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Do foreign ownership and board characteristics matter for carbon emission disclosure in Indonesian banks?

Khairun Nisaa[1], Doddy Setiawan[2]

[1]Magister Accounting, Department of Accounting, Faculty of Economic and Business,
[2]Department of Accounting, Faculty of Economic and Business, Universitas Sebelas Maret,
Jl. Ir. Sutami No. 36A Surakarta, Central Java 57126, Indonesia

ABSTRACT

This study analyzes the impacts of foreign influence on carbon emission disclosure across three dimensions: foreign ownership, foreign directors, and directors' international experience. A dataset utilized in this study is 325 observations to 43 conventional commercial banks listed on the Indonesia Stock Exchange (IDX) over the period 2017–2024. Employing multiple linear regression with a fixed-effects model (FEM) in Stata 17, the findings reveal that foreign ownership shows no significant effect on CED. Implying the legitimacy pressure from ownership alone, as proposed by Legitimacy Theory, is insufficient without direct board involvement. In contrast, foreign directors and directors' international experience demonstrates significantly affect CED, supporting Upper Echelons Theory, by which explains this effect through directors' characteristics. These findings suggest that director characteristics is driven more than foreign ownership in affecting carbon emission disclosure, highlighting the role of corporate governance in supporting the achievement of the Sustainable Development Goals (SDGs) in the Indonesian banking sector. This study contributes to the carbon disclosure and corporate governance literature by identifying three dimensions of foreign influence into a single analytical framework, as compared to previous studies that examined these factors separately, thus offering a more comprehensive governance perspective on how the involvement of foreign attributes can shape firms' strategic decisions to enhance carbon emission transparency.

Keywords: Banking sector, Carbon emission disclosure, Directors' international experience, Foreign ownership, Foreign directors, SDGs

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1. Introduction

As the largest carbon emitter in Southeast Asia, Indonesia surpasses other countries in the region such as Thailand, Malaysia, and Vietnam (Statista, 2025). Indonesia is also highly vulnerable to the consequences of rising emissions, evidenced by the increasing frequency of hydrometeorological disasters

Corresponding Author: **Khairun Nisaa** | E-mail: khainisaa19@student.uns.ac.id

recorded across the country (BNPB, 2023). Implying that as an archipelagic nation with extensive coastal areas are subject to climate-sensitive ecosystems and natural disasters. Subsequently, this condition has placed growing demand on corporations, including financial institutions, to demonstrate accountability upon their environmental impact through carbon emission disclosure (CED).

In the financial sector, banking institutions emerge as key actors due to their central role in allocating financial resources across economic activities. Banks play a strategic role as financial intermediaries by allocating capital across sectors that drive production and investment (Gorton & Winton, 2003). In practice, firms rely heavily on bank financing to support business expansion and sustain their operations. Banks occupy a particularly prominent position in this regard, as their lending and investment decisions indirectly finance carbon-intensive activities across other sectors, making their environmental transparency a matter of broader public and regulatory concern (Daromes et al., 2020).

This financing role also exposes banks to climate-related financial risk in ways non-financial firms do not experience directly. Following the Task Force on Climate-related Financial Disclosures (TCFD) framework, banks face physical risk when extreme weather damages the assets or disrupts the operations of debtors, impairing loan collateral and repayment capacity, and transition risk when tightening climate policy, carbon pricing, or shifting market demand erodes the creditworthiness of carbon-intensive debtors. While these risks materialize through the loan book rather than the bank's own operations, carbon emission disclosure functions as a risk-management signal as much as an environmental one: to indicate whether a bank has identified, priced, and is actively managing its exposure to climate-sensitive debtors.

In Indonesia, this dimension is reinforced by regulation. Otoritas Jasa Keuangan (OJK), as mandated by the regulation No. 51/POJK.03/2017, requires banks to report on their Sustainable Finance Action Plan and channel financing toward activities classified under the Indonesia Green Taxonomy, positioning banks as intermediaries to redirect capital away from carbon-intensive sectors. However, a 2022 survey by the Climate Policy Initiative (Larasati & Mafira, 2022) found that Indonesian banks' ESG-labeled portfolios reached 34 percent of total lending (USD 3.6 trillion) between 2019 and 2021, implying that less than 15 percent of surveyed banks had begun integrating climate-related risks into their formal risk-management processes, and most had not extended their emissions accounting beyond their own operations (Scope 1 and 2) to the financed emissions embedded in their lending and investment activities (Scope 3). This gap between regulatory expectation and disclosure practice underscores why understanding what drives CED among Indonesian banks including governance characteristics such as foreign ownership, foreign directors, and directors' foreign experience remains a pressing and unresolved empirical question.

