheme presented in the launch of the Indonesia Carbon Exchange) have the potential to have a substantial impact on companies' carbon strategies and activities ([Jiang & Luo, 2018](#); [Jin et al., 2021](#); [D. Li et al., 2016](#)).

H₂: *There is a significant difference in carbon performance after the launch of the Indonesia Carbon Exchange.*

The launch of the Indonesia Carbon Exchange marks a pivotal moment in the regulatory landscape for companies, especially those classified as in high-polluting sectors, such as the energy, industrial, basic materials, transportation and logistics, and infrastructure sectors. These sectors face greater scrutiny due to their significant contribution to climate change in the form of greenhouse gas emissions releases, which creates an urgent need for transparent reporting practices (Liesen et al., 2015; Luo et al., 2012; Qian & Schaltegger, 2017). The magnitude of the influence of this sector on the environment also means that every activity of a company will invite a more sensitive perception than companies that are not included in the high-polluting sector if environmental information is not presented comprehensively and accountably (Cho & Patten, 2007; Haque & Ntim, 2020). Thus, companies will proactively manage their disclosures to reduce negative public perceptions (Cowan & Deegan, 2011; Liu et al., 2023).

Datt et al. (2019) reveal that in carbon-dense companies, management tries to disclose their carbon information more comprehensively to reduce the reputational risks associated with their operations. This is proven by Kouloukoui et al. (2019) as this study in the context of companies in Brazil formulated results that broader disclosure of environmental information occurred in sectors that had a high profile and more attention to society compared to companies with lower pollution potential. The reason for these results lies in the dynamics of legitimacy theory, which suggests that organizations will increase their disclosure in response to perceived threats to their legitimacy. High-polluting companies, under the pressure of regulatory scrutiny and societal expectations, tend to adopt broader carbon disclosure practices to maintain legitimacy (Lee et al., 2015; Yuliana & Wedari, 2023). This is in contrast to companies in the low-pollutant sector, where limited exposure and lower emission burdens can make such disclosures less critical from a business perspective, resulting in less incentive or motivation for management to report carbon emissions information transparently.

The relationship between a company's classification as a high-polluting or low-pollution sector and its carbon performance after the launch of a carbon exchange is also relevant to understanding the effectiveness of regulatory mechanisms aimed at reducing greenhouse gas emissions. A market-based approach to carbon regulation through carbon trading schemes creates economic incentives for companies to reduce their carbon emissions (J. Guo et al., 2020). This will motivate them to adopt more environmentally friendly practices (Zhou et al., 2020). High-polluting companies can benefit significantly from improving their operational efficiency, as emission reductions can be associated with cost savings and increased productivity (B. Wang et al., 2022). Judging from the aspect of legitimacy, companies in high-polluting sectors face high expectations from stakeholders, including consumers to investors. This expectation can encourage companies to not only comply with legal standards, but also to realize a competitive advantage with carbon performance as a strategy to maintain legitimacy (Chen et al., 2018; Y. Guo et al., 2024). Thus, companies in high-polluting sectors will outperform other companies classified as low-polluting in carbon performance after the launch of an emissions trading scheme rooted in the interaction of regulatory pressures, economic incentives, and stakeholder expectations.

H₃: *High-polluting sector companies reveal carbon emissions that are more comprehensive after the launch of the Indonesia Carbon Exchange than low-polluting sector companies.*

H₄: *High-polluting sector companies improve carbon performance better after the launch of the Indonesia Carbon Exchange compared to low-polluting sector companies.*

3. Methods

3.1. Population and Sample

The population of this study is all companies listed on the Indonesia Stock Exchange for the 2022–2024 period. The sample selection in this study uses a non-probability sampling technique, namely by using the purposive sampling method. The detailed population description, exclusion criteria, and the resulting final sample used in this study are summarized in Table 1.

Table 1. Research population and sample.

