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THE INFLUENCE OF GREEN STRATEGY AND INTERNATIONAL OPERATIONS ON CARBON EMISSION DISCLOSURE WITH OWNERSHIP CONCENTRATION AS A MODERATION VARIABLE

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Abstract
This study investigates the effect of Green Strategy and International Operation on Carbon Emission Disclosure (CED), with a specific focus on the moderating role of Ownership Concentration. Using a quantitative associative approach and panel regression analysis, data were collected from 72 financial sector companies listed on the Indonesia Stock Exchange (IDX) over the period 2020–2023, resulting in 288 firm-year observations. The study employs a panel data regression model and Moderated Regression Analysis (MRA) to test the proposed hypotheses. The results reveal that both Green Strategy and International Operation have a significant positive effect on Carbon Emission Disclosure, confirming that environmentally oriented strategies and international business exposure lead to greater transparency in emission reporting. Moreover, Ownership Concentration does not moderate the relationship between Green Strategy and Carbon Emission Disclosure. However, it positively moderates the relationship between International Operation and Carbon Emission Disclosure, suggesting that highly concentrated ownership enhances the strategic influence of international exposure on environmental reporting. This study contributes to the growing body of literature on corporate environmental disclosure by providing empirical evidence from an emerging market context. The findings support the Stakeholder Theory and Legitimacy Theory, indicating that both internal corporate strategies and external operational contexts play vital roles in shaping environmental transparency.

Keywords: Green Strategy, International Operation, Ownership Concentration, Carbon Emission Disclosure

1. Introduction

Climate change, primarily driven by excessive greenhouse gas (GHG) emissions, has become one of the most pressing global environmental challenges. The accumulation of carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), and other industrial gases in the atmosphere leads to the intensification of the greenhouse effect, resulting in global warming (Cholida & Kawedar, 2020). Among these gases, CO_2 remains the most dominant contributor to climate change due to its vast accumulation from fossil fuel combustion, deforestation, and industrial activity.

Amid growing environmental concerns, the financial sector—particularly banks—has emerged as a critical actor in the global decarbonization agenda. In Indonesia, Bank Indonesia (BI) has taken a proactive stance by integrating climate-related policies into the banking sector, including macroprudential inclusive financing ratios, green bond investments, and preferential loan-to-value ratios for low-emission vehicles (Antaranews.com, accessed July 16, 2025). These regulatory efforts aim to enhance green finance accessibility and promote corporate transparency regarding environmental performance, especially carbon emission disclosure (CED).

However, the role of financial sector development in environmental quality remains debated. Some studies argue that financial growth facilitates eco-friendly investments and reduces environmental degradation (Charfeddine & Khediri, 2016; Jiang & Ma, 2019), while others suggest that financial expansion may exacerbate pollution due to increased industrial activity (Shahbaz et al., 2013b). The empirical evidence remains inconclusive, particularly in emerging economies like Indonesia.

This study focuses on carbon emission disclosure as a manifestation of corporate accountability and sustainability. CED refers to the voluntary or mandatory reporting of carbon-related activities and their environmental impacts. Although international frameworks and stakeholder pressure have elevated CED practices in developed countries, such disclosure remains limited and inconsistent in Indonesia (Kiswanto et al., 2023; Sudjono & Setiawan, 2022). As of recent studies, many high-carbon sectors such as coal and manufacturing exhibit low compliance with carbon disclosure standards, underscoring the urgent need for regulatory and strategic interventions (Guo & Pan, 2022; Maharani & Rozzaid, 2022).

Building on this context, this study investigates the effect of green strategy and international operations on carbon emission disclosure, with ownership concentration as a moderating variable. A green strategy represents a firm's proactive stance on environmental protection, health and safety, and sustainable operations (Andrian & Kevin, 2021). International operations, which reflect cross-border business activities and global supply chain engagement, are often associated with higher scrutiny from international stakeholders, thus influencing disclosure behavior (Hashmi, 2015).

