JURNAL BISNIS DAN AKUNTANSI
Vol. 27, No. 2, December 2025, Page 393-408
Accreditation of Sinta 2 SK No. 72/E/KPT/2024

P-ISSN: 1410 – 9875
E-ISSN: 2656 – 9124
http://jurnaltsm.id/index.php/JBA

THE INFLUENCE OF RELEASING CARBON EMISSIONS ON ACCOUNTING RETURNS: THE MODERATING ROLE OF BUSINESS STRATEGY

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Received: February 26, 2026; Revised: April 28, 2026; Accepted: May 13, 2026

Abstract: *This study uses 1856 data from non-financial companies listed on the Indonesia Stock Exchange between 2015 and 2023 to examine business strategy as a modulator of the impact of carbon emissions disclosure on accounting returns. The relationship between creative business tactics and the disclosure of carbon emissions on accounting returns is what makes this study distinctive. Principal component analysis (PCA) is used for determining the value of the accounting functions. The study's findings suggest that business techniques mitigate the impact of disclosing carbon emissions on a company's accounting returns. This study contributes to regulations by showing that most non-financial companies are still not fully aware of the impact of climate change and that carbon emission disclosure is closely related to environmental pollution. As a result, the government needs to pay close attention to this issue. Companies must implement innovative business strategies by making carbon emissions disclosure a competitive advantage to increase the company's accounting return. In addition, this can also provide positive information to investors, thereby assisting investors in making investment decisions.*

Keywords: Accounting Return, Business Strategy, Carbon Emission Disclosure

INTRODUCTION

Researchers, in general, deploy accounting performance or market performance signals to gauge the financial results of a firm. The salience of the two divergent views of corporate financial performance for the academic literature has yielded various conceptualizations (Rowe and Morrow 1999). According to Rowe and Morrow (1999), the conceptualization of financial performance is two-dimensional, with two aspects namely, accounting performance and market performance. Murphy et al. (1996) showed that the majority of performance proxies are aligned with efficiency, growth, and profitability. The importance of the measurement to be taken must be explicitly stated, calling for an investigation of the numerous dimensions for the determination of organizational performance. In the accounting discipline, a strategic approach is taken to the detection, quantification, and governance of the financial and the non-financial aspects for performance measurement (Ittner et al. 2003).The escalation of competition within the markets has made the measurement of corporate performance more attractive to both

practitioners and researchers (Gomes et al. 2007).

Studies in the past resulted in persistent differences in study outcomes on measuring various aspects of corporate performance as seen from Tosi et al.'s study (2000) and that of Maltz et al.'s study (2003). The researchers combined a number of corporate financial performance measurement dimensions from a study undertaken by Combs et al. (2005),which used a total of seven efficiency indicators: cash flow/assets, cash flow/sales, return on assets (ROA), return on equity (ROE), return on investment (ROI), return on sales (ROS), earnings per share, as well as net profit margin in total as accounting return. The researchers, however, restricted analysis to four proxies used in accounting return measurement, namely ROA and ROE.

Almost all countries in the world have developed different cooperative agreements that aim to control carbon emissions (Han et al. 2023) to meet sustainable development targets, has inspired almost all countries, such as Indonesia, to address climate change urgently through enacting appropriate policies as well as strategies. In turn, more interest in exploring how corporations disclose their carbon emissions is growing increasingly popular (Kurnia et al. 2025). Previous research suggested that the problem of carbon emissions has attracted significant interest from investors, managers, as well as credit rating organizations (Datt et al. 2018; Gao and Calderon 2023; Luo and Wu 2019). Borghei et al. (2018), claim that high levels of disclosure of carbon emission are easier to verify as well as forward-looking in allowing accounting-based benefits to be achieved. Hassan and Romilly (2018) revealed a significant positive correlation existed between disclosure of carbon emission as well as company value in developed countries; however, it is identified that disclosure of carbon emission negatively impacts company value. Despite this, however, Brouwers and Hulle (2018) confirm that emission disclosure can result in increased environmental spending and significantly negatively influence corporate performance. Choi and Luo (2021) suggest that a significant negative impact for carbon emission disclosure on corporate valuation exists. Siddique et al. (2021) point to a significant short-term adverse impact of disclosure on carbon emissions on short-term financial performance while acknowledging a positive relationship in the long run. Misani and Pogutz (2015) argue that a significant negative impact of emission disclosure on Tobin's Q.

Many companies still do not care about the environment, and this is a cause for concern among stakeholders (Steelyana et al. 2024). In Indonesia, pressure is mounting on companies to adopt strategies that enable disclosure of carbon emissions through investment in carbon offset projects to support regulatory compliance, build brand reputation, and deliver significant cost savings. Almost all countries in the world, which involves Indonesia, now use the IFRS S1 and IFRS S2 as their Standard Disclosure Statements. The Financial Services Authority, which was (OJK) has put out OJK Regulation No. 51/POJK.03/2017, which is about how to put into action sustainable finance for public businesses, issuers, and standardised financial services institutions. This is one significant standard that is essential in guiding the financial industry to practice economic, social, and environmental sustainability. Development of a business strategy is the first step for organizations seeking to evaluate the strength of their internal control environment. Organizations that are prospectors have most intense growth in efforts to exploit newly arising market opportunities, while those that are defenders mainly focus on operational efficiency to support a variety of different products through even keel growth (Hambrick 1983; Miles and Snow 2003). Business strategy is a useful summary metric used to evaluate the strength of a firm's internal controls that are a focal area of interest for organizations (Bentley-Goode et al. 2017). The strategic approaches used in this research are guided by typology developed by Miles et al. (1978) as used in accounting-related scholarly literature (Bentley-Goode et al. 2017; L. Chen et al. 2022; Y. Chen et al. 2017). In terms of the framework developed from Miles and Snow (2003), four groups are identified: prospector, defender, analyzer, and reactor. The prospector approach is characterized with expansion of

product offerings through addition of new items to offerings in the marketplace irrespective of related expenditure and pricing issues. In contrast to the above approach, the defender approach focuses on existing product lines, service offerings with lower quality and pricing aims. Analyzers exhibit both defender and prospector characteristics on several dimensions while reactors do not exhibit a distinct strategy, rather following movements of markets before reacting. There is significant research that has been conducted on interdependencies between organizational performance and business strategy. In this research study, we fill a void that exists on the relationship between disclosure of carbon emissions and accounting returns with organizational strategy as a moderating influence. The research method used is principal component analysis (Allee et al. 2022) to determine the accounting return-related dimensions. This study addresses the gap in the relationship between carbon emissions disclosure and accounting returns by incorporating business strategy as a moderating variable. The study employs a principal component analysis methodology (Allee et al. 2022) to identify the dimensions of accounting returns, a step not taken in previous research. This aligns with Allee et al. (2022), who state that PCA is a valid method because it can reduce redundancy among variables and improve the ability to capture variations in company performance more comprehensively.