No.	Information	Sample
1	Companies listed on the Indonesia Stock Exchange in 2022 and 2024	767
2	Companies that do not consistently publish annual or sustainability reports consecutively for the 2022 and 2024 periods	(189)
3	Companies that are inconsistent in disclosing Scope 1 and 2 emissions information	(189)
Number of company samples		186
Year of observation		2
Total sample data studied		372

3.2. Variable Operations

The selected indicators provide a parsimonious yet theoretically grounded representation of corporate carbon behavior, ensuring comparability across firms amid Indonesia's early stage of carbon reporting maturity. Although simplified, these proxies align with previous studies (Y. He et al., 2013; Houten & Wedari, 2023; Kurnia et al., 2020) and remain appropriate given the current state of corporate carbon disclosure and data availability in the Indonesian context. Table 2 below explains the operational variables used in this study.

Table 2. Variable operational.

Variabel	Indicator	Measurement	Formula
Carbon Disclosure	GRI: 305	The analysis of the content of the GRI standard in the company's sustainability report, especially on the 305 index with seven specific disclosures, was carried out to measure carbon disclosure (Houten & Wedari, 2023).	$\frac{\text{Number of items disclosed}}{\text{Maximum number of disclosures}}$
	POJK No. 51/POJK.03/2017 of 2017—Emission	Sustainable finance disclosure reference in Indonesia (Qudriyah et al., 2021)—(1) amount and intensity of emissions and (2) emission reduction efforts.	Score 1 for each disclosure
	Carbon Intensity	Carbon performance is measured by the carbon intensity approach, which divides the accumulation of emissions into Scopes 1, 2, and 3 GHG emissions by the amount of sales (in millions of IDR) (Y. He et al., 2013).	$\frac{\text{Scope 1} + \text{Scope 2} + \text{Scope 3}}{\text{Total Sales}}$
Carbon Performance	Emission Scope 1	Scope 1 emissions are direct emissions, originating from a location or from a source owned and controlled by the company (Lewandowski, 2017; Luo, 2019).	Natural logarithm of emission Scope 1
	Emission Scope 2	Scope 2 refers to indirect carbon emissions that come from the generation of electricity purchased and consumed by equipment or operations owned or controlled by the company (Stachelscheid & Dutzi, 2025).	Natural logarithm of emission Scope 2

Table 2. Cont.

Variabel	Indicator	Measurement	Formula
Polluting Sector	High and Low-Polluting Sector	Basic material (Hrasky, 2012), industrial (Borghei, 2021), transportation (Solikhah et al., 2020), energy (Lu et al., 2021), and infrastructure (Dhar et al., 2022) are high carbon intensive sectors.	Variable Dummy, 1 for high carbon intensive and 0 for low carbon intensive sectors
Environmental Performance	PROPER	Environmental performance measurement is adapted from the research of (Rokhmawati et al., 2015) which uses dummy variables taken from the company's PROPER rating.	Score one for the gold, green, and blue PROPER rankings; score two for the PROPER rating red, black, and nil
Market Value	Price per Share to Book Value	Comparison between the current stock market price and book value per share (Sunarwijaya et al., 2023).	$\frac{\text{Closing Price}}{\text{Net Equity} \div \text{Outstanding Shares}}$

3.3. Analytical Techniques

This study has two approaches in formulating four hypotheses, where hypotheses one and two regarding the significant differences in carbon disclosure and performance after the Indonesia Carbon Exchange will be tested through the Wilcoxon test. To find out whether the data used are normally distributed or not, the Kolmogorov–Smirnov normality test is carried out. In formulating the results of hypotheses three and four, testing was carried out using the Difference-in-Differences (DiD) method; this method is relevant because it is able to compare the differences in changes between two groups of companies, namely high-polluting industry and low-polluting industry, so as to capture the relative impact of the launch of ICE on the two groups of sectors. The formulation of the DiD model is as follows:

$$CD_{it} = \alpha + \beta_1 Post_t + \beta_2 High_i + \beta_3 (Post_t \times High_i) + \gamma Controls_{it} + \varepsilon_{it}$$

$$CP_{it} = \alpha + \beta_1 Post_t + \beta_2 High_i + \beta_3 (Post_t \times High_i) + \gamma Controls_{it} + \varepsilon_{it}$$

4. Results and Discussion

4.1. Result

4.1.1. Descriptive Statistics

Table 3 presents the descriptive statistics of all variables used in this study based on 372 firm-year observations. The results indicate considerable variation across both carbon disclosure and carbon performance measures. Carbon disclosure based on the GRI 305 (CD1) standard has an average value of 0.5737, indicating that companies disclose at least four of the seven emissions information from GRI: 305, with values ranging from 0.29 to 1.00. Disclosure measured using POJK No. 51/POJK.03/2017 (CD2) shows a mean of 1.3441, with a minimum of 0.00 and a maximum of 2.00, indicating heterogeneous levels of regulatory-based disclosure among firms.

