Board Characteristics and Environmental Disclosure: Evidence from Sri Lankan Listed Companies

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ABSTRACT

Despite growing scholarly attention to corporate environmental reporting, empirical evidence on the influence of board characteristics on environmental disclosure in Sri Lanka remains limited. Thus, this study aims to examine the effect of board characteristics on environmental disclosure among non-financial listed companies in Sri Lanka. The study uses panel data from 60 non-financial companies listed on the Colombo Stock Exchange (CSE), selected through random sampling, covering the period 2021–2025 and yielding 300 firm-year observations. . Environmental disclosure is measured using a 34-item Environmental Disclosure Index based on the Global Reporting Initiative (GRI), while board characteristics comprise board size, board independence, board gender diversity, and CEO duality. Secondary data are collected from published annual reports, and environmental disclosure is assessed through content analysis. The empirical analysis initially estimates pooled Ordinary Least Squares (OLS), Fixed Effects, and Random Effects models. The Breusch–Pagan Lagrangian Multiplier and Hausman specification tests are subsequently applied to determine the appropriate panel-data model, with the test results supporting the Fixed Effects model for final estimation. The findings indicate an average environmental disclosure level of 31%. Board gender diversity has a positive and statistically significant effect on environmental disclosure, whereas board size, board independence, and CEO duality have no statistically significant effects. The study is limited to a five-year period, 60 companies, and selected board characteristics. Nevertheless, it contributes recent empirical evidence on board-level determinants of environmental disclosure in Sri Lanka and provides practical insights for listed companies, regulators, and policymakers seeking to strengthen board diversity and corporate environmental transparency.

Keywords: Board Characteristics, Environmental Disclosure, Corporate Governance, Sri Lanka

1. INTRODUCTION

Growing concern over climate change, environmental degradation and the environmental consequences of business activities has increased expectations for companies to be transparent about their environmental performance (Nuskiya et al., 2021; Krishnasamy & Keerthana, 2026; Xu et al., 2025). Therefore, corporate reporting has expanded beyond traditional financial information as stakeholders increasingly demand information about firms' environmental responsibilities, practices and impacts. Within this broader reporting environment, corporate environmental disclosure (CED) has become an important means through which companies communicate their environmental policies, practices, performance and impacts to stakeholders (Wilmshurst & Frost, 2000; Nuskiya et al., 2021). Environmental disclosure can improve corporate transparency and provide stakeholders with information needed to assess how firms manage environmental risks and responsibilities (Jamil & Khan, 2024). These developments have increased academic and regulatory attention towards understanding not only the extent of environmental disclosure but also the factors that influence differences in disclosure practices among companies.

Corporate governance has received considerable attention in environmental disclosure research because board characteristics can influence corporate reporting practices (Khaireddine et al., 2020; Nuskiya et al., 2021). In particular, the composition and structure of the board may affect the extent to which companies disclose environmental information (Khaireddine et al., 2020; Xu et al., 2025). Previous studies have therefore examined board size, board independence, board gender diversity and CEO duality in relation to environmental disclosure (Khaireddine et al., 2020; Xu et al., 2025). In the Sri Lankan context, Nuskiya et al. (2021) specifically examined board size, board independence, board meetings and CEO duality as governance determinants of CED. However, findings concerning individual board characteristics and environmental disclosure remain mixed across different institutional and organisational settings (Xu et al., 2025).

International empirical evidence demonstrates these differences. Khaireddine et al. (2020) found that board independence and board gender diversity were positively associated with environmental disclosure among French listed companies. Board size also had a significant positive relationship with environmental disclosure. In India, Kumari et al. (2022) reported positive

relationships between board size, board meetings and environmental disclosure, while board independence, gender diversity and CEO duality were insignificant. Almaqtari et al. (2023) also documented relationships between board attributes and environmental reporting using evidence from Asian and European companies. More recently, Alta'any et al. (2026) found that board size, board independence, CEO duality and board gender diversity did not significantly explain the environmental reporting dimension in an international sample. The variation in empirical findings suggests that the relationship between board characteristics and environmental disclosure may differ according to institutional and organisational contexts.

