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AUDIT COMMITTEE CHARACTERISTICS IN DRIVING ESG PERFORMANCE UNDER ESG EXPOSURE CONDITIONS

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Abstract: *Grounded in the Resource Dependence Theory (RDT), this study investigates how ESG Exposure variables affect the relationship between ESG performance and audit committee meeting attendance, independence, expertise, and size. A total of 461 firm-year observations from 91 companies listed on the Indonesia Stock Exchange (IDX) during 2016–2025 were analyzed using the Fixed Effect Model (FEM) with cluster-robust standard error, challenging traditional governance theory. The results show little significant impact of committee meeting attendance and committee independence on ESG performance, implying ceremonial behaviors. Among all variables, only audit committee expertise is found to be a positive driver. Meanwhile, audit committee size has a strong negative impact, as predicted by social loafing and coordination failure. Furthermore, the results of the moderation analysis suggest that ESG Exposure, in general, does not strengthen the effectiveness of governance. Instead, it significantly exacerbates the adverse impact of committee size in high-risk industries, where agile sustainability decision-making is negatively impacted by excessive committee members. These findings indicate a need for a regulatory shift from quantitative structural indicators to competency norms in cognition and engagement. Policymakers and shareholders of energy and emission-heavy industries should focus on governance based on "lean" and "competent" committees, and not those with too many members that perpetuate "social loafing pathologies", lowering ESG performance and green stock prices.*

Keywords: Audit Committee, ESG, Exposure, Resource Dependence Theory, Performance

INTRODUCTION

Centering on commitment to ethical and sustainable practices, Environmental, Social, and Governance (ESG) has become a vital part of the business world (Liu & Xie, 2024). Regulators, investors, and the general public are increasingly expecting companies to disclose their ESG performance and demonstrate commitment to sustainability (Yang et al., 2021). This shift from optional to compulsory dimension will have a tangible impact on business success. One of the crucial elements of corporate governance for fulfilling stakeholder expectations

regarding ESG is an effective audit committee (Maroun, 2022). As part of the board of commissioners, this committee is responsible for the accuracy of corporate reports and the company's compliance with regulations (Karim et al., 2024).

The transition from voluntary to mandatory sustainability reporting has gained momentum in many countries, including Indonesia, with the imposition of legal and financial requirements, as well as high penalties. In this regard, the audit committee has emerged as the hub of integrity, transparency, and accountability in the reporting process (Sobhan et al., 2025). Beyond financial reporting and internal controls, audit committees are now tasked with monitoring ESG disclosures, such as climate risks, human capital management, and sustainability compliance. The lack of accurate evaluation of ESG metrics can lead to penalties, reputation loss, and investment boycotts.

Although the audit committee is identified as one of the most significant factors in ESG reporting, several gaps in theory, empirical evidence, and methodology remain in existing literature. Theoretically, all governance and sustainability studies are based on Agency and Stakeholder Theories (Belouadah, 2026), which focus on the audit committee's role as an overseer of agency conflicts. This perspective fails to take into account the wider landscape of firm-environment relations in uncertain and volatile settings. Empirically, the impact of the audit committee–ESG relations is mixed; some studies reveal a positive effect of audit committee size and independence (Almutair & Al Barrak, 2024), while others report null or even negative impact due to coordination inefficiencies (Sobhan et al., 2025). Research methods are often overly simplistic, for example, based solely on meeting frequency, which does not reflect engagement depth (Umar et al., 2024). In addition, oversight effectiveness may be affected by the underrepresentation of key independent or financially knowledgeable individuals.

This novel study expands the literature by focusing on Average Committee Meeting Attendance—which measures participation as opposed to scheduled meetings—rather than Meeting Frequency. To examine how a sector's vulnerability to sustainability risks influences the urgency of governance resource deployments, which falls under the umbrella of Resource Dependence Theory (RDT), ESG Exposure is also introduced as a moderating mechanism (Elmghaamez et al., 2024). According to RDT, the audit committee is more than merely an oversight mechanism; it is a strategic resource provider, and the expertise, independence, and physical presence of its members are used for survival and legitimacy in high-risk ESG environments. This study empirically tests the causality between ESG Performance and Audit Committee Independence, Expertise, Size, and Average Meeting Attendance, as well as the amplification effect of ESG Exposure in the Indonesian capital market landscape.