This research makes a theoretical contribution to the existing literature by introducing findings concerning the impact of carbon disclosure on accounting returns, with business strategy serving as an unexamined moderating variable. Additionally, this study offers practical implications. For regulators, the findings provide insights into policies and regulations associated with monitoring carbon emissions disclosure in Indonesia, where firms have indicated their preparations through carbon emissions disclosure presented in their annual and sustainability reports. It is imperative that the Indonesian government swiftly enacts regulations for carbon emissions disclosure based on sectoral classifications, which will facilitate companies in delivering carbon emissions disclosure information effectively and efficiently. For businesses, the results elucidate that the adoption of the most effective, innovative, and efficient business strategies will enable companies to furnish carbon emission disclosure information and will positively influence the enhancement of the company's accounting return. For investors, the findings assist in making informed investment decisions. Investors should closely observe the carbon emission production activities of companies and evaluate the extent of efforts made by these firms to transparently reduce and disclose such information.

Signalling Theory

According to signalling theory, sustainability activities serve as positive signals that mitigate the negative effects of a company (Yin et al. 2025), such as carbon emissions disclosure. Carbon emissions disclosure plays a crucial role in reducing information asymmetry and enhancing market transparency. According to signalling theory, sustainability performance is a reliable way for the market for assessing the quality of management, the quality of procedures, and the ability to develop long-term value (Fakhfakh et al. 2026). Companies with sustainability initiatives will enhance investor confidence, which in turn will improve corporate performance (Said Abdel Azzim et al. 2026). Signalling theory addresses the differential power of various signals of sustainability through their alignment with societal norms and expectations (Sintia F et al. 2025)

Disclosures of Carbon Emissions and Accounting Returns

Carbon emissions disclosure is part of a sustainability framework for measuring company performance. Carbon emissions disclosure will reduce expenses and attract attention from investors (Desai and Desai 2021). Additionally, carbon emissions disclosure provides information to investors as well as other stakeholders while evaluating companies. Carbon emissions disclosure information can reduce the possibility of information asymmetry (Duan et al. 2021). Voluntary disclosure of

carbon significantly contributes to company value (Xu and Narita 2025). The companies that consider environmental disclosure would create value (Guastella et al. 2022). Disclosures regarding environmental factors can reduce capital costs, consequently significantly improving company performance (Saini et al. 2025). Carbon performance can considerably develop financial performance (Meng et al. 2023). High-quality disclosure regarding carbon can reduce information asymmetry, consequently improving company value (Zhu et al. 2024). Environmental disclosure positively contributes to company market value (Desai 2024). In this study, accounting return is used to determine company performance. As per above background, H1 is framed as follows:

H_1: There is a positive correlation between disclosing carbon emissions and accounting return.

Business Strategies Serve to Moderate the Impact of Carbon Emissions Disclosure on Accounting Return

The approaches used by companies are very important when it comes to the progression of companies. The approaches help organizations navigate competition in their own sectors or industries effectively. In addition, different strategic methods used by companies within the same industry can create competitive advantages. Companies that adopt creative business approaches have a significantly positive impact on their profitability (Day et al. 2025; Maury 2022; Poretti et al. 2024; Rodrigues et al. 2021; Suoniemi et al. 2020). Companies that are using good business approaches can take advantage of voluntary disclosure of carbon emission information as a unique competitive advantage, then increase accounting returns. In addition, this conceptual framework asserts that investors are morally compelled to finance companies that are showing efforts in sustainability practice (Srairi 2025). Preemptive sustainability efforts that are proactive, especially those that are environmentally friendly, can increase profit margins significantly (Xu and Narita 2025). Environmental information disclosure after the passage of positive environmental regulations significantly impacts a firm's financial performance (Liu et al. 2024). In addition, disclosure of carbon emissions makes a significantly positive impact on company performance (Dewaelheyns et al. 2023; Yu et al. 2022). Companies that embark on creative business strategies such as prospector are likely to increase disclosure of carbon emissions with respect to accounting returns, thereby enabling those with laudable and transparent environmental performance to bank on this factor as a differentiating tool from rival companies. As such, the researchers postulated the following hypothesis:

H_2: Business strategy (prospector) moderates disclosure of carbon emissions' effect on accounting returns.

Variable Measurement

This study uses secondary data and panel data. Carbon emission disclosure is measured through the use of the GRI index from companies' sustainability reports and annual reports using content analysis methods. The control variables, accounting return, and business strategy were sourced from the OSIRIS data set.

The dataset used includes non-financial companies from the Indonesia Stock Exchange from 2015 until 2023 with 1856 observations. The non-financial industry often shows significant social and environmental impact (Haroon et al. 2025; Kurnia et al. 2025) and is seen as a prime target for foreign investors (Wang 2011).

The sample used in this study comprised non-listed firms on the Indonesia Stock Exchange with 1,856 observations for the observation period between 2015 and 2023. The study period began in 2015, given that in 2015 Indonesia had become part of the global commitment through the Paris Agreement in response to global environmental issues and climate change. Since then, every country has been required to increase its awareness and contribution to climate change mitigation. In this context, companies play a strategic role as key actors in supporting the implementation of these commitments, particularly through sustainable and environmentally responsible business practices. Table 1 demonstrates how the

calculation of the sample was performed in this research.