Analyzing the factors of disclosure behavior requires a theoretical lens capable to correlate the governance characteristics with the disclosure decisions. Consequently, this study draws primarily on legitimacy theory, which posits that firms disclose environmental information to signal conformity with the norms and expectations of their stakeholders, thereby maintaining their social license to operate (Suchman, 1995; Deegan, 2002). Within this framework, foreign owners and directors, exposed to jurisdictions with stronger environmental transparency norms, are theorized to raise the legitimacy expectations a bank must satisfy, thereby pushing further toward more extensive CED. This argument is also reinforced by upper echelons theory, which holds that strategic disclosure choices reflect the values and international exposure of the executives who make them (Hambrick & Mason, 1984), suggesting that directors with foreign nationality or foreign experience are more likely to internalize and act on these legitimacy pressures and translate them into actual disclosure decisions.

Empirical evidence on the effect of foreign governance characteristics on disclosure outcomes in Indonesia, however, is currently limited and inconsistent. Wulan (2022) examining IDX environmentally sensitive firms, finds that neither foreign directors nor foreign ownership significantly affects CED, while foreign commissioners do; the author explicitly notes that direct evidence on foreign ownership and foreign directors' effect on carbon disclosure in Indonesia remains scarce. In contrast with Fuadah et al. (2022), who find that foreign ownership significantly and positively affects broader ESG disclosure among Indonesian firms, also with Setiawan et al. (2021), who find that foreign board attributes, including foreign ownership, directors, and commissioners consistently increase CSR engagement among Indonesian manufacturing firms. These conflicting results suggest that the effect of foreign governance on disclosure may depend on the disclosure construct examined (carbon-specific versus broader ESG/CSR) and on unobserved sector characteristics.

This sector dependency is reinforced by available evidences from the banking industry itself. In the only study to examine foreign board attributes in Southeast Asian banks, Setiawan et al. (2024) find that foreign ownership and foreign board members negatively influence climate change disclosure, while foreign women have a positive effect and foreign CEOs show no significant effect, a pattern opposite to that is found in non-financial Indonesian firms (Fuadah et al., 2022; Setiawan et al., 2021). The authors attribute this reversal to foreign shareholders' short-term profit orientation and the minority, less locally attuned position of foreign board members in Asian banking contexts. Because this study covers Southeast Asia rather than Indonesia specifically, and does not isolate directors' international experience from their nationality, it remains unclear whether this negative pattern holds for Indonesian banks and whether it is driven by ownership, board nationality, or the boards' international exposure more broadly.

A different stream of research which concentrated in China, distinguishes directors' foreign experience international exposure gained through education or work abroad from foreign nationality or ownership, grounding this distinction in upper echelons theory. Kazim et al. (2024) find that directors with foreign experience reduce corporate environmental violations, particularly in polluting industries; Liu (2024) finds that directors' foreign experience reduces corporate carbon emissions through a green-innovation channel; Hussain et al. (2024) find that female directors' foreign experience improves green innovation; and Li & Liu (2025) find that chairmen's and CEOs' foreign experience improves ESG performance, with chairmen's experience exerting the stronger effect. These studies consistently find that foreign experience, independent of nationality, functions as a distinct governance resource. However, none of this evidence originates from Indonesia or the banking sector, and none examines foreign experience jointly with foreign ownership and foreign directors to assess their relative or combined influence.