Table 3. Descriptive statistics table.

Variable	N	Minimum	Maximum	Mean	Std. Deviation
CD1	372	0.29	1.00	0.5737	0.21950
CD2	372	0.00	2.00	1.3441	0.85618
CP1	372	0.00	12.30	0.1980	0.92129
CP2	372	0.03	7.78	3.9556	1.66810
CP3	372	0.00	7.34	4.0017	1.29665
EP	372	0.00	1.00	0.3737	0.48443
MV	372	0.00	19.36	1.6658	2.29211

Regarding carbon performance, carbon intensity (CP1) has a mean value of 0.1980, with a wide range from 0.00 to 12.30 and a relatively high standard deviation, reflecting substantial differences in firms' emission efficiency. Direct carbon emissions (Scope 1), measured by CP2, exhibit an average value of 3.9556, while indirect emissions (Scope 2), measured by CP3, have a mean of 4.0017. The dispersion observed in both Scope 1 and Scope 2 emissions indicates heterogeneity in firms' operational and energy-related emission profiles.

For the control variables, environmental performance (EP) has a mean of 0.3737 and ranges between 0.00 and 1.00, suggesting variation in firms' environmental ratings across the sample. Market value (MV) shows substantial dispersion, with a mean of 1.6658 and a maximum value of 19.36, indicating differences in firm valuation. Overall, the descriptive statistics demonstrate sufficient variability across all variables, supporting their inclusion in the Difference-in-Differences analysis.

4.1.2. Normality Test

The normality test in the Table 4 was not carried out in an effort to test the normality of the data on the DiD model because this study used 372 observations. As per the Central Limit Theorem, the residual distribution in large samples tends to be close to normal so that the normality test is not a crucial requirement (Gujarati & Porter, 2009; Wooldridge, 2016). Normality tests were conducted on the difference scores between the pre- and post-launch periods. The results indicate mixed distributional properties across indicators, with several variables deviating from normality. Given this condition and to ensure robustness and comparability across indicators, the Wilcoxon signed-rank test was employed as a non-parametric alternative to assess differences before and after the launch of the Indonesia Carbon Exchange.

Table 4. Normality test.

Variable	Information	Kolmogorov–Smirnov (Sig.)	
		Pre-ICE (2022)	Post-ICE (2024)
CD1	GRI: 305	0.001	0.001
CD2	POJK No. 51/POJK.03/2017 of 2017	0.001	0.001
CP1	Carbon Intensity	0.001	0.001
CP2	Emission Scope 1	0.200	0.200
CP3	Emission Scope 2	0.058	0.007

4.1.3. Differential Test (Wilcoxon Test)

The test results differ from the Wilcoxon test in Table 5, which shows that there are significant differences in carbon disclosure in the CD1 indicator—GRI: 305 (0.004)—and in the CD2 indicator—POJK No. 51/POJK.03/2017 in 2017 (0.000)—between the periods before and after the launch of the Indonesia Carbon Exchange. The results indicate that while carbon intensity (CP1) and Scope 2 (CP3) emissions exhibit significant changes following the launch of the Indonesia Carbon Exchange, Scope 1 emissions (CP2) do not show a statistically significant difference.

Table 5. Wilcoxon test.

Variable	Z-Value	Sig. (2-Tailed)	Conclusion
CD1	−2.861	0.004	Hypothesis 1 is accepted
CD2	−4.321	0.000	Hypothesis 1 is accepted
CP1	−2.861	0.004	Hypothesis 2 is accepted
CP2	−1.819	0.069	Hypothesis 2 is Unaccepted
CP3	−3.920	0.000	Hypothesis 2 is accepted

4.1.4. Classic Assumption Test—For DiD Models

In the multicollinearity test, the tolerance value of all variables in each model was more than 0.1 and VIF less than 10. These results show that the data are free from multicollinearity problems. As for the heteroscedasticity test, there are no symptoms of heteroscedasticity as evidenced by a scatterplot graph spreading from point 0. Thus, in model 1 it will continue in the DiD test. The autocorrelation test using the Durbin–Watson test showed that both models were free of autocorrelation, as the value of the DW on each model was in the range of −2 to +2.