THEORETICAL FRAMEWORK AND HYPOTHESES

Average Committee Meeting Attendance and ESG Performance

Previous governance studies have measured committee commitment by the number of meetings held per year (meeting frequency) without accounting for member participation in these meetings, leaving an important gap in the literature. In fact, frequency is a proxy that is susceptible to ceremonial compliance bias. Some meetings are arranged solely to meet requirements from the Financial Services Authority (*Otoritas Jasa Keuangan*/OJK). These meetings, however, lack analytical content if committee members are not present. Conversely, Average Committee Meeting Attendance serves as a behavioral indicator that reflects time allocation, vigilance, cognitive commitment, and dedication to human resources. According to RDT, high attendance reflects the full utilization of committee members' expertise and networks, as well as the mobilization of intellectual capital for ESG strategies. This is as evidenced by recent studies. Itan et al. (2025) show that disciplined attendance positively affects ESG performance. Similarly, Arif et al. (2021) report that companies with engaged boards have lower carbon emission intensity. Therefore, the first hypothesis is proposed as follows:

H1: Average committee meeting attendance has a positive and significant effect on ESG performance.

Audit Committee Independence and ESG Performance

Various governance factors, including audit committee independence, contribute to transparent and independent oversight. While Agency Theory views independent members as neutral monitors, RDT emphasizes their role in introducing outside norms, networks, and regulatory knowledge to the company. With respect to ESG, independent members are more sensitive to stakeholder pressures, more likely to advocate responsible practices, and less likely to engage in greenwashing to conserve reputation. Empirical evidence from the EU confirms that high independence of the audit committee has a significant positive impact on disclosure transparency and drives sustainability performance since it ensures that the committee's resources are used for the long-term interests of macro-shareholders (Pozzoli et al., 2022). Therefore, the second hypothesis is proposed as follows:

H2: Audit committee independence has a positive and significant effect on ESG performance.

Audit Committee Expertise and ESG Performance

In the context of sustainability reporting, Audit Committee Expertise encompasses accounting expertise, auditing of non-financial risks, knowledge of the Task Force on Climate-related Financial Disclosures (TCFD) framework, and the ability to assess double-materiality data. Within RDT, this is the most vital intangible, cognitive asset for facing an increasingly volatile regulatory landscape. Only an audit committee with empirical expertise can interpret third-party ESG rating algorithms, identify anomalies in supply chain carbon emissions, and provide sufficient assurance about the quality of sustainability reports. The study by Aprianti et al. (2022) in the Indonesian context indicates that audit committees with specialized expertise positively affect the quality of sustainability reporting and overall ESG performance. Therefore, the third hypothesis is proposed as follows:

H3: Audit committee expertise has a positive and significant effect on ESG performance.

Audit Committee Size and ESG Performance

Conventionally, larger audit committees are believed to increase the boards' governance capacity. Nevertheless, RDT and organizational behaviour studies indicate a paradox: audit committees beyond some critical size would lead to social loafing, coordination problems, diffusion of responsibility for governance, and poorer governance. Growing committee membership causes members to feel complacent that other members are performing adequate 'due diligence' on sustainability-related issues, disclosures to become more biased, policy responses to lag, and command-chain paralysis to occur. Large committees are not analytical, have an "echo chamber" effect in risk review processes, and impede climate-risk mitigation. As reported in studies by Attia et al. (2025) and Alsultan and Hussainey (2025), larger committees often experience coordination problems and do not improve the quality of ESG disclosure. Therefore, the fourth hypothesis is proposed as follows:

H4: Audit committee size has a negative and significant effect on ESG performance.

ESG Exposure as an Amplifying Moderating Variable

This study makes a significant methodological contribution by proposing ESG exposure as an intervening mechanism between the audit committee and ESG performance. RDT hypothesizes that the more turbulent the regulatory environment and the more uncertain the industry's sustainability, the more critical the company's need to conquer and harness governance resource reserves from its audit committee. For companies with high ESG exposure, where the quality of their audit committee is essential for risk management, there is no evidence of a connection between audit committee quality and ESG exposure. The audit committee's high meeting attendance, independence, and expertise all contribute to absorbing shocks and improving ESG performance. As ESG exposure is likely to enhance the positive impact of committee meeting attendance, independence, and expertise, it also magnifies the negative impact of overly large committee structures, although the dynamics of moderation are not necessarily amplifying (Brighi et al., 2025). In numerous high-risk industrial contexts, governance needs to be swift, agile, and decisive, which bureaucratically vast oversight bodies cannot replicate. Therefore, the fifth hypothesis is constructed into several sub-hypotheses as follows:

H5a: ESG exposure strengthens the positive effect of average committee meeting attendance on ESG performance.

