



ESG and Corporate Performance: The Moderating Role of TMT Functional Diversity

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ABSTRACT

This study investigates the impact of Environmental, Social, and Governance (ESG) on corporate performance, with a focus on the moderating role of top management team (TMT) functional diversity. Utilizing a panel dataset of Chinese A-share listed companies from 2009 to 2020, we find a significant positive association between ESG performance and corporate performance, with TMT functional diversity serving as a positive moderator. Building on these findings, we recommend that firms place emphasis on TMT diversity, cross-functional collaboration, and ESG-related expertise to enhance ESG strategy implementation. The study demonstrates that leveraging the functional diversity of the TMT can help firms better formulate and implement ESG strategies, thereby improving long-term corporate performance and sustainability.

Keywords: Environmental, Social, and Governance, Corporate Performance, Top Management Team, Diversity, Moderating Effect

JEL Classifications: G30, M14

1. INTRODUCTION

Green development has emerged as a critical strategic objective for sustainable growth amid escalating global climate challenges. As public and investor awareness of environmental responsibility continues to rise, companies integrate environmental and social considerations into their core business strategies. Against this backdrop, ESG practices have become a facilitator for advancing sustainable development across numerous economies (Matos, 2020; DasGupta, 2022). Currently, over 80 countries and regions worldwide have mandated ESG information disclosure, leading to the enactment of more than 2,000 related regulations and provisions.

The growing emphasis on ESG has sparked intense debate regarding its implications for corporate performance. Some researchers argue that ESG engagement fosters long-term value creation by enhancing corporate reputation, investor confidence, and risk management (Pulino et al., 2022; Koundouri et al., 2022; Xie et al., 2019), critics contend that ESG initiatives may impose

additional costs without guaranteeing financial returns (Duque-Grisales & Aguilera-Caracuel, 2021; Velte, 2017). Because of these divergences, a deeper investigation into the impact of ESG practices and the mechanisms through which they influence corporate outcomes is both theoretically significant and practically relevant for corporate management and policy development.

In fact, companies face numerous challenges in ESG implementation. Effective ESG engagement requires substantial investments in human capital and technological resources, as well as an indispensable capacity for cross-departmental coordination. Given the multifaceted nature of ESG, an executive team with diverse functional backgrounds may be better equipped to integrate business practices into a firm's core operations (Buyl et al., 2011; Qian et al., 2013). As a result, the composition of the TMT, has become an increasingly relevant factor in understanding firms' ESG engagement. However, despite its potential significance, the role of TMT functional diversity in shaping ESG outcomes remains underexplored in the existing literature.

In light of these challenges, it is crucial to examine how ESG practices influence corporate performance, especially in the context of Chinese enterprises, where unique institutional and regulatory factors in an emerging market shape business operation. Given the regulatory landscape in China, several critical questions remain underexplored: How do ESG practices influence corporate performance in Chinese enterprises? What role does the diversity of TMT function backgrounds play in this relationship? Furthermore, how does the TMT functional diversity moderate the impact of ESG engagement? To address these questions, this study employs listed companies from 2009 to 2020 to conduct an empirical analysis, providing new insights into the intersection of ESG, TMT functional diversity, and corporate performance.

The remainder of this paper is organized as follows: Section 2 conducts theoretical analysis and develops the hypothesis, Section 3 explains the empirical methodology, Section 4 presents the regression analysis results, and the results are discussed in Section 5. Finally, Section 6 concludes the paper and suggests managerial implications.

2. THEORETICAL ANALYSIS AND HYPOTHESES DEVELOPMENT

The impact of ESG on corporate performance is a complex and multidimensional issue, encompassing financial, market, governance, and social responsibility aspects. Some scholars argue that ESG may have adverse effects on corporate performance by increasing operational costs or diverting management attention, thereby weakening corporate performance. Due to inconsistencies in ESG disclosure standards, some firms may exaggerate their ESG performance to gain market advantages without actually committing sufficient resources (Kim and Lyon, 2015). This not only undermines corporate credibility but also heightens regulatory risks and potential legal liabilities (Aouadi and Marsat, 2018). Furthermore, some scholars contend that ESG merely represents an additional cost without necessarily generating tangible financial returns (Apergis et al., 2022; Andrieş and Sprincean, 2023).

However, with the growing prominence of ESG, an increasing number of scholars now believe that strong ESG performance can enhance corporate performance. Stakeholder theory posits that firms should not only create value for shareholders but also address the interests of other stakeholders, including governments, markets, executives, and consumers (Alshbili et al., 2021). ESG certification serves as a positive signal to external stakeholders, enhancing corporate reputation and trust, which in turn facilitates stakeholder support. Firms with high ESG involvement are more likely to attract responsible investors, enhance customer loyalty, and expand market share (Lin, 2024). When companies face social controversies or ethical challenges, they tend to strengthen ESG disclosures to mitigate external negative impacts (Garcia et al., 2017).