Sri Lankan evidence also shows variation across different forms of corporate disclosure. Nuskiya et al. (2021), based on 41 listed companies during 2015–2019, found that CED increased over the study period but remained at an early stage compared with developed economies. Board size and board independence were positively associated with CED, while CEO duality was negatively associated with CED. Randunu et al. (2022) subsequently examined carbon-emission disclosure among environmentally sensitive Sri Lankan companies during 2016–2020. Board size had a positive relationship with carbon-emission disclosure, whereas board independence was insignificant. Shamil et al. (2014) also identified associations between board characteristics and sustainability reporting among Sri Lankan firms. More recently, Niresh and Vinsana (2026) found a positive and significant relationship between board gender diversity and integrated reporting disclosure. Nevertheless, carbon disclosure, sustainability reporting and integrated reporting differ from environmental disclosure and therefore cannot fully explain recent CED practices.

Despite the growing importance of environmental transparency, the level of environmental disclosure among Sri Lankan listed companies remains relatively limited. Krishnasamy and Keerthana (2026) reported a mean CED level of only 21% among 100 CSE-listed companies during 2020–2024, suggesting that a considerable amount of environmental information was not disclosed. At the same time, environmental disclosure was found to be positively and significantly associated with firm value, highlighting the economic relevance of such information (Krishnasamy & Keerthana, 2026). This presents an important concern in the Sri Lankan context. Although environmental information appears to be relevant to firm value, the overall level of disclosure remains relatively low. Understanding the factors associated with differences in environmental disclosure is therefore important. In particular, the extent to which board characteristics contribute to such differences remains an area requiring further empirical investigation.

Although previous studies have contributed to understanding corporate environmental reporting in Sri Lanka, recent evidence on the relationship between board characteristics and environmental disclosure remains limited. The most directly relevant Sri Lankan study examined the period from 2015 to 2019 and did not incorporate board gender diversity (Nuskiya et al., 2021). Subsequent studies have focused on related areas such as carbon disclosure, integrated reporting and the consequences of environmental disclosure rather than directly addressing the board-level determinants of CED (Randunu et al., 2022; Niresh & Vinsana, 2026; Krishnasamy & Keerthana, 2026). This gap is particularly relevant given the mixed evidence reported across different institutional settings (Xu et al., 2025; Alta'any et al., 2026). Accordingly, this study examines the relationship between board characteristics and environmental disclosure among Sri Lankan listed companies during 2021 to 2025. By incorporating board gender diversity alongside established board characteristics and examining a more recent period, the study extends existing Sri Lankan evidence and contributes to a better understanding of corporate environmental transparency in an emerging-market context.

2. AIMS/OBJECTIVES

To examine the impact of board characteristics on environmental disclosure among Sri Lankan listed companies.

3. THEORY

The relationship between board characteristics and environmental disclosure can be understood through Agency Theory and Stakeholder Theory, which provide different but complementary explanations of corporate reporting behaviour. Agency Theory originates from the separation of ownership and management, which can create conflicts of interest and information asymmetry between managers and shareholders (Jensen & Meckling, 1976). Within this relationship, the board performs a monitoring function by overseeing managerial decisions and promoting accountability and transparency (Nuskiya et al., 2021). Board structure is therefore important because differences in monitoring capacity may affect the information made available to external users (Khaireddine et al., 2020; Xu et al., 2025). Larger boards may offer a broader range of expertise, while greater independence can enhance objective oversight. Conversely, the concentration of executive and board leadership through CEO duality may restrict independent monitoring (Nuskiya et al., 2021; Xu et al., 2025). However, Agency Theory assumes that stronger monitoring mechanisms should improve transparency, an expectation that is not consistently supported across different institutional settings (Kumari et al., 2022; Xu et al., 2025). More importantly, its emphasis on the

manager–shareholder relationship provides only a partial explanation of environmental reporting because environmental information is relevant to groups beyond shareholders.