H5b: ESG exposure strengthens the positive effect of audit committee independence on ESG performance.

H5c: ESG exposure strengthens the positive effect of audit committee expertise on ESG performance.

Compared to the other variables, the relationship between ESG exposure and committee size is significantly different. Pathologies of the oversized committee—social loafing, lack of coordination, and diffused responsibility—are exacerbated in industries with high ESG exposure. Sustainability crises are developing rapidly in emission-intensive, extractive, or environmentally sensitive industries, thus necessitating swift navigation of new governance landscapes. As external ESG pressure increases, large committees with a lot of friction turn governance inefficiency into a governance catastrophe. In this regard, Nandi et al. (2025) theorize that larger audit committees negatively impact CSR outcomes. On the other hand, Gull et al. (2024) report that under stress, committees with excessive members effectively become environmental committees that fail to integrate a focus on CSR.

H5d: ESG Exposure strengthens the negative effect of audit committee size on ESG performance.

RESEARCH METHODS

This quantitative study employed an explanatory design with the longitudinal panel data regression model. This allows for the control of unobserved firm-specific heterogeneity, macroeconomic fluctuations, and changes in regulatory regimes across time. The population is all public corporations listed on the Indonesia Stock Exchange (IDX) from 2016 to 2025. Samples were selected using strict non-probability purposive sampling, with inclusion

criteria as follows: (1) Continuous IDX listing without forced delisting during 2016–2025; (2) Routine publication of audited Annual Reports and Sustainability Reports; (3) ESG Performance scores and ESG Exposure module data available to all users in Refinitiv Workspace; and (4) Clear disclosure of audit-committee biographies, empirical experience, independence, committee size, and meeting attendance.

This study's empirical robustness is based solely on data extracted from Refinitiv Workspace, which standardizes cross-border metrics, removes subjectivity bias from the local data, and mathematically integrates industry-specific materiality weights. All research instruments are defined technically in accordance with the specifications and computation, as shown in Table 1.

Table 1. Operational Definition

Type of Variable	Name	Variable Definition	Source of Data
Dependent	ESG Score (ESG)	Metrics of environmental preservation, social responsibility, and governance compliance performance	Refinitiv Workspace
Independent	Committee Meetings Attendance Average (CMAA)	Actual attendance rate of the audit committee in oversight forums (behavioral governance metric)	
	Audit Committee Independence (ACI)	Ratio of non-affiliated audit committee members who are structurally and objectively independent	
	Audit Committee Expertise (ACE)	Empirical capability in financial literacy, accounting, and understanding of double materiality	
	Audit Committee Size (ACS)	The company's intellectual absorption capacity, calculated from the total number of audit board members	
Moderation	ESG Exposure (EX)	Quadrant of industry risk magnitude projected from the intensity of sustainability, materiality, and vulnerability	
Control	Firm Size (ln Total Asset) (SIZE)	Natural logarithm of total assets representing the company's capitalization capability	
	Return on Assets (ROA)	Proxy for the company's profitability margin in utilizing historical assets	

Source: Data Processed, 2026

The multivariate panel data regression was performed using the latest version of the econometric software STATA. Following model justification, the model's theoretical postulates were tested using two basic equations.

1. Main Effect Regression Equation (H1–H4): Estimating the direct transmission effect of audit committee characteristics on sustainability performance.

$$ESG_{it} = \beta_0 + \beta_1 CMAA_{it} + \beta_2 ACI_{it} + \beta_3 ACE_{it} + \beta_4 ACS_{it} + \beta_5 SIZE_{it} + \beta_6 ROA_{it} + \varepsilon_{it}$$

2. Moderated Regression Analysis (MRA) Equation (H5a–H5d): Formulated explicitly to explore the intervening effect (interactive amplification) where the moderating variable vector acts to mitigate or strengthen the directional coefficients between the independent variables and corporate sustainability performance in the IDX landscape.

$$ESG_{it} = \beta_0 + \beta_1 CMAA_{it} + \beta_2 ACI_{it} + \beta_3 ACE_{it} + \beta_4 ACS_{it} + \beta_5 CMAAxEX_{it} + \beta_6 ACIxEX_{it} + \beta_7 ACExEX_{it} + \beta_8 ACSxEX_{it} + \beta_9 SIZE_{it} + \beta_{10} ROA_{it} + \varepsilon_{it}$$

RESULTS AND DISCUSSION

Initially, a descriptive statistical analysis was performed to determine the central tendency and dispersion of all 461 observations. The descriptive statistics of all variables are presented in Table 2 below.