Ownership concentration, on the other hand, acts as a governance mechanism that can either enhance or inhibit transparency, depending on the alignment of majority shareholders' interests with broader stakeholder values (Kömeçoğlu & Vuran, 2018). Previous studies offer mixed evidence regarding its moderating role in sustainability reporting (Adaobi, 2021; Suripto, 2023), suggesting the need for deeper exploration within specific national and sectoral contexts.

This study seeks to fill the empirical and theoretical gaps by analyzing the combined influence of green strategy and international operations on CED in Indonesian financial firms, while assessing whether ownership concentration moderates these relationships. Unlike prior studies that tend to examine these variables in isolation or in non-financial sectors, this research provides a comprehensive and context-specific model relevant to current regulatory shifts and stakeholder expectations in Indonesia.

The remainder of this paper is structured as follows: Section 2 reviews relevant literature and theoretical frameworks; Section 3 describes the research methodology; Section 4 presents the empirical results and analysis; and Section 5 discusses the findings, followed by conclusions and policy implications.

2. Theoretical Background

2.1. Legitimacy Theory

Legitimacy theory posits that organizations strive to align their operations and disclosures with prevailing social norms and values to ensure societal approval and survival (Dowling & Pfeffer, 1975; Suchman, 1995). An organization is considered legitimate when its value system is congruent with the societal value system in which it operates (Chariri & Ghozali, 2007). This alignment is crucial for securing long-term organizational support, including from government, communities, and other stakeholders (Rahajeng & Marsono, 2011).

Corporate disclosure—especially environmental disclosure—can be viewed as a strategic tool to maintain or regain legitimacy, particularly in response to public scrutiny regarding ecological impacts (Deegan & Unerman, 2006). Carbon Emission Disclosure (CED), as a subset of environmental reporting, is a mechanism for demonstrating that a firm's activities are consistent with environmental and societal expectations. The presence of a legitimacy gap—where corporate actions diverge from public expectations—may threaten corporate image and invite regulatory or social backlash (Ghozali, 2016; Gray et al., 1994).

2.2. Stakeholder Theory

Stakeholder theory emphasizes that firms have a responsibility not only to their shareholders but also to other parties who are affected by or have influence over the organization, including employees, customers, communities, and regulators (Freeman, 1984; Ghazali & Chairi, 2007). According to this theory, corporate disclosures are not merely compliance tools but a means to manage stakeholder relationships and expectations, especially concerning social and environmental issues (Deegan & Unerman, 2011).

Effective stakeholder engagement and transparency can mitigate risks of conflict and foster trust. In the context of CED, companies are encouraged to voluntarily disclose carbon-related data to meet the growing demand from environmentally conscious stakeholders (Bhorgei-Ghomi & Leung, 2013). Failing to do so may result in loss of reputation and financial capital, especially for firms with high leverage or exposure to global markets (Umi Hanifah & Wahyono, 2018).

2.3. Carbon Emission Disclosure

Carbon Emission Disclosure refers to the voluntary or regulated disclosure of carbon-related information, including greenhouse gas (GHG) emissions, mitigation efforts, and environmental strategies (Andrew & Cortese, 2012; Choi et al., 2013). CED is increasingly seen as a key indicator of corporate sustainability and environmental accountability. It is often presented in sustainability or annual reports and serves as a communication tool with investors and stakeholders regarding a company's climate-related performance (Ida et al., 2023).

According to the Carbon Disclosure Project (2022), companies that engage in comprehensive CED benefit from enhanced transparency, improved operational efficiency, and increased market opportunities. In the Indonesian context, CED remains largely voluntary, resulting in inconsistent practices and limited coverage in corporate reports (Jannah & Muid, 2014; Sari et al., 2021).

2.4. Green Strategy

A green strategy refers to a firm's commitment to integrating environmental sustainability into its core business operations. It involves actions aimed at reducing environmental harm, improving resource efficiency, and creating eco-friendly products and services (Pattie, 1992; Borin et al., 2013). Green strategies enable firms to achieve economic performance while minimizing negative environmental impacts.