As an emerging market, China is advancing ESG practices in an effort to drive corporate sustainability and long-term development. Since 2006, the China Securities Regulatory Commission (CSRC) and major stock exchanges have introduced ESG reporting

guidelines, requiring listed companies to disclose environmental and social responsibility information in a standardized manner. Standardized ESG disclosure improves corporate transparency, attracts long-term capital, and reduces market risks (Aouadi and Marsat, 2018; Nirino et al., 2021). Additionally, the governance structures of Chinese listed firms are often complex, with some companies facing issues such as shareholder expropriation and managerial short-termism. ESG practices help optimize corporate governance, mitigate financial misconduct and misleading disclosures, ultimately enhancing corporate performance (He et al., 2022; Ellili, 2022; Darnall et al., 2022).

In China's government-led economic system, the government has a significant impact on the development of enterprises. ESG practices enables firms to better align with policy directives and regulatory requirements, thereby gaining support from the government. By strengthening ESG practices, enterprises can better comply with regulatory requirements, thereby gaining access to government incentives such as tax benefits or specialized financial support (e.g., green credit, green bonds, and R and D subsidies) (Malik and Kashiramka, 2024; Zhang et al., 2023; Zhao et al., 2022). Moreover, ESG-related social responsibility initiatives can help firms secure non-financial advantages from the government, such as land-use rights, which are critical for business survival in a highly competitive environment (Long et al., 2020; Huang, 2022). Given these arguments, we propose the following hypothesis:

Hypothesis 1. ESG practices have a positive effect on corporate performance.

In the formulation and implementation of corporate strategies, the TMT plays a pivotal role. As the core of corporate governance and decision-making, the functional composition of its TMT members not only shapes the firm's overall strategic direction but also significantly affects the development and execution of ESG practices (Zhou et al., 2024; Sang et al., 2024). TMT functional diversity may moderate the relationship between ESG and corporate performance through two mechanisms, thereby enhancing the effectiveness of ESG strategies.

TMT functional diversity enables firms to integrate managerial expertise from various domains when formulating ESG strategies, leading to more comprehensive, precise, and contextually relevant ESG initiatives. Executives from specific functional backgrounds—such as finance, technology, human resources, operations, and marketing—offer unique perspectives on ESG's multifaceted value, enriching strategic planning. For example, human resources executives may focus on workplace conditions, employee benefits, and labor relations, while those with technical expertise prioritize green innovation and sustainable production. Finance executives play a key role in assessing ESG investment returns and developing sustainable financing strategies. This diversity enhances the relevance and feasibility of ESG policies, mitigates governance blind spots stemming from a singular perspective, and fosters long-term sustainability, ultimately strengthening employees' organizational identification and satisfaction.

The successful implementation of ESG strategies requires coordination across multiple internal departments, and TMT functional diversity plays a key integrative role in this coordination. Since ESG spans environmental protection, social responsibility, and corporate governance, its execution involves various functional areas such as R and D, supply chain management, human resources, marketing, and finance. A TMT with diverse functional backgrounds can bridge interdepartmental information gaps and foster cross-functional collaboration, improving the efficiency of ESG strategy implementation. For example, executives with technical expertise can optimize green production processes, while those with marketing backgrounds can strengthen the firm's ESG image through branding and stakeholder engagement. This integrated approach ensures the seamless adoption of ESG policies across business units, enhancing firm performance.

In summary, the executive team with diverse functional backgrounds, with its varied experiences, expertise, and skills, is better equipped to enhance the effectiveness of ESG strategies, ultimately improving corporate performance. Based on this rationale, this study proposes the following hypothesis:

Hypothesis 2. The positive relationship between ESG and firm performance may be further strengthened when executive functional diversity is higher.

3. RESEARCH METHODOLOGY AND DATA

3.1. Sample Selection and Data Sources

This study collects data of Chinese A-share listed companies from 2009 to 2020. The sample procession is as follow: (1) Exclusion of ST (Special Treatment) and *ST (Star Special Treatment) samples; (2) Exclusion of samples with a debt-to-asset ratio >1; (3) Exclusion of samples with missing data; (4) To mitigate the influence of outliers on regression results, all financial data in the sample are winsorized at the 1st and 99th percentiles. After these procedures, the final sample consists of 29,462 observations in an unbalanced panel dataset.

The ESG data are derived from the Huazheng ESG rating system, sourced from the WIND database. Other data are obtained from the CSMAR database.

3.2. Variable Definitions

- (1) Dependent Variable: Corporate Value (ROA): Measured as the ratio of a firm's revenue to its total assets in a given year.
- (2) Independent Variable: ESG Performance (ESG). In China, multiple rating agencies provide ESG ratings for listed companies. Among them, the Huazheng ESG rating is widely adopted by researchers and practitioners due to its broad coverage and high timeliness (Liu et al., 2024; Wu et al., 2024). The Huazheng ESG rating system categorizes ESG performance into nine levels, ranging from lowest to highest as C, CC, CCC, B, BB, BBB, A, AA, and AAA. Following the methodology of scholars such as Gao et al., these nine levels are assigned values from 1 to 9, respectively, and denoted as ESG.