Table 2 is a detailed description of the variables used in this research study. The disclosure of carbon emissions is made through the GRI index with content analysis method (Kurnia et al. 2025). The GRI 305 index's guidelines for the disclosure of carbon emissions are divided into six categories: disclosure of management strategy and disclosure 305-1, 305-2, 305-3, 305-4, 305-5, and 305-6, totalling 19 reporting requirements. The CED index is computed following a number of specific steps: (1) A binary measure is utilised to score each item under disclosure. (2) The maximum score is 19, while the lowest is 0. A company's score would involve 19 if it revealed every item in its report, since each item is given a grade of 1. (3) After adding up the specific business's cumulative assessment scores, they are divided by 19. The equation is stated as follows:

$$CED=\frac{\sum_{i=1}^{n} di}{n}$$

The business strategy that is analysed using the Miles and Snow typology serves as the study's independent variable. The typology of business strategies entails six proxies (Dalwai and Salehi 2021; Habib and Hasan 2020; Peng 2020). The proxies are as follows: (1) Employee Intensity that gauges the capacity of the organization to produce and distribute products and services efficiently; (2) SE Employ that evaluates the scale of enterprise activities undertaken by employees; (3) Sales Growth that investigates historical sales progression of the company; (4) Sales effort that mirrors the efforts made by the company in sales and marketing; (5) Tendency to develop new products that evaluates organizational inclination to create Product Innovation from existing products; and (6) Focus on production assets that evaluates investment efficiency. Business strategy is operationalized as a dummy variable, with 1 representing a prospector strategy and 0 representing a defender strategy. The accounting return of the company is measured through Combs et al. (2005), which used a total of seven efficiency indicators: cash flow/assets, cash flow/sales, return on assets (ROA), return on equity (ROE), return on investment (ROI), return on sales (ROS), earnings per share, made easier through principal component analysis (PCA). Some earlier research works used PCA in analysis (Banna et al. 2022). The research design here includes a mix of control parameters: firm size, company's financial leverage, firm age, board of directors, board of commissioners, and independent commissioners.

Different multiple linear regression models were used to explore accounting returns' impact from carbon emissions disclosure. The moderation analysis was then undertaken to identify whether business strategies mediate the relationship between carbon emissions disclosure and accounting returns. To support these results, we also introduced a robustness test.

The robustness test introduced involved classifying disclosure as high and low carbon emissions groups as well as disclosure introduced before COVID-19 pandemic. The following specification model is introduced for hypothesis testing purposes:

Direct Effect:

$$\text{Accounting Return}_{it} = \alpha+\beta 0CED_{it}+\beta 1BS_{it}+\beta 3SIZE_{it}+\beta 4LEVERAGE_{it}+\beta 5FIRMSIZE_{it}+\beta 6DIR_{it}+\beta 7COM_{it}+\beta 8COMIND_{it}+\varepsilon_{it}$$

Table 1. Sample Selection Criteria

Justification	Total
Companies that do not qualify as financial and were listed on the IDX from 2015 to 2023	470
Companies that failed to consistent issue annual reports for the 2015–2023 period	(167)
Companies providing incomplete financial information in their annual and sustainability reports	(71)
Number of firms fitting the criteria	232
Total observations (232 times 8 years)	**1856**

Table 2. Measurement Of Variables

Name Of Variable	Measurement	Reference	Source
Dependent variable:			
Accounting return	Cash flow/assets, cash flow/sales, return on assets (ROA), return on equity (ROE), return on investment (ROI), return on sales (ROS), earnings per share	(Brighi et al. 2025; Constantatos et al. 2025; Dorsaf 2025; Richter 2025)	OSIRIS
Independent Variable:			
Carbon emission disclosure	GRI Index	(Kurnia et al. 2025)	AR and SR
Business strategy:			
Employee Intensity	Number of employees divided by sales	(Dalwai and Salehi 2021; Habib and Hasan 2020)	OSIRIS
SE Employ	Standard Deviation of Employees		
Sales Growth	$Sales_t$-$sales_{t-1}$ divided by $sales_{t-1}$		
Sales effort	SGA expenses divided by sales		
Tendency to develop new product	Intengible asset divided by sales		
Focus on production assets	Proportion of fixed asset divided by total assets		
Control variable:			
Size	Natural log of total assets	(Desai et al. 2025; Dewaelheyns et al. 2023; Dossa et al. 2025; Le and Nguyen-Phung 2024; Liu et al. 2024; Yu et al. 2022)	OSIRIS
Leverage	Total liabilities to total assets		
Age	Firmage		
B.Director	Number of directors		
B.Commissioner	Number of commissioner		
Ind.Commissioner	Number of Ind. Commisioner		

Moderation Effect:
Accounting Returnit = α+β0CEDit+β1BSit+ β2CED*BSit+β3SIZEit+β4LEVERAGEit+ β5FIRMSIZEit+β6DIRit+β7COMit+β8COMINDit + εit

METHOD

Using three equations and a Moderated Regression Analysis (MRA) model, this study estimated the following baseline (Sharma et al. 1981). Two evaluations were used to test the moderation model: the first evaluated at how the moderation variable directly affected the dependent variables, and the second evaluated how the moderation variable and the independent variables interacted. Predictor, homologizer, quasi, and pure moderation are the four quadrants into which findings about moderation can be divided based on these two equations. Sharma et al. (1981) state that whereas predictors and quasi are categorised as independent variables, moderation is assumed to lie within the homologizer and pure moderation quadrants, as shown in Table 3.