Green strategic initiatives often align with stakeholder expectations for environmental stewardship and demonstrate proactive risk management regarding climate change (Porter & Van der Linde, 1995). The implementation of green strategies has been linked to increased carbon transparency and more extensive disclosure practices (Afni et al.,

2018; Olson, 2018). In this study, green strategy is assessed using multidimensional indicators encompassing product development, facility management, partnerships, reporting systems, and environmental technologies.

2.5. International Operations

International operations expose firms to diverse regulatory, cultural, and stakeholder environments, which can significantly influence disclosure behavior (Hashmi et al., 2015). Multinational corporations are often subject to greater environmental scrutiny and are expected to adopt global best practices in environmental reporting, including carbon emission disclosure (Zhang & Yu, 2012; Sullivan & Gouldson, 2011).

Operating in multiple jurisdictions often requires firms to comply with varying legal and regulatory frameworks concerning carbon emissions, thus motivating more detailed and transparent disclosures. Firms with extensive international operations are also likely to be involved in global supply chains, further increasing the relevance and complexity of CED.

2.6. Ownership Concentration

Ownership concentration refers to the proportion of equity held by a limited number of shareholders who exercise significant control over corporate decisions (Kamijaya, 2019; Muhyidin et al., 2021). High ownership concentration may enhance monitoring and reduce agency conflicts between managers and owners (Ismanto & Rosini, 2023), potentially influencing disclosure behavior positively.

However, the effect of ownership concentration on CED remains mixed. While concentrated ownership may lead to better governance and disclosure due to greater accountability (Akbar et al., 2021), it may also result in reduced transparency if dominant shareholders prioritize personal gains over stakeholder interests (Ratnadi & Ulupui, 2016). Therefore, ownership concentration is considered a potential moderating variable in the relationship between green strategy, international operations, and CED.

2.7 Hypotheses Development

2.7.1. The Effect of Green Strategy on Carbon Emission Disclosure

According to legitimacy theory, sustainability reporting serves as a mechanism through which firms demonstrate their commitment to environmental accountability. The voluntary disclosure of carbon emissions enhances public trust and organizational legitimacy, potentially increasing the firm's intangible assets and long-term value (Rachmawati, 2021). Green strategy, which incorporates energy efficiency, renewable resource usage, and emission reduction initiatives, provides a structured approach for managing environmental risks and aligning with climate-related opportunities (Porter & Van der Linde, 1995; Adrian & Kevin, 2021).

Green strategies are also aligned with stakeholder theory, which asserts that companies must respond to the demands of various stakeholders, including investors, customers, and regulators, by providing transparent information regarding environmental performance (Ghozali, 2016). As such, carbon emission disclosure (CED) can be seen as a response to stakeholder pressure and expectations (Afni et al., 2018).

Empirical evidence supports this relationship. Karina (2021), Ramadhani (2023), and Maharani (2024) found a significant positive influence of green strategy on CED, indicating that companies with well-integrated green strategies are more likely to disclose carbon-related information as part of their environmental responsibility.

H1: Green strategy has a significant effect on carbon emission disclosure.

2.7.2. The Effect of International Operations on Carbon Emission Disclosure

Operating across international boundaries exposes firms to various institutional environments, including regulatory frameworks and stakeholder expectations that differ by country. Stakeholder theory posits that organizations must communicate relevant information to all parties affected by corporate actions (Freeman, 2010). In this context, international operations can motivate firms to disclose carbon emissions transparently to align with global customer expectations and comply with diverse environmental regulations (Ngatimin et al., 2024).

Prior studies support this assertion. Hashmi (2015), Bahsakara (2018), and Doring et al. (2023) observed that internationalized firms exhibit greater environmental transparency due to higher stakeholder scrutiny and the need for legitimacy across jurisdictions. Moreover, Park et al. (2023) emphasizes the influence of foreign investors from environmentally conscious countries, who transfer disclosure practices to emerging markets.

H2: International operations have a significant effect on carbon emission disclosure.