Table 2. Descriptive Statistics

Variable	Mean	Std. Dev.	Min	Max
ESG	54.06566	17.87943	8.162385	89.05197
CMAA	95.32538	9.607501	0	100
ACI	88.57272	19.04984	25	100
ACE	0.2234273	0.4169949	0	1
ACS	1.832972	1.194315	0	6
ESG Exposure	0.5140998	0.5003441	0	1
SIZE	31.79164	1.362895	28.4072	35.57903
ROA	0.0719766	0.1030207	−0.9364951	0.7216002

Source: Data Processed, 2026

As shown in Table 2, the ESG scores range widely from sustainability leaders at 8.16 to severe underperformers at 89.05, with an average of 54.07 and a significant standard deviation of 17.88. Committee Meetings Attendance Average (CMAA) is 95.33% (with the minimum attendance of 0 minutes indicating extreme absenteeism). Furthermore, most issuers have more than the required minimums to achieve Audit Committee Independence (ACI), with an average of 88.57% (25–100%).

Most notably, the average score for Audit Committee Expertise (ACE) is 0.223, meaning that only 22.3% of the observed committees have any specific sustainability or double-materiality knowledge. The average Audit Committee Size (ACS) is 1.83, with significant differences across companies (ranging from 0 to 6). The average ESG Exposure (EX) is 0.514, indicating that 51.4% of firm-year observations are in the category of environmentally or socially vulnerable companies. This result facilitates an appropriate estimation of the MRA. Meanwhile, control variables behave normally: SIZE median ≈ 31.79; ROA median ≈ 7.20% with wide dispersion (−93.65% to 72.16%).

The Fixed Effect Model (FEM) is arguably an asymptotically efficient estimator to control for time-invariant unobserved heterogeneity on the IDX. Table 4 presents a summary of the final results based on 461 cross-temporal observations of 91 companies. STATA does not include the Z variable (ESG Exposure) as it is collinear with the other two variables, which are both time-invariant variables by nature of FEM (e.g., coal mining is always extreme, banking is always low). The FEM treats constant parameters as separate intercepts, and the dynamics of the shift in Z can still be legitimately observed through the shift in interaction parameters.

Table 3. Classical Assumption Test

Diagnostic Evaluation Phase	STATA Execution Justification	Econometric Decision Significance
Multicollinearity	Variance Inflation Factor (VIF) Assessment	Passed. All independent predictors and control variables are free from perfect collinearity (VIF < 10).
Heteroskedasticity	Modified Wald Test for Groupwise Heteroskedasticity on fixed effect model residuals	Symptoms Detected. The homoskedasticity hypothesis is rejected, validating volatility variation across corporate panels.
Autocorrelation	Wooldridge Test for Autocorrelation in Panel Data	Symptoms Detected. Validating the probability of residual correlation over time (first-order serial correlation).
VCE Correction Solution	Parameter Estimation, fe vce(cluster id)	Corrective Execution. Substituting the traditional standard error calculation with cluster-robust to restore valid inference significance.

Source: Data Processed, 2026

Factual Time Dedication as an ESG Catalyst (H1 Partially Supported)

CMAA shows a conditional effect for the 2 specifications. In the unconditional main-effect model (Model 1), this variable is not statistically significant (β = 0.0280, p = 0.345). However, when ESG Exposure is added to Model 2, the coefficient of CMAA is significant at the 5% level (β = 0.0536, p = 0.046). This suggests that the marginal impact of committee meeting attendance depends on the industry's sustainability-risk regime rather than being industry-wide. The result for the unconditional model contradicts the notion that higher attendance leads to better oversight. From the perspective of RDT, time allocation alone is insufficient; cognitive resources need to be managed effectively. Similarly, Le et al. (2025) and Mutsa Ruziwa et al. (2025) do not observe any significant relationship between ESG outcomes and the frequency of audit committee meetings. The moderated finding reflects a transition from ceremonial to substantive monitoring of corporate engagement with sustainability risk, further enhancing RDT interpretation. Therefore, H1 is partially supported; it is rejected by the unconditional model, but supported by the ESG-Exposure-conditioned model.

Structural Failure of Independence (H2 Rejected)

The ACI coefficient is positive, but not significantly different from zero (p = 0.311). Therefore, H2 is rejected. This challenges the classical view that more independent parties lead to better governance. The FEM econometric explanation is, in fact, solid: within-variation in the proportion of independent commissioners on the IDX is most likely due to the minimum regulatory compliance. Independent individuals often lack functional authority over the allocation of CSR funds or the use of strategic resources; thus, their involvement in improving ESG reporting can be regarded as managerially meaningless and ineffective (Junus et al., 2022).