Taken together, these unresolved issues motivate the present study. Rather than treating foreign influence as a single, undifferentiated construct, this study simultaneously examines three dimensions of foreign governance, including foreign ownership, foreign directors, and directors' foreign experience, a combination that prior research has only addressed in part. Wulan (2022) tests foreign ownership and foreign directors but not directors' foreign experience, while the China-based studies on directors' foreign experience do not test it alongside foreign ownership or foreign directors. The study also departs from prior works by focusing specifically on Indonesian banks, directly addressing the sector-specific reversal documented by Setiawan et al. (2024) in the broader Southeast Asian banking context, a pattern that remains untested at the country level and whose underlying driver remains unclear, whether it stems from ownership, board nationality, or international exposure. By introducing directors' foreign experience, a construct thus far validated only in the Chinese context, into the Indonesian carbon disclosure literature, this study disentangles international exposure from foreign nationality and ownership, offering a more granular account of how foreign governance shapes CED among Indonesian banks.

Indonesian banks offer significant financed-emissions exposure yet remain under-scrutinized for their carbon disclosure behavior. Existing evidence on foreign ownership and foreign directors in Indonesia is inconsistent across studies. The only study on foreign board attributes in Southeast Asian banks even found effects opposite to non-financial firms. Directors' foreign experience, though shown elsewhere to shape environmental governance, has never been tested in Indonesia or in banking. Examining these three foreign governance dimensions jointly within Indonesian banks is therefore both timely and necessary.

2. Theoretical Framework and Hypotheses Development

Foreign Ownership and Carbon Emission Disclosure

Foreign ownership refers to the participation of foreign investors in a company's ownership structure. The presence of foreign shareholders is often associated with higher expectations for corporate transparency, including environmental disclosure (Fuadah et al., 2022). Based on the legitimacy theory, firms tend to discover the maintained legitimacy through lining up their activities and reporting practices with stakeholder expectations (Liu et al., 2023). In this context, companies with foreign investors may face greater pressure to reveal environmental information, involving carbon emissions, to maintain credibility in global capital markets.

Foreign investors typically face monitoring constraints due to geographical distance and differences in institutional environments. As a result, corporate disclosure serves as an important mechanism for reducing information asymmetry and enhancing transparency (Kim et al., 2021). Carbon emission disclosure provides information regarding environmental performance and climate-related risks, which may assist foreign investors in evaluating the sustainability of a firm's operations. Empirical studies support this argument. Kim et al. (2021) finds that firms with higher levels of foreign ownership in South Korea are more inclined to voluntarily disclose carbon emissions information. Similarly, Oyerogba et al. (2025) show that foreign ownership improves the quality of carbon emission disclosure, while Widianingsih & Kohardinata (2024) highlight that carbon disclosure can serve as a fundamental signal for foreign investors in investment decision-making.

However, prior studies also report inconsistent results. Research in Indonesia finds that foreign ownership does not impact CED significantly, particularly when the proportion of foreign ownership is relatively small and corporate decisions remain dominated by domestic controlling shareholders (Majidah et al., 2024; Putra & Lindrianasari, 2024). In addition, foreign investors with a short-term investment orientation may prioritize financial performance over environmental transparency (Oyerogba et al., 2025). These mixed findings indicate that the correlation between foreign ownership and CED remains inconclusive and requires further empirical examination.

H_1: Foreign ownership affects CED.

Foreign Directors and Carbon Emission Disclosure

Foreign directors are often associated with board internationalization, which relates to the involvement of foreign individuals on boards of directors who bring international perspectives, networks, and governance practices to corporate decision-making (Luo et al., 2022). Foreign directors typically possess cross-country experience and exposure to more advanced sustainability standards, which may increase the board's awareness of environmental problems like carbon emission and climate change reporting (Mardini & Elleuch Lahyani, 2022). Derived from legitimacy theory, the foreign directors' presence may encourage firms to improve environmental disclosure in order to respond to global stakeholder expectations and maintain legitimacy in international markets (Setiawan et al., 2024).

Foreign board members may play an important role in strengthening corporate environmental accountability. Their international exposure may lead to the adoption of global sustainability practices and encourage firms to improve environmental transparency, including carbon emission disclosure (Wahyuningrum et al., 2024; Wahyuningrum et al., 2025). Several empirical studies support this argument. Wahyuningrum et al. (2025) find that foreign board members positively influence carbon emission disclosure in Indonesian non-financial companies. Similarly, cross-country evidence shows that foreign directors enhance carbon disclosure and environmental performance by strengthening legitimacy and reducing information asymmetry (Mardini & Elleuch Lahyani, 2022). Luo et al. (2022) also report that board internationalization motivates firms to engage more actively in CSR practices.