2.7.3. The Moderating Effect of Ownership Concentration on the Relationship between Green Strategy and Carbon Emission Disclosure

Ownership concentration refers to the degree to which shares are held by a few dominant shareholders. High ownership concentration can improve monitoring effectiveness and reduce agency conflicts, thereby influencing corporate governance and transparency (Alfiani & Rahmawati, 2019; Ismanto & Rosini, 2023). Firms with strong performance and concentrated ownership are often more motivated to disclose relevant environmental information to protect investor interests (Sukarti & Suwarti, 2018).

Given that green strategy requires top-level commitment and stakeholder responsiveness, ownership concentration may strengthen the effect of green strategy on CED by enhancing strategic alignment and reporting rigor.

H3: Ownership concentration moderates the relationship between green strategy and carbon emission disclosure.

2.3.4. The Moderating Effect of Ownership Concentration on the Relationship between International Operations and Carbon Emission Disclosure

Companies operating internationally are subject to multiple layers of environmental regulation and stakeholder expectations, requiring greater levels of environmental transparency (Sullivan & Gouldson, 2012). However, the extent of such disclosure may vary depending on internal governance structures, including ownership concentration. Firms with concentrated ownership structures may be more responsive to environmental disclosure requirements due to increased oversight and accountability (Yusuf, 2020).

Therefore, ownership concentration could moderate the influence of international operations on CED, especially in firms where dominant shareholders prioritize long-term sustainability and global reputation.

H4: Ownership concentration moderates the relationship between international operations and carbon emission disclosure.

3. Methods

3.1 Research Desain

This research adopts a quantitative associative approach, which aims to identify and explain the causal relationships between variables through hypothesis testing. The quantitative method emphasizes the use of numerical data and statistical analysis, based

on a positivist paradigm (Sugiyono, 2019). The primary method of analysis applied is panel data regression, which allows for the integration of both time-series and cross-sectional data. This approach is suitable for capturing the dynamic effects of multiple variables across a defined time period and multiple entities.

The data used in this study is secondary data, which refers to data obtained from existing sources rather than collected directly by the researcher. The data were obtained through document analysis of annual reports and sustainability reports published by companies in the financial sector that are listed on the Indonesia Stock Exchange (IDX). The reports were accessed through the official websites of the respective companies as well as from the IDX's official website (www.idx.co.id). The data collection period covers the years 2020 to 2023.

This study employs a purposive sampling method to select companies that meet specific research criteria. The selection was based on the following conditions:

Table 1. Sample Selection Process

No.	Criteria	Does Not Meet	Meets Criteria
1.	Financial sector companies listed on the IDX (2020–2023)	-	104
2.	Companies that did not publish financial statements during observation	(32)	72
3.	Companies that did not disclose required research variables	-	72
	Total Selected Sample		72
	Observation Years		4
	Total Panel Data Observations (72 × 4)		288

Source: Secondary data processed, 2025

3.2 Variable Measurement

Table 2. Operational Definitions and Measurement of Variables

Variable Type	Variable	Conceptual Definition	Measurement Method	Source
Dependent Variable	Carbon Emission Disclosure (CED)	Disclosure of greenhouse gas emissions resulting from human activities (e.g., fossil fuel combustion) that contribute to climate change and global warming.	CED = (Number of items disclosed / Total disclosure items) × 100%	Choi et al. (2013)
Independent Variable	Green Strategy (GS)	A business strategy focused on environmental sustainability, aiming to reduce negative and increase positive environmental impacts.	GS = (Total score obtained by firm / Maximum possible score) × 100%	Olson (2008)
Independent Variable	International Operation (IO)	Operational activities of a firm conducted beyond domestic borders, including branches, subsidiaries, or agents overseas.	Dummy variable: 1 = Firm has overseas operations; 0 = No overseas operations	Bhaskara (2018)

Moderating Variable	Ownership Concentration (OC)	The percentage of shares owned by the largest individual shareholder in the firm, reflecting the degree of ownership control.	OC = % of shares held by the largest individual shareholder (Top 1)	Wulandari & Setiawan (2023)