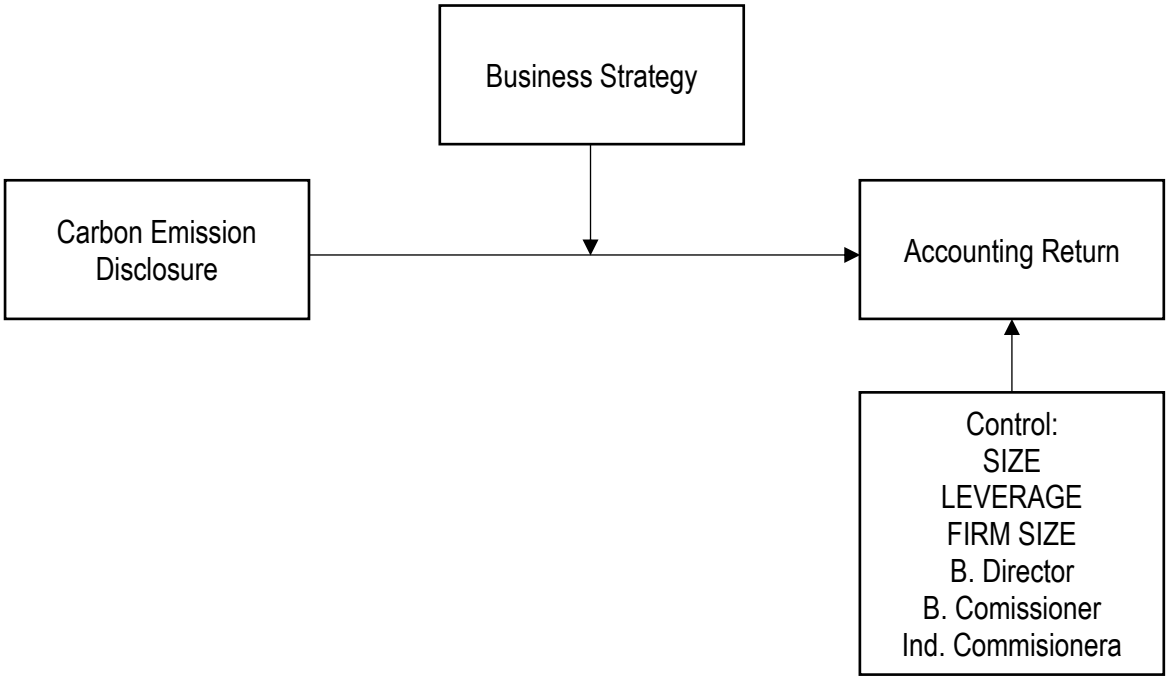

Figure 1. Conceptual Framework

RESULTS

Table 4. contains descriptive statistics for study-at-hand variables. The classification results indicate that the prospector strategy is the most dominant among Indonesian companies. A total of 1,538 companies have adopted the prospector strategy, while 315 companies remain in the defender strategy. This reflects a shift in business orientation toward a more innovative and adaptive approach to environmental changes. Nevertheless, the presence of companies with a defender strategy suggests that some businesses continue to prioritize cost efficiency and stability in response to economic uncertainty. Firms with a CED score ≥ 0.5 are classified as high disclosure while those with a score < 0.5 are classified as low disclosure. The results show that 1,092 firms fall into the high disclosure category, whereas 764 firms are categorized as low disclosure.

Table 5. provides the correlation matrix. The results weak correlation between independent measures with aggregate levels staying below 0.80 which means that multicollinearity is not a concern in this study.

Carbon emissions disclosure and accounting return

The test results presented in Table 7. indicate that accounting returns are not significantly affected by disclosure of carbon emissions; thereby that Hypothesis 1 (H1) is rejected. The findings are opposite from those presented in the literature as outlined by Desai (2024), Guastella et al. (2022), Meng et al. (2023), Saini et al. (2025), Xu and Narita (2025), as well as Zhu et al. (2024).

Table 3. Typology of Moderation Variable

	Related to Predictor	Not Related to Predictor
Not Interaction with Predictor	Predictor/Intervening/Exogenous	Homolgizer
Interaction with Predictor	Quasi	Pure

Table 4. Descriptive Statistics

	N	Min	p25	Median	p75	Max	Mean	SD
(1) Acc.Return	1856	-6.07	-0.241	-.027	.272	5.966	0	1
(2) Business Strategy	1856	0	1	1	1	1	.83	.376
(3) CED	1856	0	0.430	.5	.57	.86	.49	.107
(4) Size	1856	6.17	11.200	12.14	13.36	17.06	12.297	1.617
(5) Leverage	1856	-7.23	-0.410	-.13	.3	7.1	.025	1.011
(6) Firmage	1856	1	7.000	17	26	121	18.354	15.957
(7) B. Director	1856	1	3.000	4	6	14	4.586	1.97
(8) B.Commissioner	1856	1	2.000	3	3	4	2.749	.632
(9) Indep. Commissioner	1856	1	1.000	1	2	5	1.594	.793

The descriptive statistics reveal that disclosure of carbon emissions is 0.49 on average across non-financial firms, thereby indicating that a substantial number of such firms lack awareness of the significance of embracing responsibility for climate change that can be traced from their disclosure of carbon emissions. Nguyen et al. (2025) assert that sustainability reporting improvements are determinants that shape sustainability reporting quality that includes facilitative regulations, effective stakeholder considerations, as well as sophisticated economic developments. Even though investors typically shun firms that exhibit high levels of carbon emissions (Han et al. 2023), carbon disclosure resonates with investors as well as with company valuation. In Indonesia, regulatory policies still support a voluntary approach to sustainability efforts disclosure like carbon emissions reporting, which makes leading firms view it as largely image-building exercise while still holding on to a perception that disclosure of carbon would add up to operational costs.

Principle Component Analysist

The eigenvalues are split into two factors with values of 3.010 and 1.973, respectively, as Table 6 demonstrates. 71.192% of the variance in all seven financial performance ratios may be attributed to these causes. This indicates that these factors account for 71.192% of accounting returns.

Table 5. Pearson Correlation

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
(1) Acc.Return	1.000								
(2) Business Strategy	-0.014	1.000							
(3) CED	0.057*	-0.002	1.000						
(4) Size	0.032	0.021	0.022	1.000					
(5) Leverage	-0.008	-0.017	-0.020	0.168*	1.000				
(6) Firmage	-0.013	-0.013	0.077*	0.038	-0.036	1.000			
(7) B. Director	0.034	0.060*	0.027	0.517*	0.038	0.040	1.000		
(8) B.Commissioner	-0.004	0.003	0.006	-0.032	0.036	0.071*	-0.119*	1.000	
(9) Indep. Commissioner	0.022	-0.015	0.022	0.499*	0.077*	0.072*	0.501*	-0.119*	1.000

**** p<0.01, ** p<0.05, * p<0.1*

Table 6. Total Variance Explained

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	3.010	43.006	43.006	3.010	43.006	43.006
2	1.973	28.186	71.192	1.973	28.186	71.192
3	.835	11.922	83.114			
4	.582	8.312	91.426			
5	.526	7.517	98.942			
6	.048	.685	99.627			
7	.026	.373	100.000			

Carbon disclosure impact on accounting returns is tempered with business strategy

When moderation is introduced, business strategy (prospector) is a moderator of the association between carbon emissions disclosure and accounting return (β=0.9, significant at 5%) of firms. According to (Sharma et al. 1981), hypothesis 2 falls within the quasi moderation. That results are stable when using ROA (β=11.04, significant at 5%) and ROE (β=3.765, significant at 1%) as well. Hypothesis 2 is thus validated.