4.1.5. Difference-in-Differences Model 1

Table 6 presents the Difference-in-Differences estimation results examining whether high-polluting sector companies disclose carbon emissions more comprehensively after the launch of the Indonesia Carbon Exchange (ICE) compared to low-polluting firms. The coefficient of the high dummy variable is positive but statistically insignificant for both disclosure indicators (CD1: $\beta = 0.045$; $p = 0.151$; CD2: $\beta = 0.029$; $p = 0.814$), indicating that prior to the ICE launch, high-polluting firms do not significantly differ from low-polluting firms in terms of disclosure comprehensiveness. Notably, environmental performance (EP) exhibits a positive and statistically significant association with both disclosure indicators (CD1: $p = 0.000$; CD2: $p = 0.012$), suggesting that firm-level environmental quality plays a more important role in explaining disclosure behavior than sectoral pollution intensity. In contrast, market value (MV) does not show a significant effect. Taken together, the DiD results suggest that while the launch of ICE encourages a general increase in carbon disclosure, it does not generate a differentiated response between high- and low-polluting sectors. This pattern indicates that the policy impact is broad-based rather than targeted, and that heterogeneous sectoral effects are either limited or not yet observable within the current observation period.

Table 6. DiD model 1.

Model	Coefficient		Std. Error		T		Sig.	
	CD1	CD2	CD1	CD2	CD1	CD2	CD1	CD2
Constant	0.478	1.136	0.024	0.098	19.776	11.641	0.000	0.000
High _i	0.045	0.029	0.031	0.125	1.440	0.235	0.151	0.814
Post _t	0.061	0.194	0.030	0.120	2.041	1.615	0.042	0.107
High _i × Post _t	0.043	0.107	0.043	0.175	0.986	0.611	0.325	0.542
EP	0.090	0.233	0.023	0.092	3.948	2.523	0.000	0.012
MV	0.001	−0.009	0.005	0.019	0.106	−0.487	0.915	0.627

4.1.6. Difference-in-Differences Model 2

The Difference-in-Differences estimation in the Table 7 shows that the interaction term $\text{High} \times \text{Post}$ does not have a statistically significant effect on carbon performance. Specifically, the coefficient of $\text{High} \times \text{Post}$ is negative for carbon intensity (CP1: $\beta = -0.167$; $p = 0.387$), Scope 1 emissions (CP2: $\beta = -0.045$; $p = 0.878$), and Scope 2 emissions (CP3: $\beta = -0.018$; $p = 0.944$). Since all p -values exceed the 10 percent significance level, the estimated effects are statistically insignificant. Importantly, these insignificant results are obtained after controlling for environmental performance and market value. This indicates that the absence of a significant DiD effect is not driven by firm-specific environmental quality or market valuation, but rather reflects the limited differential impact of the post-policy period itself on firms' carbon performance.

Table 7. DiD model 2.

Model	Coefficient			Std. Error Robust			T			Sig.		
	CP1	CP2	CP3	CP1	CP2	CP3	CP1	CP2	CP3	CP1	CP2	CP3
Intercept	0.139	3.117	3.813	0.107	0.164	0.147	1.298	19.053	25.901	0.195	0.000	0.000
High_i	0.164	0.710	−0.219	0.138	0.210	0.189	1.193	3.376	−1.158	0.234	0.001	0.248
Post_t	0.089	−0.015	0.116	0.132	0.202	0.182	0.677	−0.075	0.639	0.499	0.940	0.523
$\text{High}_i \times \text{Post}_t$	−0.167	−0.045	−0.018	0.192	0.293	0.264	−0.867	−0.153	−0.070	0.387	0.878	0.944
EP	0.003	1.561	0.610	0.101	0.155	0.139	0.034	10.101	4.389	0.973	0.000	0.000
MV	−0.015	−0.038	0.006	0.021	0.032	0.029	−0.722	−1.164	0.217	0.471	0.245	0.828