However, previous studies also report inconsistent results. Wulan (2022) finds that foreign directors do not impact CED significantly in environmentally sensitive firms in Indonesia. In the context of Southeast Asian banking, foreign board members are also associated with lower climate change disclosure, suggesting potential institutional barriers or governance conflicts (Setiawan et al., 2024). These mixed findings indicate that the effect of foreign directors on carbon emission disclosure may depend on industry characteristics, regulatory environments, and legitimacy pressures across countries. Therefore, further empirical examination is necessary, particularly in the context of Asian banking sectors.

H_2: Foreign directors affect carbon emission disclosure.

Directors' International Experience and Carbon Emission Disclosure

Foreign experience of directors represents one of the managerial characteristics that may influence corporate environmental disclosure. Such experience is typically gained through education, professional work, or managerial positions abroad, which can shape directors' global perspectives and strategic orientation toward sustainability issues (Bai et al., 2020; Duan et al., 2020). Exposure to international governance practices and environmental regulations may encourage directors to support greater transparency in environmental reporting, including carbon emission disclosure (Hussain et al., 2024; Kazim et al., 2024).

From a corporate governance point of view, international experience can be viewed as a form of strategic human capital that strengthens monitoring capabilities and enhances corporate legitimacy among international stakeholders (Alquhaif et al., 2025; Li & Liu, 2025). Empirical evidence supports this argument. Khalid et al. (2022) discover that executives with foreign experience aim to be more responsive to environmental issues and more likely to support voluntary climate-related disclosure. Similarly, Liu (2024) shows that international managerial experience encourages green innovation and give contribution to carbon emission reduction. These discoveries indicate that directors with international exposure may play an important role in promoting corporate environmental transparency.

However, previous studies also provide inconsistent evidence regarding the role of international experience. Some research suggests that international board attributes do not always significantly influence environmental disclosure practices (Ummah & Setiawan, 2021). These inconsistencies present that the influence of directors' international experience may vary across countries depending on institutional environments, industry characteristics, and regulatory pressures (Kazim et al., 2024).

Therefore, further study is demanded to examine this relationship, particularly in the Asian banking sector, where global exposure is high, and carbon transparency pressures are increasing.

H_3: International experience of directors affects CED.

3. Methodology

This study focuses on conventional banks listed on the Indonesia Stock Exchange (IDX) over the period 2017–2024, a sector selected for its strategic role as a financial intermediary and its growing exposure to environmental accountability and carbon-related risks. Secondary data were gathered from the official IDX website and supplemented by annual and sustainability reports published on each bank's official website. Firms with incomplete data were excluded from the sample, yielding a final dataset of 325 observations from 43 banks. This study applies three model selection tests, the Chow test, the Hausman test and the Breusch-Pagan LM test, to determine the most appropriate estimation model, with all data processing conducted using Stata version 17.

Table 1. Sample distribution

Criteria	Total
Number of conventional banks listed in IDX	43
Study observation period	8
Total conventional bank listed on IDX in 2017-2024	344
Conventional bank with incomplete data	(19)
Total conventional bank that became study sample	325

The study further uses panel data regression analysis to examine the impacts of foreign ownership, foreign directors, and directors' international experience on CED. The regression model is specified in Equation 1 (Eq. 1).

$$CED\_it = \alpha + \beta 1FO\_it + \beta 2FD\_it + \beta 3DIE\_it + \beta 4ROA\_it + \beta 5SIZE\_it + \beta 6AGE\_it + \varepsilon\_it \quad \text{(Eq. 1)}$$

Table 2. Variable measurement

Variables	Measurement	References
Dependent variable		
Carbon Emission Disclosure (CED)	Carbon Disclosure Index (CDI) = Number of disclosed carbon items / 18 disclosure items	Wahyuningrum et al. (2024)
Independent variables		
Foreign Ownership (FO)	Foreign Shares / Total Outstanding Shares × 100 percent	Setiawan et al. (2021); Mardini & Elleuch Lahyani (2022)
Foreign Director (FD)	Number of Foreign Directors / Total Board Directors	Luo et al. (2022); Wahyuningrum et al. (2025)
Directors' International Experience (DIE)	Proportion of directors having international education and/or professional working experience abroad.	Bai et al. (2020); Liu (2024)
Control variables		
Profitability (ROA)	Company's ability to generate earnings from total assets	Setiawan et al. (2024)
Firm Size (SIZE)	Firm size measured by logarithm of total assets.	Setiawan et al. (2024)
Firms Age (AGE	Number of years the company has operated since its establishment.	Setiawan et al. (2024)