3.3 Analysis Data

To empirically test the research hypotheses, two panel data regression models were developed. The models aim to examine the direct effects of Green Strategy (GS) and International Operation (OI) on Carbon Emission Disclosure (CED), as well as the moderating effect of Ownership Concentration (OC) on these relationships.

$$CEDit = \alpha + \beta1\ GSit + \beta2\ O\ it + \varepsilon it \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

$$CEDit = \alpha + \beta1\ GSit + \beta2\ OIit + \beta3\ (GSit \times OCit) + \beta4\ (OIit \times OCit\ ) + \varepsilon it \ldots\ldots\ldots 2$$

Where:

CEDit : Carbon Emission Disclosure for firm *i* in year *t*
α : Constant term
β1,β2 : Coefficients of the independent variables
GSit : Green Strategy
OIit : International Operation
GSit×OCit : Interaction term between Green Strategy and Ownership Concentration
OIit×OCit : Interaction term between International Operation and Ownership Concentration
εit : Error term

4. Results and Discussion

4.1 Descriptive Statistics

Table 3 presents the descriptive statistics for the research variables: Carbon Emission Disclosure (CED), Green Strategy (GS), International Operations (OI), and Ownership Concentration (OC) over 288 firm-year observations during the period 2020–2023.

Table 3. Descriptive Statistics

Statistics	CED	GS	OI	OC
Mean	0.0691	0.5649	0.1528	59.2334
Median	0.0000	0.6000	0.0000	59.3965
Maximum	0.6667	0.8000	1.0000	100.0000
Minimum	0.0000	0.2000	0.0000	16.6670
Std. Deviation	0.1446	0.1441	0.3604	21.5225
Skewness	2.4228	-0.0163	1.9302	0.0080
Kurtosis	8.7941	2.2016	4.7258	2.3067
Jarque-Bera	684.6096	7.6630	214.5775	5.7706
Probability	0.0000	0.0217	0.0000	0.0558
Observations	288	288	288	288

Source: Secondary data processed, 2025

Interpretation:

1) Carbon Emission Disclosure (CED) has a low mean of 0.0691 and a median of 0.0000, suggesting that most companies did not disclose carbon emissions. Its high skewness (2.42) and kurtosis (8.79) indicate a non-normal distribution, confirmed by the significant Jarque-Bera probability ($p < 0.01$).

2) Green Strategy (GS) shows a relatively high average score of 0.5649 with a narrow standard deviation (0.1441), indicating consistency across firms. The distribution is approximately normal, although the Jarque-Bera test (p = 0.0216) still suggests mild deviation.
3) International Operations (OI) has a mean value of 0.1528, indicating that only a few companies have international operations. The high skewness (1.93) and kurtosis (4.72) also reveal a non-normal and positively skewed distribution.
4) Ownership Concentration (OC) exhibits a mean of 59.23%, with values ranging between 16.67% and 100%. The distribution is relatively symmetric and platykurtic, with a borderline significant Jarque-Bera probability (p = 0.0558).

These findings suggest heterogeneity in disclosure practices and operational strategies among financial sector firms in Indonesia, warranting further inferential analysis using panel regression.

4.2 Model Selection for Panel Data Regression

Table 4. Model Selection for Panel Data Regression Result

Test Type	Test Statistic	Probability	Decision	Chosen Model
Chow Test	Chi-square = 1.3268	0.7228	$p > 0.05 \rightarrow$ Fail to reject H_0	Common Effect Model
Hausman Test	Chi-square = 0.0000	1.0000	$p > 0.05 \rightarrow$ Fail to reject H_0	Random Effect Model
Lagrange Multiplier	Chi-square = 1.6309	0.4424	$p > 0.05 \rightarrow$ Fail to reject H_0	Common Effect Model

Source: Secondary data processed, 2025

Notes:
1) Chow Test is used to compare the Common Effect Model (CEM) with the Fixed Effect Model (FEM).
2) Hausman Test compares the Random Effect Model (REM) with the Fixed Effect Model (FEM).
3) Lagrange Multiplier (LM) Test compares the Common Effect Model (CEM) with the Random Effect Model (REM).