Stakeholder Theory broadens this explanation by recognising corporate accountability to employees, customers, regulators, communities and other groups affected by business activities (Freeman, 1984). Environmental disclosure can consequently be viewed as a response to demands for information about corporate environmental responsibilities and performance (Khaireddine et al., 2020; Nuskiya et al., 2021). From this perspective, the relevance of board structure extends beyond monitoring management to the recognition and consideration of diverse stakeholder interests (Xu et al., 2025). A board with broader expertise, independence and diversity may be better positioned to recognise different expectations concerning environmental accountability (Khaireddine et al., 2020; Xu et al., 2025). Nevertheless, Stakeholder Theory does not imply that stronger stakeholder representation will automatically produce greater disclosure because stakeholder groups may differ in influence, priorities and information demands. Neither theoretical perspective therefore provides a complete explanation independently. Agency Theory provides an explanation of the internal governance and monitoring systems that influence disclosure decisions while Stakeholder Theory provides an explanation of the external accountability and information pressures that influence disclosure decisions. Their integration offers a better theoretical framework for the analysis of the effect of the board characteristics on environmental disclosure in the Sri Lankan corporate environment.

Based on Agency Theory, Stakeholder Theory, and previous empirical studies, the following hypotheses are formulated:

H_1: Board size has a significant positive impact on environmental disclosure among Sri Lankan listed companies.

H_2: Board independence has a significant positive impact on environmental disclosure among Sri Lankan listed companies.

H_3: Board gender diversity has a significant positive impact on environmental disclosure among Sri Lankan listed companies.

H_4: CEO duality has a significant negative impact on environmental disclosure among Sri Lankan listed companies.

4. METHODS

This study adopts a quantitative longitudinal research design using panel data to examine the impact of board characteristics on environmental disclosure among non-financial companies listed on the Colombo Stock Exchange (CSE). The study population comprises non-financial listed companies, while financial-sector companies are excluded because of differences in regulatory and reporting requirements. A sample of Sixty companies was selected using random sampling from the eligible population of non-financial listed companies. The selected companies were observed over the five-year period from 2021 to 2025, resulting in a balanced panel of 300 firm-year observations. The panel structure enables variations across companies and over time to be incorporated into the analysis.

Secondary data are collected from the selected companies' published annual reports, which provide corporate governance and environmental disclosure information (Nuskiya et al., 2021; Krishnasamy & Shanthakumar, 2026). Environmental disclosure was measured through content analysis of corporate annual reports using a 34-item Environmental Disclosure Index (EDI) based on the Global Reporting Initiative (GRI) framework, following Tharsika and Keerthana (2025) and Krishnasamy and Keerthana (2026). The checklist covers 11 environmental disclosure categories: materials, energy, water, biodiversity, emissions, effluents and waste, products and services, compliance, transport, overall environmental expenditure, supplier environmental assessment, and environmental grievance mechanisms. Each disclosure item was coded using a binary scoring system, whereby a score of one was assigned if the relevant environmental information was disclosed in the annual report and zero otherwise. The EDI was calculated by dividing the total number of disclosed items by 34, yielding a standardized index ranging from zero to one. The EDI was calculated as follows:

Where:

$$EDI_{it} = \frac{\sum_{j=1}^{n} d_{ijt}}{n} \quad \text{.....(1)}$$

- EDI_{it} = Environmental Disclosure Index of firm *i* in year *t.*
- d_{ijt} = 1 if environmental disclosure item *j* is disclosed by firm *i* in year, and 0 otherwise.
- n = Total number of environmental disclosure items (34 in this study).

An unweighted scoring approach was adopted, assigning equal importance to all disclosure items. The same checklist and scoring procedure were applied throughout the study period (2021–2025) to maintain consistency in measurement across firms and years Board size, board independence, board gender diversity and CEO duality constitute the independent variables, reflecting board attributes commonly examined in environmental disclosure research (Nuskiya et al., 2021; Kumari et al., 2022). The operational measurements are presented in Table 1.

Table 1. Variable Measurement

Variable	Measurement	Supporting Source
Environmental Disclosure Index (EDI)	Number of environmental items disclosed ÷ 34. Each item is coded one if disclosed and zero otherwise.	Krishnasamy & Shanthakumar (2026)
Board Size (BS)	Total number of directors on the board.	Nuskiya et al. (2021); Kumari et al. (2022)
Board Independence (BI)	Number of independent directors ÷ total number of directors.	Nuskiya et al. (2021); Kumari et al. (2022)
Board Gender Diversity (BGD)	Number of female directors ÷ total number of directors.	Kumari et al. (2022)
CEO Duality (CEOD)	Dummy variable coded one when the CEO and board chair positions are held by the same person and zero otherwise.	Nuskiya et al. (2021); Kumari et al. (2022)

Source: Based on Nuskiya et al. (2021), Kumari et al. (2022), and Krishnasamy and Shanthakumar (2026).