CED represents carbon emissions disclosure as the dependent variable, measured using a carbon disclosure index based on the proportion of items disclosed across 18 indicators, which each disclosure item is given a score of 1 if it is disclosed in the company's report, and 0 if it is not disclosed (Wahyuningrum et al., 2024). Foreign ownership (FO) is measured as the shares' percentage retained by foreign investors in line with total outstanding shares (Setiawan et al., 2021; Mardini & Elleuch Lahyani, 2022). Foreign directors (FD) are calculated as the proportion of foreign members on the directors' board, while directors' international experience (DIE) is proxied by the board members' proportion with international experience (Liu, 2024), serving as the main independent variable.

This research also incorporates control variables, involving profitability (ROA), measured as net income divided by total assets; firm size (SIZE), calculated as the total assets' natural logarithm; and firm age (AGE), calculated as the number of years from the year of establishment to the year of observation. These variables are included because more profitable, larger, and older banks are generally subject to greater stakeholder scrutiny and possess more resources to support carbon disclosure practices (Akhter et al., 2023).

4. Results

Table 3 presents the descriptive statistics of the variables used in this study. The relatively low CED (0,301 or 30 percent) reflects the voluntary nature of carbon disclosure in Indonesia, which remains less institutionalized than general sustainability reporting despite OJK's recent push through the CRMS since 2024. The high variation in foreign ownership (mean = 38.96, SD = 35.59) mirrors the heterogeneous ownership structure of Indonesian banks following the 2024 relaxation of foreign ownership limits to 99 percent, even as overall foreign presence in the sector continues to decline amid state-bank dominance. The relatively high DFE (44.7 percent) suggests Indonesian banks favor directors with international exposure, such as overseas education or work experience, over appointing foreign nationals outright, consistent with the sector's practice of recruiting internationally trained risk and treasury executives under Basel standards. Regarding control variables, profitability (ROA) averages 0.004, with some firms recording significant losses, while firm size (SIZE) and firm age (AGE) exhibit wide ranges, indicating that the sample encompasses banks of varying scale and maturity.

Table 3. Descriptive statistics

Variables	Mean	Standard Deviation	Minimum	Maximum
Dependent variable				
CED	0.301	0.235	0	1
Independent variables				
FO	38.955	35.589	0	99
FD	0.112	0.159	0	0.6
DIE	0.447	0.260	0	1
Control variables				
ROA	0.004	0.054	-0.923	0.044
SIZE	31.205	2.803	11.318	36.150
AGE	50.235	25.682	1	129

Table 4 presents the Pearson correlation matrix together with the Variance Inflation Factor (VIF) for each independent variable. All correlation coefficients remain below the common multicollinearity threshold of 0.70, and all VIF values are below 10 (mean VIF = 4.14), indicating no serious multicollinearity in this model.

Table 4. Correlation matrix and variance inflation factor test results

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	VIF
CED	1.000							
FO	0.317* (0.000)	1.000						3.58
FD	0.304* (0.000)	0.627* (0.000)	1.000					2.14
DIE	0.714* (0.000)	0.442* (0.000)	0.400* (0.000)	1.000				5.20
ROA	0.024 (0.663)	-0.021 (0.701)	-0.093 (0.086)	-0.011 (0.836)	1.000			1.03
SIZE	0.235* (0.000)	0.198* (0.000)	0.124* (0.022)	0.282* (0.000)	0.104 (0.055)	1.000		7.54
AGE	0.239* (0.000)	0.171* (0.002)	0.015 (0.791)	0.200* (0.000)	0.105 (0.052)	0.252* (0.000)	1.000	5.38
Mean VIF								**4.14**

Sig. *p < 0.05

Before the presenting the regression results, the panel model selection procedure is summarized in Table 5. The Chow test shows a p-value of 0.000 < 0.05, so FEM is selected over the common effect model. The LM test shows a p-value of 0.0017, < 0.05, so REM is selected over the common effect model. The Hausman test shows a p-value of 0.000, < 0.05, so FEM is selected over REM. Based on these three tests, FEM is used as the final estimation model in this study.