Based on the results of all three diagnostic tests, the most appropriate model for estimating the panel data in this study is the Common Effect Model (CEM).

4.3 Classical Assumption Tests

Table 5. Classical Assumption Tests Summary

No.	Test Type	Method Used	Test Statistic / Value	Probability / Criteria	Conclusion
1	Normality Test	Jarque-Bera	JB = n/a, Prob = 0.4205	> 0.05	Normally distributed
2	Multicollinearity	Variance Inflation Factor	VIF < 10 (Max = 1.009)	VIF criteria met	No multicollinearity detected
3	Heteroskedasticity	ARCH Test	$Obs*R^2 = 1.7694$, Prob = 0.1835	> 0.05	Homoscedasticity assumption is met
4	Autocorrelation	Durbin-Watson	DW = 1.9267	1 < DW < 3	No significant autocorrelation detected

Source: Secondary data processed, 2025

Notes:
1) Normality is confirmed as the Jarque-Bera probability exceeds the 5% threshold.
2) Multicollinearity is absent since all VIF values are far below 10.
3) Heteroskedasticity is not present, as shown by the ARCH test probability exceeding 0.05.
4) Autocorrelation is not an issue, as the DW statistic lies between 1 and 3.

The diagnostic tests confirm that the regression model meets the classical linear regression assumptions. Hence, the results obtained from the panel data regression analysis are considered statistically reliable and valid for inference.

4.4 Hypothesis Test

Table 5. Results of Hypothesis Testing and Model Fit

Hypothesis / Fit Test / Coefficient Determination		Coefficient	t-Statistic	Prob.	Result
H1	Green Strategy (GS) → Carbon Emission Disclosure (CED)	1.676666	3.777	0.0002	Accepted (significant)
H2	International Operation (OI) → Carbon Emission Disclosure (CED)	0.598695	3.374	0.0008	Accepted (significant)
H3	Ownership Concentration moderates the GS → CED relationship	-0.018104	-0.890	0.3745	Rejected (not significant)
H4	Ownership Concentration moderates the OI → CED relationship	0.027938	2.499	0.0130	Accepted (significant)
F-Statistic (Overall Model Significance)		-	14.196	0.0000	Model is significant
Adjusted R-squared		0.0842 (8.42%)			

Source: Secondary data processed, 2025

Based on the table above, several key results from the regression model are interpreted as follows:
1) H1 & H2: Both variables show significant positive effects, supporting the theoretical framework based on legitimacy and stakeholder theory.
2) H3: Moderating effect of ownership concentration on green strategy is not significant, thus hypothesis is rejected.
3) H4: Moderating effect of ownership concentration on international operations is significant and positive, indicating a strengthening relationship.
4) F-statistic = 14.196 (p-value = 0.0000) indicates that the independent variables simultaneously have a significant effect on carbon emission disclosure.
5) Adjusted R^2 = 0.0842 implies that 8.42% of the variation in carbon emission disclosure is explained by Green Strategy and International Operations, with the remaining 91.58% explained by other factors not included in the model.

Table 6. Results of Moderated Regression Analysis (MRA)

Variable	Coefficient	Std. Error	t-Statistic	Probability	Interpretation
Constant (C)	-1.1180	0.3082	-3.6273	0.0003	Significant
Green Strategy (GS)	1.6040	0.4420	3.6288	0.0003	Significant (H1 supported)
International Operation (OI)	0.7353	0.1853	3.9686	0.0001	Significant (H2 supported)

Ownership Concentration (KK)	0.0020	0.0031	0.6484	0.5173	Not significant
GS × KK (Moderating Effect)	-0.0181	0.0204	-0.8896	0.3745	Not significant (H3 not supported)
OI × KK (Moderating Effect)	0.0279	0.0112	2.4991	0.0130	Significant (H4 supported)