Data are analysed using Stata. Descriptive statistics summarise the study variables, while Pearson correlation analysis examines the direction and strength of bivariate relationships. The Variance Inflation Factor (VIF) assesses multicollinearity among the independent variables. Panel-data regression is employed to examine the impact of board characteristics on environmental disclosure. Pooled Ordinary Least Squares (OLS), Fixed Effects (FE), and Random Effects (RE) models are estimated. The F-test compares pooled OLS with FE, while the Breusch–Pagan Lagrange Multiplier (LM) test compares pooled OLS with RE. The Hausman specification test determines the appropriate choice between FE and RE. . Statistical significance is assessed at the 10% level for both regression analysis and panel-model selection. The 10% significance threshold is applied to evaluate the statistical significance of the estimated regression coefficients and to

interpret the Hausman specification test. This threshold is consistent with significance levels employed in previous empirical panel-data research (Hassan & Lahyani, 2020; Dicuonzo et al., 2022).

5. RESULTS

The descriptive statistics provide an initial overview of the distribution and characteristics of the study variables. As presented in Table 2, the mean board size is 8.147 directors, while board independence and board gender diversity report mean values of 0.419 and 0.125, respectively. CEO duality records a mean of 0.190. The EDI has a mean value of 0.310, with observed values ranging from 0.000 to 0.912.

Table 2. Descriptive Statistics

Variable	Obs.	Mean	Std. Dev.	Min	Max
BS	300	8.147	2.077	4.000	13.000
BI	300	0.419	0.119	0.180	0.750
BGD	300	0.125	0.135	0.000	0.630
CEOD	300	0.190	0.393	0.000	1.000
EDI	300	0.310	0.265	0.000	0.912

Source: Authors' calculations based on secondary data.

Table 3 reports the Pearson correlation coefficients and Variance Inflation Factors (VIF). The correlations among the independent variables range from -0.249 to 0.391. The VIF values range from 1.03 to 1.29, with a mean VIF of 1.15, indicating that multicollinearity is not a concern in the regression analysis.

Table 3. Correlation Matrix and Variance Inflation Factors

Variable	BS	BI	BGD	CEOD	EDI	VIF
BS	1.000					1.07
BI	- 0.249***	1.000				1.29
BGD	- 0.038	0.391***	1.000			1.20
CEOD	- 0.096*	0.135**	- 0.030	1.000		1.03
EDI	0.311***	- 0.032	0.068	- 0.051	1.000	-

Notes: ****, ** and * indicate statistical significance at the 1%, 5% and 10% levels, respectively. VIF denotes Variance Inflation Factor.*
Source: Authors' calculations based on secondary data.

To determine the appropriate panel-data estimation model, the F-test, Breusch–Pagan Lagrange Multiplier (LM) test, and Hausman specification test were conducted, as presented in Table 4. The F-test and LM test indicated that the Fixed Effects (FE) and Random Effects (RE) models, respectively, were preferred over pooled Ordinary Least Squares (OLS).

Table 4. Model Selection Tests

Test	Statistic	p-value	Decision
F-test (FE vs. Pooled OLS)	F(59, 236) = 16.08	0.001	FE preferred to pooled OLS
Breusch- Pagan LM (RE vs. Pooled OLS)	chibar²(01) = 313.93	0.001	RE preferred to pooled OLS
Hausman (FE vs. RE)	$\chi^2(4) = 9.41$	0.0516	FE preferred at the 10% level

Source: Authors' calculations based on secondary data.

The Hausman specification test yielded a chi-square statistic of 9.41 (p = 0.0516), which was statistically significant at the 10% level but not at the 5% level. Accordingly, the null hypothesis was rejected at the 10% significance level, providing marginal evidence in favour of the FE model over the RE model. Therefore, the FE model was retained for the final regression analysis.

Table 5. Fixed Effects Regression Results

Variable	Coefficient	t-statistic	p-value
Constant	0.287***	2.93	0.004
BS	0.002	0.18	0.860
BI	-0.123	-1.05	0.294
BGD	0.551***	3.78	0.001
CEOD	-0.038	-0.46	0.647
Observations	300		
Number of groups	60		
Within R^2	0.0725		
F-statistic	4.61***		
Prob > F	0.0013		

*Notes: *** indicates statistical significance at the 1% level.*
Source: Authors' calculations based on secondary data.