4.2. Discussion

4.2.1. There Is a Significant Difference in Carbon Disclosure After the Launch of the Indonesia Carbon Exchange

The first hypothesis test showed that there was a significant difference in carbon disclosure after the launch of Indonesia's Carbon Exchange. This shows that the existence of schemes or regulations from the government in an effort to improve the environment, especially in overcoming carbon emissions, has succeeded in encouraging companies to increase the comprehensiveness of carbon information disclosure. These results are in line with the results of a study from Cowan and Deegan (2011) which proves that there is a significant increase in annual report emissions disclosure after the National Pollutant Inventory (NPI) regulation in Australia which suggests that environmental regulation can encourage changes in corporate environmental disclosure practices for the better. Likewise, the results of research from Jaggi et al. (2018) outline that the establishment of an emissions trading scheme encourages managers to implement reporting policies that increase the scope and transparency of carbon information. In the economic context, Nyahuna et al. (2023) revealed that carbon disclosure has a strong correlation with improved financial performance, where companies need to control and supervise the surge in emissions they produce so that they can be the basis for economic decisions in the form of selling carbon credits. Thus, the existence of a carbon exchange can be a strategic step to attract a market that increasingly considers the environmental value of companies through green financing or investment from green investors (Kılıç & Kuzey, 2018).

Viewed from the theoretical aspect of legitimacy, the increasing expectation for companies for transparency of environmental information and more detailed sustainability practices not only responds to regulatory demands, but also aligns with societal values regarding environmental responsibility that need to be reviewed by management. As a result, legitimacy-driven organizations have significantly increased the depth of reporting their carbon information to stakeholders (Faisal et al., 2018; Zamil et al., 2023). Research

shows that the launch of a carbon exchange in Indonesia is forcing organizations to revisit their approach to carbon emissions disclosure. As highlighted by [Nada and Györi \(2025\)](#), legitimacy theory supports the idea that businesses must actively communicate their environmental performance and strategies to achieve public acceptance of the businesses they run. The findings show that by adhering to public expectations for transparency regarding carbon emissions, companies not only comply with the legal framework set by policy makers, but also create value through enhanced legitimacy ([Hrasky, 2012](#); [Kaur & Lodhia, 2018](#)).

4.2.2. There Is a Significant Difference in Carbon Performance After the Launch of the Indonesia Carbon Exchange

The results of the study show that the second hypothesis is accepted or it can be interpreted that there is a significant difference in carbon performance after the launch of the Indonesia Carbon Exchange. These findings indicate that the presence of carbon exchanges, which also present an emissions trading scheme in Indonesia's business climate, has succeeded in encouraging companies to improve their carbon performance. These results are in line with the research of [Zhang et al. \(2017\)](#) and [Zheng et al. \(2021\)](#) which found that the implementation of the Emission Trading Scheme (ETS) in the business environment has been proven to reduce the production of carbon emissions. The results of this study are also consistent with research conducted by [Orazalin et al. \(2024\)](#) which emphasized that regulatory pressures through carbon trading mechanisms are able to encourage companies to integrate climate mitigation strategies in their business activities. Thus, the presence of carbon exchanges can be seen as an effective policy instrument to drive the transformation towards low-carbon business practices ([Jiang et al., 2025](#)). The reason behind these results is that carbon emissions have the potential to affect the company's future revenue and cash flow. Companies with high levels of emissions need to make modifications or adjustments in their production processes to avoid a spike in emission production that risks sanctions that impact the company's finances in the future ([Choi & Luo, 2021](#)). On the other hand, companies that are able to reduce their emission intensity can take advantage of new economic opportunities, namely selling carbon credits on the carbon market, and thereby obtain additional financial resources.

Judging from the regulatory aspect, companies that are able to reduce the amount of carbon emissions can reduce the potential sanctions given to companies that have poor environmental performance. Thus, regulatory pressures and stakeholder demands also play an important role in encouraging improved carbon performance. In terms of legitimacy, these results also provide theoretical support for the research of [Galán-Valdivieso et al. \(2019\)](#) which shows that companies are under threat of losing legitimacy if they do not demonstrate commitment to emissions management, so involvement in sustainable initiatives and environmental performance disclosure is a way to maintain legitimacy. In line with that, [Lewandowski \(2017\)](#) emphasized that carbon performance is now increasingly recognized as a material business issue influenced by stakeholder dynamics, where the transparency of emissions and environmental performance play a role in maintaining good relations with the market and increasing company value. Thus, the existence of carbon exchanges in Indonesia that carry schemes and regulations related to emission control has succeeded in encouraging industry players to improve their carbon performance.