Source: Secondary data processed, 2025

Table 6 presents the results of the Moderated Regression Analysis (MRA), which aims to examine whether Ownership Concentration (KK) moderates the relationship between Green Strategy (GS) and International Operation (OI) on Carbon Emission Disclosure (CED):

1) Green Strategy (GS) has a statistically significant positive effect on CED (β = 1.6040, p = 0.0003), indicating that firms with stronger environmental strategies tend to disclose more carbon emission information. This supports Hypothesis 1 (H1).
2) International Operation (OI) also shows a significant positive influence on CED (β = 0.7353, p = 0.0001), suggesting that companies engaged in cross-border operations are more likely to disclose carbon emission data, thus supporting Hypothesis 2 (H2).
3) Ownership Concentration (KK), as an independent variable, does not have a significant direct effect on CED (p = 0.5173), indicating that ownership structure alone does not directly influence carbon disclosure levels.
4) The interaction term GS × KK (M1) shows a negative but non-significant coefficient (β = -0.0181, p = 0.3745), meaning that ownership concentration does not moderate the relationship between green strategy and carbon emission disclosure. Therefore, Hypothesis 3 (H3) is not supported.
5) Conversely, the interaction term OI × KK (M2) demonstrates a positive and significant effect (β = 0.0279, p = 0.0130), indicating that ownership concentration moderates the effect of international operations on carbon emission disclosure. Specifically, higher ownership concentration strengthens the positive relationship between international activities and carbon emission transparency. Thus, Hypothesis 4 (H4) is supported.

4.5 Discussion

4.5.1 The Effect of Green Strategy on Carbon Emission Disclosure

The empirical results indicate that the Green Strategy variable has a statistically significant positive influence on Carbon Emission Disclosure (CED), with a probability value of 0.0003 < 0.05. This confirms that firms committed to environmental strategies are more likely to disclose their carbon emissions. The descriptive statistics show an average Green Strategy score of 0.5649, suggesting that more than half of the sampled financial sector companies demonstrate a mature integration of environmental considerations into their strategic practices.

These findings are consistent with the Stakeholder Theory, which emphasizes that companies must consider the expectations of stakeholders—including investors, regulators, and civil society—by voluntarily disclosing comprehensive performance information, including environmental impacts. According to Bayu Tri Cahya (2017), stakeholder-responsive organizations disclose not only mandatory financial data but also voluntary environmental, social, and governance (ESG) information to maintain legitimacy and support from various stakeholder groups.

This result aligns with prior empirical studies, such as those by Andrian & Kevin (2021), Karina (2021), and Tila & Augustine (2019), which find a positive association

between green strategy implementation and carbon emission transparency. Firms that integrate climate-related risks and opportunities into their strategy tend to proactively disclose carbon data to sustain competitiveness, legitimacy, and market trust (Afni et al., 2018; Kılıç & Kuzey, 2019). Thus, it can be concluded that a firm's commitment to green strategy directly correlates with its willingness and capacity to disclose carbon emissions.

4.5.2 The Effect of International Operation on Carbon Emission Disclosure

The analysis shows that International Operation (IO) has a positive and significant effect on Carbon Emission Disclosure, with a probability value of 0.0001 < 0.05. The average IO value is 0.1528, indicating that several financial institutions in the sample are engaged in cross-border activities.

These findings support the Legitimacy Theory, which posits that organizations seek societal acceptance by aligning their operations with prevailing norms and expectations (Suchman, 1995; Ghozali, 2016). Companies operating internationally often face diverse environmental regulations across jurisdictions, compelling them to increase transparency regarding carbon emissions to comply with global and local requirements.

Empirical studies by Bhaskara (2018), Suripto (2023), and Hashmi et al. (2015) corroborate these results, highlighting that multinational firms are more inclined to disclose carbon data due to external pressures and global stakeholder scrutiny. Likewise, Zhang & Yu (2012) emphasize that firms with extensive international operations are more responsive to environmental disclosure expectations, especially when dealing with environmentally conscious investors and customers across countries. Hence, international exposure reinforces carbon transparency practices.