Following the model selection tests, the Fixed Effects model is used to estimate the impact of board characteristics on environmental disclosure, with the results reported in Table 5. Board gender diversity exhibited a positive and statistically significant association with environmental disclosure (β = 0.551, p = 0.001), supporting H_3. Specifically, a 10% increase in female board representation is associated with an estimated 5.51% increase in environmental disclosure, holding other variables constant. In contrast, board size (β = 0.002, p = 0.860), board independence (β = - 0.123, p = 0.294), and CEO duality (β = - 0.038, p = 0.647) did not exhibit statistically significant associations with environmental disclosure. Therefore, H_1, H_2, and H_4 were not supported. The overall model was statistically significant (F = 4.61, p = 0.0013), with a within R^2 of 0.0725.

6. DISCUSSION

The mean EDI of 0.310 indicates that sampled companies disclose approximately 31% of the environmental items. This is higher than the 21% mean disclosure reported by Krishnasamy and Shanthakumar (2026) for Sri Lankan listed companies during 2020–2024. The finding also reflects the increasing trend in environmental disclosure identified by Nuskiya et al. (2021), although environmental reporting in Sri Lanka was considered to remain at an early stage. Thus, environmental disclosure appears to be improving, but considerable scope for further improvement remains.

Among the board characteristics examined, board gender diversity has a statistically significant impact on environmental disclosure. This finding is consistent with Khaireddine et al. (2020), who reported a significant positive influence of board gender diversity on environmental disclosure. From a stakeholder theory perspective, greater gender diversity may broaden the range of stakeholder interests considered in board decision-making and strengthen attention to environmental accountability. From an agency theory perspective, diverse boards may also strengthen monitoring and encourage greater transparency. However, Kumari et al. (2022) found no significant impact of board gender diversity in India, indicating that its influence may vary across institutional contexts.

In contrast, board size, board independence and CEO duality do not significantly impact environmental disclosure. The board-size finding differs from Nuskiya et al. (2021) and Khaireddine et al. (2020), who reported positive associations with environmental disclosure. The insignificant impact of board independence is consistent with Kumari et al. (2022), but differs from Nuskiya et al. (2021). Similarly, the insignificant impact of CEO duality supports Kumari et al. (2022), whereas Nuskiya et al. (2021) reported a negative association. These findings provide limited support for agency theory, as formal monitoring structures such as board independence and separation of leadership roles do not significantly explain environmental disclosure. Overall, the results suggest that board composition, particularly gender diversity, may be more relevant to environmental transparency than board size, independence or leadership structure in the Sri Lankan context.

7. IMPLICATIONS AND LIMITATIONS

The results have both theoretical and practical implications. Theoretically, board gender diversity has an impact on the board and strengthens consideration for stakeholders' broader expectations, which aligns with the stakeholder theory. The result also offers some confirmation of agency theory,

since greater diversity of the board members might improve monitoring and accountability. The lack of significant impacts from board size, board independence and CEO duality, however, suggests that traditional board composition may not necessarily be associated with increased environmental disclosure. Therefore, the results emphasize the need to take into account the composition and diversity of the board and not just structural governance characteristics.

In practical terms, the results have implications for listed companies, regulators and policymakers in Sri Lanka. Compelling messages for female representation on board can be used as an element of other activities to enhance environmental accountability and transparency. It may also be worth considering encouraging more women to serve on boards and providing guidance for environmental reporting by regulators and policymakers. The average environmental disclosure level of Sri Lankan listed companies is as low as 31%, thus there is ample room for enhancements to the level of disclosure of environmental information.

The study has some limitations that can be addressed in future research. First, the sample is restricted to 60 non-financial listed companies, and the time period is limited to 2021-2025, which may have an impact on generalizability. Further research might involve more individuals and a longer time frame. Second, environmental disclosures are measured with an unweighted 34 item index, measuring how much disclosure rather than how good or bad it is. Research in the future may include disclosure quality, quantitative environmental performance measures, or weighted disclosure measures. Lastly, other governance factors can be investigated in future studies including the quality of the board, board meetings, characteristics of sustainability committees and audit committee, and using alternative econometric methods to overcome endogeneity.

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