The results support the signalling theory that companies with creative business strategies would exploit carbon emissions disclosure as a competitive force to exceed performance in the marketplace. The influence of business strategy is paramount in boosting corporate value since it outlines competitive methods within the industry. In addition, this theory maintains that investors are morally predisposed to support companies with sustainability pledges (Srairi 2025). Preemptive action in sustainability can help increase profits (Xu and Narita 2025). Companies with creative business strategies (prospector) place a significantly positive impact on profitability (Day et al. 2025; Maury 2022; Poretti et al. 2024; Rodrigues et al. 2021; Suoniemi et al. 2020). Carbon emissions disclosure also improves organizational performance (Dewaelheyns et al. 2023; Yu et al. 2022) especially when supported with a healthy business approach.

Additional Test

Additional tests on research framework are reported in Table 8. Based on Table 6, Component 1 and 2 have the highest eigenvalues, namely 3.010 and 1.973, with a cumulative contribution of 71.192% to the total variance. Therefore, this study conducted an additional test using these two components to construct the accounting return variable. The results are consistent with the main test, indicating that the accounting return construct used has a robustness.

Table 7. Research Hypothesis Testing Results

	Accounting Return		ROA		ROE	
C	-1.18***	-1.01***	-7.02***	-5.38**	-9.12***	-13.17***
CED	-0.17	-	-1.13	-	-3.49	-
BS	-	-0.29*	-	-3.52*	-	2.93***
CED	-	-1.02***	-	-12.84***	-	-0.002
BS*CED	-	0.91**	-	11.04**	-	3.765***
Size	0.10***	0.10***	0.78***	0.88***	1.14***	1.20***
Leverage	-0.15***	-0.13***	-1.48***	-0.98***	-1.28***	-1.34***
Firmage	-0.0006	0.0002	-0.01	0.005	-0.01	-0.006***

	Accounting Return		ROA		ROE	
B. Director	0.024**	0.08***	0.28**	1.22***	0.61***	0.65***
B.Commissioner	-0.008	0.01	-0.05	0.30***	-0.58	-0.41***
Indep. Commissioner	0.02	0.02**	0.36	0.05	-0.005	0.02
Obs	1856	1856	1856	1856	1856	1856
Adjusted R^2	0.27	0.18	0.13	0.12	0.08	0.07

*** p<0.01, ** p<0.05, * p<0.1*

Robustness Test

Robustness tests on research are reported in Table 9. The analysis was carried out through estimating the research framework's role in moderating the effect of disclosure of carbon emission on accounting returns, namely ROA and ROE, through classifying top and bottom scores on disclosure of carbon emission in pre-COVID times. The results confirm that the research framework is robust.

CONCLUSION

This research contributes to the existing literature on business strategies that enhance the effect of carbon emissions disclosure on corporate accounting returns. The outcome of this research shows that business strategy moderates it so that carbon emissions disclosure does not influence accounting returns. We then applied business strategy as a moderating variable and identified that business strategy enhances the role of carbon emissions disclosure on corporate accounting returns.

The population in this research includes non-financial Indonesia Stock Exchange-listed companies during 2016-2023 with 1,856 observations. The paper is theoretically significant. These research findings contribute to existing literature and are a source of inspiration for future researchers on business strategy moderating carbon emissions disclosure on accounting returns. Our results also have real-world effects. First, the results show the government that Indonesian enterprises that don't deal with money still don't completely understand how carbon emissions from businesses affect the climate. Even though the regulations are still voluntary, companies have not fully complied with them. However, for companies that disclose their carbon emissions using innovative strategies, this can be an opportunity to gain a competitive edge in the market. Therefore, the government needs to quickly enforce these regulations to make them mandatory. In addition, there needs to be continuous monitoring by the government of companies that are still reluctant to disclose their carbon emissions, especially companies that produce carbon emissions above the specified threshold to achieve the SDGs.

Table 8. Additional Test Result

	Accounting Return		ROA		ROE	
C	-0.16*	-0.30***	-7.35**	-2.78**	-33.82***	-13.17***
CED	0.13	-	-1.90	-	-0.01	-
BS	-	-0.24***	-	-4.15**	-	1.74***
CED	-	-0.63***	-	-5.76	-	-0.97*
BS*CED	-	0.52***	-	8.81**	-	4.72***
Size	0.01	-0.002*	0.78***	-1.35***	1.72***	-0.73***
Leverage	-0.02**	-0.001***	-1.48***	-0.02	-7.77***	-0.019***
Firmage	-0.001**	-0.0001	-0.01	0.42***	0.09	0.85***
B. Director	-0.04	0.007***	0.28**	0.081	0.71	-0.20***
B.Commissioner	0.003	0.007***	-0.05	1.075***	0.17	1.36***
Indep. Commissioner	-0.007	-0.002	0.36	-1.35	4.57***	-0.73***
Obs	1856	1856	1856	1856	1856	1856
Adjusted R^2	0.27	0.18	0.13	0.12	0.08	0.07

*** p<0.01, ** p<0.05, * p<0.1*

Table 9. Robustness Test Result - 1

	CED Score Under 50			CED Score Upper 50		
	Accounting Return	ROA	ROE	Accounting Return	ROA	ROE
C	-2.16	-2.16	-5.07***	-10.04***	-2.09***	-19.95**
BS	-4.49	-4.49	-6.35***	1.72**	-10.74***	9.0004
CED	-18.34***	-18.34***	-26.23***	-1.59	8.74***	7.74
BS*CED	12.4*	12.4*	16.92***	2.57*	0.85***	10.62
Size	1.003***	1.003***	1.57***	0.73***	-0.93***	1.14***
Leverage	-1.92***	-1.92***	-1.61***	-0.73***	0.004***	-1.008***
Firmage	-0.01	-0.01	-0.019***	-0.004***	0.26***	0.003
B. Director	0.11	0.11	0.40***	0.33***	0.21***	0.60***
B.Commissioner	0.008	0.008	-0.06	0.48***	-0.22***	0.70**
Indep.Commissioner	0.04	0.04	-0.37***	-0.53***	-5.77***	-1.47*
Obs	1856	1856	1856	1856	1856	1856
Adjusted R^2	0.16	0.017	0.12	0.18	0.12	0.07

Firms are obligated to consider actively the desires of international stakeholders. In the current times, disclosure of carbon emissions is a critical requirement, and this would be a positive signal for investors when companies are concerned about climate change. It signals that such disclosure would be worthwhile for companies in the long run. Organizations with creative entrepreneurial approaches can turn carbon emissions as a chance for sustaining legitimacy as well as reputation-enhancing purposes and enable such information to be drawn on by investors when taking well-informed investment decisions.