4.5.3 The Moderating Effect of Ownership Concentration on the Relationship Between Green Strategy and Carbon Emission Disclosure

The interaction between Green Strategy (GS) and Ownership Concentration (KK) yields a non-significant coefficient (β = -0.0181; p = 0.3745 > 0.05), indicating that ownership concentration does not moderate the relationship between green strategy and carbon emission disclosure. Thus, Hypothesis 3 is rejected.

This finding contradicts Legitimacy Theory, which argues that organizations seek to justify their existence through alignment with societal values (Deegan & Unerman, 2006). The absence of a significant moderating effect suggests that concentrated ownership structures may not be actively influencing or enhancing environmental transparency driven by green strategy. One plausible explanation is that investors may perceive green initiatives as compliance rather than value-generating activities, particularly in the short term. Furthermore, high ownership concentration does not necessarily translate into stronger environmental accountability in the financial sector.

These results imply that ownership concentration alone may not be an effective governance mechanism for promoting carbon transparency, especially when green strategies are not directly linked to investor returns or regulatory pressure.

4.5.4 The Moderating Effect of Ownership Concentration on the Relationship Between International Operation and Carbon Emission Disclosure

Conversely, the interaction between International Operation (OI) and Ownership Concentration (KK) reveals a significant positive effect (β = 0.0279; p = 0.0130 < 0.05), indicating that ownership concentration moderates and strengthens the relationship

between international operations and carbon emission disclosure. Therefore, Hypothesis 4 is accepted.

This outcome is consistent with Stakeholder Theory, which holds that firms must demonstrate accountability not only to shareholders but also to other key constituents (Freeman, 1984). High ownership concentration may facilitate stronger oversight and strategic alignment, ensuring that international operations—which are inherently exposed to environmental risk and regulation—are supported with enhanced carbon reporting practices.

As suggested by Sullivan & Gouldson (2012), firms operating globally are subject to varying environmental standards and reputational pressures. In such contexts, concentrated ownership may serve as an internal control mechanism that reinforces transparent climate-related disclosure. Investors with significant ownership stakes are likely to encourage compliance with international norms to preserve firm value and mitigate environmental risk exposure. Hence, the interaction effect indicates that firms with both international operations and concentrated ownership structures are more proactive in disclosing carbon emission data to meet global stakeholder expectations and enhance legitimacy.

5. Conclusion

This study aimed to examine the influence of Green Strategy and International Operation on Carbon Emission Disclosure (CED), along with the moderating role of Ownership Concentration within Indonesian financial sector firms listed on the Indonesia Stock Exchange from 2020 to 2023. Based on panel data regression analysis and Moderated Regression Analysis (MRA), several key findings emerged.

First, the results indicate that Green Strategy has a positive and significant effect on Carbon Emission Disclosure. Firms that actively implement environmentally focused strategies are more likely to disclose their carbon emissions, aligning with Stakeholder Theory which emphasizes the importance of organizational accountability and transparency to a broad set of stakeholders.

Second, International Operation was also found to significantly and positively affect Carbon Emission Disclosure. This finding supports the Legitimacy Theory, suggesting that companies engaged in cross-border activities are motivated to comply with varying environmental regulations and stakeholder expectations across jurisdictions by increasing transparency in their emission disclosures.

Third, the moderating effect of Ownership Concentration on the relationship between Green Strategy and CED was found to be insignificant, indicating that ownership structure does not strengthen or weaken the environmental transparency associated with green strategic practices. This result suggests a possible disconnect between green initiatives and the perceptions or interests of concentrated ownership in the short term.

Fourth, Ownership Concentration was found to moderate the relationship between International Operation and Carbon Emission Disclosure. Specifically, it enhances the positive impact of international operations on carbon disclosure, suggesting that firms with concentrated ownership are more likely to institutionalize sustainability practices in response to global pressures and compliance needs.

In summary, the study concludes that both Green Strategy and International Operation are important drivers of carbon emission disclosure, while the effectiveness of Ownership Concentration as a moderating factor depends on the strategic context—being significant only in the case of international operations.

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