Expertise as a Superior Resource (H3 Accepted)

In every model, the results are statistically unassailable and always best for ACE. The coefficient is 4.907 (p = 0.005) in Model 1, below the 1% threshold. When ESG Exposure is included as a moderator in Model 2, this significance is not only maintained but also improved, with the coefficient increasing to 6.644 (p = 0.001). One of the most empirically convincing findings of this study is the dual-model consistency between the main-effect and moderated specifications, which demonstrates that expertise is not conditional or context-specific; rather, it is a fundamental, intrinsic, long-term governance resource that enhances the efficacy of ESG governance, regardless of the industry's risk dynamics. This is in line with the key concept of RDT, which holds that organizational survival depends not only on structure but also on the quality of the cognitive resources allocated for governance (Elmghaamez et al., 2024). In this regard, audit committees that lack ESG competencies are among the main flaws. In an emerging economy without proper institutional ESG compliance frameworks, the audit committee has a major influence on the breadth and depth of ESG disclosure (Karim et al., 2024; Sahu et al., 2025).

ACE appears to be a distinct cognitive mechanism for the creation of ESG value, as indicated by the positive amplification of the ACE coefficient between Model 1 and Model 2 (4.907 → 6.644), which means that ACE is not diminished by adding the interaction terms. Sahu et al. (2025) use fixed-effects with Driscoll-Kraay standard errors across 6,073 firms in 34 OECD countries and find that audit committee expertise improves the ESG–SDG correlation, owing to its ability to increase transparency, decrease information asymmetry, and improve the quality of non-financial oversight. In the Indonesian context, specifically, Aprianti et al. (2022) provide evidence at the IDX level, revealing that the quality of sustainability reporting significantly improves the ESG performance scores. The GCC region validates the cross-context robustness, as confirmed by Belouadah (2026). The complementary evidence points to a shift in Indonesia's compliance strategy from structural measures (the number of members and number of meetings) to verifiable sustainability auditing certification. Among all committee attributes examined in this study, expertise is the most powerful and the only effective attribute in all ESG-focused companies listed in the IDX.

Table 4. Regression Estimation Results of the Fixed Effect Model (Cluster-Robust)

Variables	Model 1	Model 2
ESG Exposure	0 (omitted)	0 (omitted)
Attendance x Exposure	-	−0.0483798
		(0.475)
Independence x Exposure	-	−0.0071719
		(0.938)
Expertise x Exposure	-	−4.814126
		(0.194)
Size x Exposure	-	−2.04096**
		(0.018)
Average Committee Meeting Attendance	0.0280226	0.0535834**
	(0.345)	(0.046)
Committee Independence	0.051262	0.0412183
	(0.311)	(0.586)
Committee Expertise	4.907065***	6.644352***
	(0.005)	(0.001)
Committee Size	−1.083765**	−0.1357213
	(0.026)	(0.734)
Firm Size/Asset	17.2161***	17.1734***
	(0.000)	(0.000)
Return on Assets	−7.445263	−8.630165
	(0.478)	(0.404)
_cons	−499.0482	−496.6008
	(0.000)	(0.000)
R-Square	0.3190	0.3354

***, **, and * denote significance at < 0.01, < 0.05, and < 0.10 levels, respectively, for one-tailed tests.
Source: Data Processing (2026)

The "Social Loafing" Paradox in Committee Size (H4 Accepted)

The coefficient of Audit Committee Size (ACS) is highly negative (β = −1.084, p = 0.026). This indicates that the audit committee's resource capacity is not proportional to its size; thus, H4 is accepted. The bigger the committee, the more agency problems and organizational pathologies—particularly social loafing problems—occur. If the size of the delegation is too large, it becomes too slow and too collective to effectively avoid detailed scrutiny of the documents relating to the governance of sustainability (Gull et al., 2024). This supports a similar finding by Alsultan and Hussainey (2025): the larger the audit committee, the greater the coordination issues and the lower the likelihood of improvement in disclosure practices.