The study's limitations are that it uses a sample that only includes non-financial companies from Indonesia. Future research can develop a larger sample that includes a variety of regions across Southeast Asia through classifying countries along whether they require or permit voluntary sustainability standards since several implicit as well as explicit factors surround culture for disclosure of carbon emission.

Further, countries are also classified depending on levels of carbon emission production—high, medium, as well as low—considering several implicit as well as explicit factors such as sustainability policies as well as culture.

Table 9. Robustness Test Result - 2

	Precovid 19		
	Accounting Return	Accounting Return	Accounting Return
C	-1.108***	-1.108***	-1.108***
BS	-0.002	-0.002	-0.002
CED	-0.58***	-0.58***	-0.58***
BS*CED	0.42***	0.42***	0.42***
Size	0.08***	0.08***	0.08***
Leverage	-0.05***	-0.05***	-0.05***
Firmage	0.0005***	0.0005***	0.0005***
B. Director	0.02***	0.02***	0.02***
B.Commissioner	0.034***	0.034***	0.034***
Indep.Commissioner	-0.026***	-0.026***	-0.026***
Obs	1856	1856	1856
Adjusted R^2	0.09	0.09	0.09

*** *p<0.01, ** p<0.05, * p<0.1*

REFERENCES:

Allee, K. D., C. Do, and F. G. Raymundo. 2022. "Principal Component Analysis and Factor Analysis in Accounting Research." Journal of Financial Reporting 7 (2): 1–39. https://doi.org/10.2308/jfr-2021-005.

Banna, H., M. K. Hassan, R. Ahmad, and M. R. Alam. 2022. "Islamic Banking Stability Amidst the COVID-19 Pandemic: The Role of Digital Financial Inclusion." International Journal of Islamic and Middle Eastern Finance and Management 15 (2): 310–330. https://doi.org/10.1108/IMEFM-08-2020-0389.

Bentley-Goode, K. A., N. J. Newton, and A. M. Thompson. 2017. "Business Strategy, Internal Control Over Financial Reporting, and Audit Reporting Quality." Auditing 36 (4): 49–69. https://doi.org/10.2308/ajpt-51693.

Borghei, Z., P. Leung, and J. Guthrie. 2018. "Voluntary Greenhouse Gas Emission Disclosure Impacts on Accounting-Based Performance: Australian Evidence." Australasian Journal of Environmental Management 25 (3): 1–18. https://doi.org/10.1080/14486563.2018.1466204.

Brighi, P., A. C. F. Della Bina, and V. Venturelli. 2025. "Firm Value and Risk: How Relevant Are ESG Factors and ESG Controversies?" Journal of Financial Reporting and Accounting ahead-of-print (ahead-of-print). https://doi.org/10.1108/JFRA-12-2024-0953.

Brouwers, R., and C. Van Hulle. 2018. "The Influence of Carbon Cost Pass Through on the Link Between Carbon Emission and Corporate Financial Performance in the Context of the European Union Emission Trading Scheme." Business Strategy and the Environment: 1–15. https://doi.org/10.1002/bse.2193.

Chen, L., F. Hu, A. Krishnan, and L. Z. Li. 2022. "Business Strategy, Financial Reporting Violations, and Audit Pricing in an Emerging Market—Evidence from China." Journal of International Accounting Research 21 (3): 47–72. https://doi.org/10.2308/JIAR-2021-054.

Chen, Y., J. D. Eshleman, and J. S. Soileau. 2017. "Business Strategy and Auditor Reporting." Auditing 36 (2): 63–86. https://doi.org/10.2308/ajpt-51574.

Choi, B., and L. Luo. 2021. "Does the Market Value Greenhouse Gas Emissions? Evidence from Multi-Country Firm Data." British Accounting Review 53 (1): 100909. https://doi.org/10.1016/j.bar.2020.100909.

Combs, J. G., T. R. Crook, and C. L. Shook. 2005. "The Dimensionality of Organizational Performance and Its Implications for Strategic Management Research." Research in Methodology and Strategy 2 (05): 259–286. https://doi.org/10.1016/s1479-8387(05)02011-4.

Constantatos, A. F., A. Merika, and X. A. Merika. 2025. "Revision of Corporate Governance Codes in the UK: Implications for Firm Value and Earnings Management." Corporate Governance 26 (3): 746-778. https://doi.org/10.1108/CG-10-2024-0545.

Dalwai, T., and M. Salehi. 2021. "Business Strategy, Intellectual Capital, Firm Performance, and Bankruptcy Risk: Evidence from Oman's Non-Financial Sector Companies." Asian Review of Accounting 29 (3): 474–504. https://doi.org/10.1108/ARA-01-2021-0008.

Datt, R., L. Luo, Q. Tang, and G. Mallik. 2018. "An International Study of Determinants of Voluntary Carbon Assurance." Journal of International Accounting Research 17 (3): 1–20. https://doi.org/10.2308/jiar-52221.

Day, M., S. S. Lichtenstein, and P. Samouel. 2025. "Supply Management Capability, Strategic Orientation and Firm Performance." Strategy and Leadership. https://doi.org/10.1108/SL-02-2025-0018.

Desai, R. 2024. "Analysing the Firm Value Effects of Environmental, Social and Governance Disclosure: Empirical Study of Indian Firms." NMIMS Management Review 32 (1): 58–67. https://doi.org/10.1177/09711023241264679.

Desai, R., and J. Desai. 2021. "Impact of Carbon Emission on Financial Performance: Empirical Evidence from India." South Asian Journal of Business Studies 11 (4): 450-470. https://doi.org/10.1108/SAJBS-10-2020-0384.

Desai, R., A. Raval, and S. Thanki. 2025. "Does Internal Carbon Pricing Moderate the Firm Value Effects of Carbon Emission? A Study of an Emerging Economy." Journal of Applied Accounting Research 26 (5): 1213–1236. https://doi.org/10.1108/JAAR-07-2024-0248.

Dewaelheyns, N., F. Schoubben, K. Struyfs, and C. Van Hulle. 2023. "The Influence of Carbon Risk on Firm Value: Evidence from the European Union Emission Trading Scheme." Journal of Environmental Management 344: 118293. https://doi.org/10.1016/j.jenvman.2023.118293.

Dorsaf, B. 2025. "The Shadow of Narcissism on CSR: Unveiling Hidden Dynamics of Financial Performance Within the SBF 120." EuroMed Journal of Business ahead-of-print (ahead-of-print). https://doi.org/10.1108/EMJB-02-2025-0059.