Table 5. Model selection procedure

Test	Prob.	Selected Model
Chow test (CEM vs FEM)	0.0000	FEM
Lagrange Multiplier (LM) (REM vs CEM)	0.0017	REM
Hausman test (FEM vs REM)	0.0000	FEM
Fit Model		**FEM**

Table 6 presents the Fixed Effect Model (FEM) regression outcomes on the impact of foreign ownership, foreign directors, and directors' international experience on CED. The regression model explains 75.41 percent of the variation in carbon emission disclosure ($R^2 = 0.7541$, Prob > F = 0.000). Foreign ownership (FO) shows no significant effect on CED (p = 0.755), while foreign directors (FD) have a positive and marginally significant effect (p = 0.069). Directors' international experience (DIE) shows the strongest positive and highly significant effect (p = 0.000). Among the control variables, firm age (AGE) is positive and highly significant (p = 0.000), whereas profitability (ROA) and firm size (SIZE) show no significant effect on CED.

To address concerns regarding potential endogeneity between foreign governance characteristics and carbon emission disclosure, the independent variables are re-estimated using a one-year lag (t-1) relative to CED under a fixed-effects specification with standard errors clustered at the bank level. Under this specification, table 7 shows foreign ownership remains statistically insignificant, while foreign directors and directors' international experience remain positive and significant, mirroring the pattern observed in the main model. This consistency across the contemporaneous and lagged specifications indicates that the results are unlikely to be driven by reverse causality, in which better-disclosing banks simply attract more foreign directors or internationally experienced directors rather than the other way around. The robustness check therefore lends greater confidence to the interpretation that foreign directors and directors' international experience are meaningful antecedents of carbon emission disclosure among Indonesian banks.

Table 6. FEM regression results

CED	Coefficients	t	p> |t|
FO	-0.001	-0.31	0.755
FD	0.220	1.87	0.069*
DIE	0.234	4.18	0.000***
ROA	0.121	1.38	0.176
SIZE	0.001	0.45	0.652
AGE	0.055	15.05	0.000***
Constanta	-2.654	-12.88	0.000
R-Square	0.7541 / 75.41%		
Prob > F	0.0000		

Note: *** Significant at the 1% level; ** Significant at the 5% level; * Significant at the 10% level.

Table 7. Fixed-effects regression, one-year lagged independent variables

CED	Coefficient	Robust Std. Error	t	P>|t|	[95% Conf.	Interval]
FO_L1	0.0000906	0.0003681	0.25	0.807	-0.0006521	0.0008334
FD_L1	0.2234482***	0.0814437	2.74	0.009	0.0590881	0.3878083
DIE_L1	0.2084625***	0.0411757	5.06	0.000	0.1253667	0.2915584
ROA	0.1709648***	0.0395891	4.32	0.000	0.0910708	0.2508589
SIZE	0.0224162	0.0391453	0.57	0.570	-0.0565821	0.1014146
AGE	0.0546961***	0.0052809	10.36	0.000	0.0440388	0.0653534
Constant	-3.262841***	1.085003	-3.01	0.004	-5.452466	-1.073216

t statistics in parentheses computed with standard errors clustered by bank; ***p < 0.01, **p <0.05, *p < 0.1

5. Discussion

This research's outcomes indicate that not all governance characteristics take a significant part in encouraging carbon-emission disclosure among Indonesian conventional commercial banks. Specifically, foreign ownership does not impact CED significantly, while foreign directors show a positive but not statistically significant effect at the 5 percent level. In contrast, directors' international experience has a positive and significant impact on CED. These discoveries indicate that internal managerial characteristics play a more important role than ownership structure in determining environmental transparency. This outcome is consistent with prior studies in Indonesia, which show that ownership structure, including foreign ownership, does not always influence carbon disclosure practices (Majidah et al., 2024).