4.2.3. There Is No Significant Difference in the Comprehensiveness of Carbon Disclosure in High-Polluting Sector Companies Compared to Low-Polluting Sector Companies After the Launch of the Indonesia Carbon Exchange

The results show that the hypothesis that companies in the high-polluting sector disclose carbon emissions more comprehensively than low-polluting sectors after the launch

of the Indonesia Carbon Exchange has not been proven significant. This indicates that the launch of Indonesia's Carbon Exchange has not been able to create a difference in the disclosure behavior of the two sectors. Instead, the policy appears to encourage a more uniform disclosure behavior across firms, regardless of their pollution intensity. This conclusion remains robust even after controlling for firm-level environmental performance and market value. The inclusion of these control variables suggests that the absence of a significant Difference-in-Differences effect is not driven by differences in firms' environmental quality or market valuation, but rather reflects the limited ability of sectoral pollution intensity to explain post-policy disclosure behavior.

These findings are consistent with the literature review by [Bazhair et al. \(2022\)](#) which states that carbon disclosure practices do not always differ substantially between sectors. In addition, a study by [Zha et al. \(2022\)](#) that measured carbon proactivity among participating companies in the ETS showed that more proactive disclosure had more to do with whether or not companies participate in the emissions trading scheme than how high their emissions were. Moreover, high-emission companies may see disclosure as a potential reputational risk so they are more cautious. Thus, instead of expanding transparency, high-polluting companies often withhold detailed information to minimize reputational risks ([Clarkson et al., 2008](#)).

From the point of view of legitimacy, this result can also be interpreted as a form of symbolic strategy of the company. Legitimacy theory argues that companies will disclose environmental information not only because of regulatory pressures, but also to maintain the social legitimacy of various stakeholders ([Suchman, 1995](#)). Research by [Galán-Valdivieso et al. \(2019\)](#) found that companies often adjust the intensity of carbon disclosure with the goal of managing public perception, not because of differences in actual pollution levels. The use of both voluntary-based (GRI 305) and regulation-based (POJK 51) disclosure indicators in this study reinforces the conclusion that disclosure strategies converge across sectors following the policy launch.

This is consistent with the findings of this study where both high-polluting and low-polluting companies pursue similar disclosure strategies to secure legitimacy in the eyes of regulators, investors, and the public, so that there is no significant differentiation between the high-polluting sector and the low-polluting sector.

4.2.4. There Is No Significant Difference in the Improvement in the Carbon Performance of High-Polluting Sector Companies Compared to Low-Polluting Sector Companies After the Launch of the Indonesia Carbon Exchange

The results of the hypothesis test show the third hypothesis, namely that high-polluting sector companies improve carbon performance better after the launch of the Indonesia Carbon Exchange than low-polluting sector companies. This conclusion remains robust when carbon performance is measured using multiple indicators, namely carbon intensity, the natural logarithm of Scope 1 emissions, and the natural logarithm of Scope 2 emissions. The use of these indicators captures both efficiency-based performance (carbon intensity) and absolute emission reductions from direct and indirect operational activities, thereby providing a comprehensive assessment of firms' carbon performance.

This result is in contrast to the results of research by [Klaus et al. \(2022\)](#) which revealed that changes in the dynamics of environmental regulations in the United States have brought better carbon performance in companies included in the carbon-intensive sector than other sectors. This can be due to the scope of the research sample which is only within a limit of one year before and after the launch of the Indonesia Carbon Exchange. In early implementation practices, high-polluting companies often face limited access to green financing that can be used to fund environmentally friendly technologies that lead companies towards carbon production efficiency ([Schoenmaker, 2021](#)). On the other hand,

low-polluting companies already have a lower emission structure so they do not require significant additional investment (Antunes et al., 2024). This explains why in the limited time span of one year before and after the launch of the Indonesia Carbon Exchange, the carbon performance gap between the two sectors has not shown a significant difference.