Dossa, J. V., C. C. Ukwuoma, D. Thomas, J. M. Dossa, and A. A. Gopang. 2025. "Prediction of Nexus Among ESG Disclosure and Firm Performance: Applicability, Explainability and Implications." Innovation and Green Development 4 (4): 100261. https://doi.org/10.1016/j.igd.2025.100261.

Duan, Y., Z. Han, H. Zhang, and H. Wang. 2021. "Research on the Applicability and Impact of CO2 Emission Reduction Policies on China's Steel Industry." International Journal of Climate Change Strategies and Management 13 (3): 352–374. https://doi.org/10.1108/IJCCSM-02-2021-0020.

Fakhfakh, I., A. Ghribi, and S. Smaoui. 2026. "Balancing Green Innovation and ESG Factors: Implications for Banking Performance." International Journal of Productivity and Performance Management ahead-of-print (ahead-of-print): 1–23. https://doi.org/10.1108/IJPPM-06-2025-0608.

Gao, L., and T. G. Calderon. 2023. "Climate Change Risk Disclosures and Audit Fees: A Text Analytics Assessment." Journal of Emerging Technologies in Accounting 20 (2): 1–23. https://doi.org/10.2308/jeta-2021-003.

Gomes, C. F., M. M. Yasin, and J. V. Lisboa. 2007. "The Dimensionality and Utilization of Performance Measures in a Manufacturing Operational Context: Organizational Change Implications." Cross Cultural Management: An International Journal 14 (4): 286–306. https://doi.org/10.1108/13527600710830322.

Guastella, G., M. Mazzarano, S. Pareglio, and R. C. Spani. 2022. "Do Environmental and Emission Disclosure Affect Firms' Performance?: Evidence from Sectorial Micro Data." Eurasian Business Review 12 (4): 695–718. https://doi.org/10.1007/s40821-021-00195-9.

Habib, A., and M. M. Hasan. 2020. "Business Strategies and Annual Report Readability." Accounting and Finance 60 (3): 2513–2547. https://doi.org/10.1111/acfi.12380.

Hambrick, D. C. 1983. "Some Tests of the Effectiveness and Functional Attributes of Miles and Snow's Strategic Types." Academy of Management Journal 26 (1): 5–26. https://doi.org/10.2307/256132.

Han, H. H., J. Lee, and B. Wang. 2023. "Greenhouse Gas Emissions, Firm Value, and the Investor Base: Evidence from Korea." Emerging Markets Review 56: 101048. https://doi.org/10.1016/j.ememar.2023.101048.

Han, Y.-G., H.-W. Huang, W.-P. Liu, and Y.-L. Hsu. 2023. "Firm-Value Effects of Carbon Emissions and Carbon Disclosures: Evidence from Taiwan." Accounting Horizons 37 (3): 171–191. https://doi.org/10.2308/horizons-18-164r.

Haroon, M., M. Ullah, Z. Li, S. Zhu, J. Wang, and C. P. Hsueh. 2025. "Impact of Emerging Technologies on Corporate Social Responsibility in Mining Industry." Resources Policy 102: 105454. https://doi.org/10.1016/j.resourpol.2024.105454.

Hassan, O. A. G., and P. Romilly. 2018. "Relations Between Corporate Economic Performance, Environmental Disclosure and Greenhouse Gas Emissions: New Insights." Business Strategy and the Environment: 1–17. https://doi.org/10.1002/bse.2040.

Ittner, C. D., D. F. Larcker, and T. Randall. 2003. "Performance Implications of Strategic Performance Measurement in Financial Services Firms." Accounting, Organizations and Society 28 (7–8): 715–741. https://doi.org/10.1016/S0361-3682(03)00033-3.

Kurnia, P., D. Agustia, N. Soewarno, and A. Ardianto. 2025. "The Mediating Role of Carbon Emission Disclosure in the Relationship Between Structure of Corporate Governance and Firm Performance." Journal of Applied Accounting Research 26 (5): 1106–1134. https://doi.org/10.1108/JAAR-01-2023-0015.

Le, H., and H. T. Nguyen-Phung. 2024. "Assessing the Impact of Environmental Performance on Corporate Financial Performance: A Firm-Level Study of GHG Emissions in Africa." Sustainable Production and Consumption 47: 644–654. https://doi.org/10.1016/j.spc.2024.04.024.

Liu, J., K. Uchida, and C. Bao. 2024. "Environmental Regulation, Corporate Environmental Disclosure, and Firm Performance: Evidence from China." Pacific Basin Finance Journal 85: 102367. https://doi.org/10.1016/j.pacfin.2024.102367.

Luo, L., and H. Wu. 2019. "Voluntary Carbon Transparency: A Substitute for or Complement to Financial Transparency?" Journal of International Accounting Research 18 (2): 65–88. https://doi.org/10.2308/jiar-52421.

Maltz, A. C., A. J. Shenhar, and R. R. Reilly. 2003. "Beyond the Balanced Scorecard: Refining the Search for Organizational Success Measures." Long Range Planning 36 (2): 187–204. https://doi.org/10.1016/S0024-6301(02)00165-6.

Maury, B. 2022. "Strategic CSR and Firm Performance: The Role of Prospector and Growth Strategies." Journal of Economics and Business 118: 106031. https://doi.org/10.1016/j.jeconbus.2021.106031.

Meng, X., D. Gou, and L. Chen. 2023. "The Relationship Between Carbon Performance and Financial Performance: Evidence from China." Environmental Science and Pollution Research 30 (13): 38269–38281. https://doi.org/10.1007/s11356-022-24974-7.

Miles, Raymond E., and Charles C. Snow. 2003. Organizational Strategy, Structure, and Process. Stanford, CA: Stanford University Press.

Miles, R. E., Snow, C. C., Meyer, A. D., & Coleman, H. J. , Jr. (1978). Organizational Strategy, Structure, and Process. Academy of Management Review, 3(3), 546–562. https://doi.org/10.5465/AMR.1978.4305755

Misani, N., and S. Pogutz. 2015. "Unraveling the Effects of Environmental Outcomes and Processes on Financial Performance: A Non-Linear Approach." Ecological Economics 109: 150–160. https://doi.org/10.1016/j.ecolecon.2014.11.010.