Moderation Effect: Bureaucratic Disruption in Risky Industries

The results of the moderated regression analysis (MRA) present an extremely pronounced anomaly map, which contradicts previous theoretical practice. The interaction terms H5a, H5b, and H5c are not statistically significant (p> 0.05). The interaction between ACE and ESG Exposure (ACE×EX) is notably non-significant (β = −4.814, p = 0.194). Meanwhile, the non-moderated ACE coefficient is actually more significant in Model 2 (β = 6.644, p = 0.001) than in Model 1 (β = 4.907, p = 0.005). This coefficient amplification under moderated specification has a strong econometric message: ACE is not an industry-specific resource triggered by threats within the sector, but rather a governance competency that has a structurally guaranteed impact on ESG performance, irrespective of the industry's ESG exposure. In contrast to committee size, which is "on-demand" and only gets activated by pressures of high ESG Exposure (ACS×EX: β = −2.041, p = 0.018), expertise is always-on and requires no external crisis. This distinguishes between high-quality governance resources that are part of the routine of competitive advantage and crisis-responsive resources that are not a part of the routine (Elmghaamez et al., 2024). These findings confirm those of Sahu et al. (2025), who evaluate 34 OECD countries using Fixed Effects regression, and those of Belouadah (2026), who examine Saudi-listed firms from Refinitiv data.

The most novel empirical finding of this study is the ACS×EX interaction, which is of negative polarity (−2.041) and dramatically significant (p = 0.018). This negative interaction strengthens the negative impact of

committee size rather than the impact of ESG exposure. The interaction's significance confirms that the effect of committee size on ESG performance is dependent on the moderator's level. During a crisis, the oversight board in companies with very high ESG exposure must make decisions quickly and militantly. In these circumstances, the bigger the committee, the worse the bureaucracy. If committee size increases, climate policy mitigation is delayed due to the diffusion of responsibility, communication barriers, and internal debate, which impede decision-making. In the face of high ESG exposure, an excessive and slow committee is unacceptable. Thus, in an industry with extreme ESG exposure, a larger committee size will result in greater liability and a lower value of the green stocks (AlHares, 2025).

CONCLUSIONS

This longitudinal panel study employing a Fixed Effect Model with cluster-robust standard error correction on the Indonesia Stock Exchange challenges several pillars of sustainability-governance orthodoxy. The empirical results show that ESG performance is not improved by meeting frequency or by recruiting independent parties. Committee Expertise is the key competency underlying ESG performance. With committee size, however, the RDT postulate reaches an empirical anomalous threshold: adding members counters rather than strengthens the resource effect. The ESG-Exposure–ESG-Response relationship sets a new precedent: in high-risk industries, the corporate effort to meet environmental demands by enlarging the board to bloated dimensions paradoxically erodes oversight agility, producing a highly significant adverse causal intervention.

These findings call for policy reform at both corporate management and regulatory levels. The Financial Services Authority (*Otoritas Jasa Keuangan*/OJK) should revise compliance guidance to remove incentives for inflating the ratio of independent directors and the number of scheduled meetings and to introduce a certification framework for sustainability audit expertise. In high-emission-exposure industries, the "committee expansion" instrument serves as a warning to major shareholders. An audit team that is lean, agile, precise, cognitively competent, and intensely dedicated to making decisions within high-risk crisis areas is essential for preventing the social-loafing pathology that erodes future green-stock valuation.

Given the emerging-market and global sustainability context, several directions of future research are strongly advised. First, future studies are recommended to explicitly model regulatory regimes as moderating variables to capture structural shifts. Second, future studies should use dynamic panel estimators to overcome the limitations of static models on endogeneity and dynamic panel bias. A two-step System Generalized Method of Moments (System GMM) with lagged internal instruments is expected to yield more coherent asymptotic causal inference without dual endogeneity bias found in static OLS or FEM.

In this study, System GMM is not adopted as a robustness check for two methodological reasons. The panel cross-section (N = 91 firms, T = 10 years) is close to the minimum requirement for reliable Arellano–Bond and Blundell–Bond estimations. At this size, the number of internal instruments is large enough to overinflate the Hansen J statistic and weaken overidentification and AR(2) diagnostics, even with collapsed instruments and Windmeijer-corrected standard errors. Additionally, the model assumes contemporaneous causality between audit-committee characteristics and ESG performance. In this context, the Fixed Effect Model with cluster-robust standard errors is asymptotically consistent and parsimonious. Thus, System GMM is positioned as a forward-looking analytical extension as the sample grows across ASEAN exchanges with a theoretically grounded ESG-persistence mechanism. Finally, the negative interaction between committee size and ESG exposure invites deeper bibliometric and empirical investigation into the complexity paradox across understudied areas and whether mechanisms such as institutional ownership or gender diversity can mitigate these severe coordination costs.

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