In terms of legitimacy, these results are in contrast to research by Guenther et al. (2016) which states that companies with higher emission intensities tend to improve their carbon performance better in addressing legitimacy issues related to their environmental impact. On the other hand, these results are in line with the view of Haque and Ntim (2018) who assert that the pressure of legitimacy often encourages companies to adopt *symbolic management practices*—for example, by displaying sustainability commitments in annual reports—without significant changes in production processes or carbon emission efficiency.

5. Conclusions

This study provides early empirical evidence of the influence of the launch of the Indonesia Carbon Exchange (ICE) on corporate disclosure behavior and carbon performance in Indonesia. This result illustrates that there has been a change in the dynamics of environmental regulations with the implementation of an emissions trading scheme through the launch of the Carbon Exchange, which has succeeded in increasing the awareness of business people in increasing the transparency of carbon emission information which is considered increasingly substantial in various business decisions.

The empirical results demonstrate a significant improvement in carbon emission disclosure following the launch of the Indonesia Carbon Exchange. This improvement is observed across multiple disclosure indicators, including GRI 305-based disclosure and compliance with POJK No. 51/POJK.03/2017, suggesting that Indonesian firms have proactively enhanced transparency in response to emerging policy expectations. This behavior reflects firms' anticipation of future regulatory enforcement under the Economic Value of Carbon framework and their intention to signal readiness to participate in carbon trading mechanisms. These findings suggest that even in the absence of strict enforcement, the symbolic pressure generated by the introduction of carbon market policies can effectively stimulate voluntary environmental disclosure.

In terms of carbon performance, the results reveal that the launch of the Indonesia Carbon Exchange has been associated with improvements in emission efficiency, as indicated by a reduction in carbon intensity. However, when carbon performance is examined using more substantive indicators—namely, absolute emissions measured through the natural logarithm of Scope 1 and Scope 2 emissions—the findings show that improvements remain limited in the short term. This indicates that while firms may adjust operational efficiency and optimize resource use, structural changes that lead to substantial emission reductions require a longer adjustment period and more intensive investment.

This study also brought more specific results by reviewing the comparison of carbon disclosure and performance in the high-polluting and low-polluting sectors which showed that there was no significant difference in the comprehensiveness of carbon disclosure or the improvement of carbon performance between high-polluting sector companies and the low-polluting sector. This finding can be explained through the legitimacy theory, which is that even high-emission companies are not fully encouraged to make greater legitimacy efforts than companies with low emission levels. This may happen due to the relatively short observation time, as well as the lack of optimal green investment support and incentive instruments that are able to encourage emission-dense companies to transform more aggressively in responding to the demands of public legitimacy. This outcome supports the argument within legitimacy theory that even high-emission firms do not necessarily engage in stronger legitimacy-seeking actions than their low-emission counterparts, possibly due

to the short observation period and the limited availability of green investment incentives that could accelerate decarbonization in emission-intensive industries.

Overall, this study highlights the distinction between short-term behavioral adjustments and long-term structural change in corporate environmental practices. While the Indonesia Carbon Exchange has proven effective in promoting transparency and initiating efficiency-based improvements, its ability to drive substantive emission reductions—particularly among emission-intensive sectors—remains limited in the early phase of implementation. These findings underscore the importance of complementary policy instruments, such as targeted green financing, stronger regulatory enforcement, and sector-specific incentives, to support emission-intensive firms in undertaking costly decarbonization efforts. By providing early evidence from an emerging carbon market, this study contributes to the growing literature on emissions trading schemes in developing economies and emphasizes that the success of carbon markets should be evaluated within an appropriate temporal and institutional context.

With the limited time coverage of the sample which only reviewed one year before and after the launch of the Carbon Exchange, the researchers are expected to be able to review more time coverage of the data population that can cover a wider area such as companies in the southeast. The next researcher is also expected to review the presence of other regulatory aspects such as carbon taxes to carbon pricing that have the potential to affect the company's carbon disclosure behavior and performance. Subsequent studies are also encouraged to incorporate additional policy variables, such as carbon tax implementation and carbon pricing mechanisms, to capture the multi-regulatory effects on corporate disclosure and performance. The next researcher can also consider other variable indicators that are more in-depth and in accordance with the conditions of the research objective.

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