Murphy, G., J. Trailer, and R. Hill. 1996. "Measuring Research Performance in Entrepreneurship." Journal of Business Research 36 (1): 15–23. https://doi.org/10.1016/0148-2963(95)00159-X

Nkgowe, ST., S., Qu, L., & Afotey Odai, L. 2025. "The interplay between digital organizational culture, ESG performance, and corporate reputation in shaping innovation capacity". Business Process Management Journal ahead-of-print (ahead-of-print). https://doi.org/10.1108/BPMJ-01-2025-0040

Nguyen, T. H., M. M. Abu Afifa, L. T. Le Nguyen, T. H. T. Tran, and N. T. Dao. 2025. "Sustainability Report Quality with Moderating Impact of Carbon Emissions Index: Evidence from ASEAN Region." Pacific Accounting Review ahead-of-print (ahead-of-print). https://doi.org/10.1108/PAR-09-2024-0228.

Peng, C. W. 2020. "The Role of Business Strategy and CEO Compensation Structure in Driving Corporate Social Responsibility: Linkage Towards a Sustainable Development Perspective." Corporate Social Responsibility and Environmental Management 27 (2): 1028–1039. https://doi.org/10.1002/csr.1863.

Poretti, C., J. P. Weisskopf, and P. de Vivie de Régie. 2024. "Innovative Business Strategies, Corporate Performance, and Firm Value in the Travel and Leisure Industry." International Journal of Hospitality Management 118: 103683. https://doi.org/10.1016/j.ijhm.2023.103683.

Richter, P. C. 2025. "CSR Incentives and Corporate Irresponsibility: Evidence from the United States." Review of Accounting and Finance ahead-of-print (ahead-of-print). https://doi.org/10.1108/RAF-11-2024-0481.

Rodrigues, J., P. Ruivo, and T. Oliveira. 2021. "Mediation Role of Business Value and Strategy in Firm Performance of Organizations Using Software-as-a-Service Enterprise Applications." Information and Management 58 (1): 103289. https://doi.org/10.1016/j.im.2020.103289.

Rowe, W. G., and J. L. Morrow. 1999. "A Note on the Dimensionality of the Firm Financial Performance Construct Using Accounting, Market, and Subjective Measures." Canadian Journal of Administrative Sciences 16 (1): 58–71. https://doi.org/10.1111/j.1936-4490.1999.tb00188.x.

Said Abdel Azzim, A., O. I. Tawfik, H. Elmaasrawy, S. Reyad, and S. Elgohary. 2026. "The Moderating Role of Corporate Social Responsibility in the Climate and Firm Value Nexus in Saudi Arabia." Management & Sustainability: An Arab Review ahead-of-print (ahead-of-print): 1–30. https://doi.org/10.1108/MSAR-08-2025-0274.

Saini, N., M. Singhania, P. Roy, S. Aggarwal, and R. Kharb. 2025. "Environment, Social, and Governance Disclosures and Firm Performance: A Critical Review and Future Agenda." Journal of the Knowledge Economy. https://doi.org/10.1007/s13132-025-02769-8.

Sharma, S., R. M. Durand, and O. Gur-Arie. 1981. "Identification and Analysis of Moderator Variables." Journal of Marketing Research 8 (3): 291-300. https://doi.org/10.2307/3150970

Siddique, M. A., M. Akhtaruzzaman, A. Rashid, and H. Hammami. 2021. "Carbon Disclosure, Carbon Performance and Financial Performance: International Evidence." International Review of Financial Analysis 75: 101734. https://doi.org/10.1016/j.irfa.2021.101734.

Sintia F., I. Dewi, and E. Rizky. 2025. "The Interplay Between ESG Controversies and Innovation on Firm Financial Performance: Evidence from Indonesia." Jurnal Bisnis Dan Akuntansi 27 (2): 233–244. http://jurnaltsm.id/index.php/JBA.

Srairi, S. 2025. "ESG Performance in GCC Banks: The Influence of Ownership Structure, Risk Attitude and Board Characteristics in Islamic vs Conventional Contexts." Sustainability Accounting, Management and Policy Journal ahead-of-print (ahead-of-print). https://doi.org/10.1108/SAMPJ-11-2024-1190.

Steelyana, E., K. Michael, and K. Raharjo. 2024. "Sustainability Reporting: Stakeholder Pressure and Board Composition Influence." Jurnal Bisnis Dan Akuntansi 26 (1): 67–84. http://jurnaltsm.id/index.php/JBA.

Suoniemi, S., L. Meyer-Waarden, A. Munzel, A. R. Zablah, and D. Straub. 2020. "Big Data and Firm Performance: The Roles of Market-Directed Capabilities and Business Strategy." Information and Management 57 (7): 103365. https://doi.org/10.1016/j.im.2020.103365.

Tosi, H. L., S. Werner, J. P. Katz, and L. R. Gomez-Mejia. 2000. "How Much Does Performance Matter? A Meta-Analysis of CEO Pay Studies." Journal of Management 26 (2): 301–339. https://doi.org/10.1177/014920630002600207.

Wang, L. 2011. "Low-Carbon Development Model of Tourist Attractions Based on Stakeholder Theory." 2011 International Conference on Electronics, Communications and Control, ICECC 2011 - Proceedings: 3800–3803. https://doi.org/10.1109/ICECC.2011.6067992.

Xu, T., and D. Narita. 2025. "Qualitative and Quantitative Voluntary Carbon Disclosure Diversely Affects Chinese Firm Performance." Discover Sustainability 6 (1): 711. https://doi.org/10.1007/s43621-025-01633-8.

Yin, L., Y. Han, J. Shao, J. Dai, and Y. Shou. 2025. "Does ESG Rating Divergence Depress Trade Credit? A Signaling Theory Perspective." Transportation Research Part E: Logistics and Transportation Review 203: 104369. https://doi.org/10.1016/j.tre.2025.104369.

Yu, P., R. Hao, Z. Cai, Y. Sun, and X. Zhang. 2022. "Does Emission Trading System Achieve the Win-Win of Carbon Emission Reduction and Financial Performance Improvement? —Evidence from Chinese A-Share Listed Firms in Industrial Sector." Journal of Cleaner Production 333: 130121. https://doi.org/10.1016/j.jclepro.2021.130121.

Zhu, J., C. Zhang, J. Zhao, Y. Ji, and W. Wang. 2024. "The Impact of Declarative and Interactive Carbon Disclosure on Firm Value: Complements or Substitutes?" Environment, Development and Sustainability 26 (5): 13375–13409. https://doi.org/10.1007/s10668-023-04215-8.

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