The insignificant effect of foreign ownership indicates that the presence of foreign investors does not encourage greater carbon disclosure necessarily. This outcome supports previous study showing that foreign ownership has no direct impact on CED in Indonesian firms (Mela et al., 2023). One possible explanation is that foreign investors tend to rely on existing disclosures rather than actively pressuring firms to increase transparency. Moreover, in emerging markets such as Indonesia, carbon emission disclosure remains relatively low and largely voluntary, suggesting weak external pressure from investors (Wahyuningrum et al., 2025). As a result, ownership structure alone may not be sufficient to drive environmental disclosure without strong regulatory enforcement or stakeholder demand.

Concurrently, foreign directors show a positive correlation with CED, though marginally significant. Implying that their presence tends to improve environmental transparency, while the effect is not strong enough to reach the 5 percent significance level. This is consistent with the findings of prior studies, where foreign directors do not impact CED significantly, particularly in emerging-market contexts (Wulan, 2022). Additional evidence from Indonesian manufacturing firms also confirms that foreign directors do not affect CED practices significantly (Armono et al., 2024). Similar findings are reported in prior studies where foreign directors do not consistently influence carbon disclosure due to contextual and institutional limitations (Budanti et al., 2024).

In the Indonesian context, the effectiveness of foreign directors may be constrained by differences in institutional environments, governance practices, and local regulations. Although foreign board members may bring international knowledge and sustainability awareness, their influence may not be fully realized without supportive governance structures and regulatory pressure.

In contrast, directors' international experience has a strong, significant positive impact on CED. This finding indicates that directors with international exposure are more responsive to global environmental issues and more likely to promote transparency in carbon reporting. This outcome correlated with prior studies emphasizing the importance of board characteristics in improving environmental disclosure practices, particularly through greater awareness and expertise. International experience can be considered a form of strategic human capital that enables directors to adopt global best practices, including sustainability reporting and carbon disclosure (Liu, 2024).

Furthermore, the significant effect of firm age suggests that more established banks aim to disclose more carbon-related information. Older firms generally have more experience, reputational concerns, and established reporting systems, which encourage greater transparency. This finding aligns with prior studies suggesting that firm characteristics such as maturity and experience can influence disclosure practices, although financial performance and firm size do not consistently affect disclosure practices. In this study, profitability and firm size are found to be insignificant, indicating that financial capability alone does not guarantee higher environmental disclosure.

6. Conclusion

Based on these findings, banking institutions are encouraged to enhance board members' competencies through international exposure, such as global training, cross-border experience, or the recruitment of internationally experienced directors, to improve carbon disclosure practices, while regulators should strengthen policies that promote environmental reporting transparency in the financial sector.

This study is subject to several limitations. First, the sample is restricted to banks listed on the Indonesia Stock Exchange, thus the findings may not apply to non-listed banks, non-bank financial institutions, or banks in other countries. Second, this study is conducted within the Indonesian institutional context, which is characterized by a specific regulatory regime for sustainable finance and foreign bank ownership; results may differ in different jurisdictions, particularly with mandatory carbon disclosure regimes. Third, carbon emission disclosure is measured through content analysis of voluntary disclosure items, which captures disclosure quantity but may not fully reflect its quality or verification status.

This study contributes specifically to the accounting literature by extending the voluntary disclosure literature through evidence that ownership-level and director-level foreign exposure operate as distinct antecedents of disclosure behavior, while also enriching the emerging carbon accounting literature with evidence from the banking sector, an industry conventionally treated as a low direct emitter but increasingly subject to carbon accounting obligations through financed emissions.

Practically, these findings suggest that Indonesian banks seeking to strengthen carbon disclosure practices may benefit more from recruiting or developing directors with genuine international experience than from simply increasing foreign ownership or foreign board representation as a matter of composition alone, highlighting the role of corporate governance in supporting the achievement of the Sustainable Development Goals (SDGs) in the Indonesian banking sector.

This study could be extended in several directions. First, future research could examine foreign governance characteristics under a mandatory carbon disclosure regime, once such regulation is further implemented broadly in Indonesia or the Southeast Asia region, to test whether the lacking effect of foreign directors observed would increase under mandatory reporting. Second, future studies could incorporate broader ESG governance mechanisms, such as sustainability committee presence or ESG-linked executive compensation, to capture governance dimensions beyond foreign involvement. Third, future research could examine board diversity, including gender, expertise, and tenure diversity, as complements to or moderators of the foreign governance variables examined in this study.

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