- (3) Moderating Variable: Top Management Team (TMT) Functional Diversity (DIV). In line with the definitions by and Cannella et al. (2008), the TMT in this study refers to the senior management personnel disclosed in the annual reports of listed companies, including the CEO, board members, independent directors, and chairman.

Drawing on the approaches of Qian et al. (2013), we classify the functional backgrounds of directors and calculate the number of executives with different backgrounds. The CSMAR database categorizes the functional backgrounds of board members into ten types: 1 = Production, 2 = R and D, 3 = Design, 4 = Human Resources, 5 = Management, 6 = Marketing, 7 = Finance, 8 = Accounting, 9 = Legal, and 0 = Other or Unclassifiable. If an executive has any of the above backgrounds, the corresponding category is incremented by 1. The sum of all category counts is then calculated to obtain the TMT functional background diversity index (DIV). A higher DIV indicates greater TMT functional diversity.

- (4) Control variables. Drawing on Rahman et al. (2023), this study controls for other variables that may influence corporate ESG performance from two aspects: firm financial conditions and TMT characteristics. Specifically, the control variables related to firm performance include: Firm Age, is measured by the number of years since the firm's establishment; Tobin's Q, is calculated as (Total Assets + Market Value of Equity - Book Value of Equity)/Total Assets for the current year; Leverage (Lev), is measured as the ratio of long-term debt to total assets for the current year; Liquidity (Cash), is measured as the ratio of cash holdings to total assets for the current year; Fixed Asset Ratio (Fix), is measured as the amount of fixed asset to total asset. The control variables related to board characteristics include: Board Size (Bsize), is measured by the total number of board members; Board Independence (Indep), is measured as the ratio of independent directors to the total number of board members.

3.3. Model Specification

To examine whether ESG can enhance corporate value, we construct the following model for testing. We include year (Year) and industry (Ind) dummy variables in the model to control for the effects of year and industry-specific characteristics.

$$ROA_{i,t} = \alpha_0 + \beta_1 ESG_{i,t} + \sum control + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (1)$$

To further verify the moderating role of top management team (TMT) functional diversity on the relationship between ESG and corporate performance, we introduce interaction terms by incorporating TMT functional diversity (DIV) into the model.

$$ROA_{i,t} = \alpha_0 + \beta_1 ESG_{i,t} + \beta_2 DIV_{i,t} + \beta_3 ESG_{i,t} \times DIV_{i,t} + \sum control + \sum Year + \sum Ind + \varepsilon_{i,t} \quad (2)$$

4. EMPIRICAL RESULTS

4.1. Descriptive Statistics

The descriptive statistics of the main variables are presented in Table 1. According to Table 1, the mean value of ESG performance

Table 1: Descriptive statistics summary

Variable	n	Mean	p50	Standard deviation	Minimum	Maximum
ROA	29462	0.04	0.04	0.08	-2.830	0.790
ESG	29462	6.40	6.00	1.11	1.00	9.00
DIV	29462	4.30	4.00	0.72	1.00	7.00
Age	29462	11.32	10.00	7.20	2.00	28.00
Lev	29462	0.43	0.42	0.20	0.05	0.88
Cash	29462	0.16	0.13	0.12	0.01	0.60
Fix	29462	0.21	0.18	0.16	0.00	0.70
Hold	29462	34.08	31.87	14.77	8.48	74.02
Indep	29462	0.38	0.36	0.06	0.25	0.60

Table 2: Pearson's correlation

	ROA	ESG	DIV	Age	Lev	Cash	Fix	Hold	Indep
ROA	1								
ESG	0.14*	1							
DIV	-0.01	0.04*	1						
Age	-0.12*	0.18*	-0.02*	1					
Lev	-0.28*	0.08*	0.02*	0.33*	1				
Cash	0.21*	0.05*	0.03*	-0.18*	-0.40*	1			
Fix	-0.04*	-0.01	-0.09*	0.07*	0.08*	-0.30*	1		
Hold	0.12*	0.13*	-0.02*	-0.04*	0.07*	0.03*	0.09*	1	
Indep	0.01*	-0.01*	0.00	-0.08*	-0.05*	0.01*	-0.06*	0.02*	1

This table shows the correlation matrix of the variables. ***, ** and * denote 1%, 5% and 10% threshold, respectively

is 6.49 with a standard deviation of 1.11, and the score ranges from 1 to 9. This indicates that there are differences in ESG performance among the sample firms, with most companies having moderate ESG ratings. The mean value of ROA is 0.04, with a standard deviation of 0.08, suggesting that the overall profitability of the sample firms is relatively low, and some firms experience significant fluctuations in performance.

Regarding the diversity variable, the mean value of TMT functional background diversity (DIV) is 4.3, with a standard deviation of 0.72. This indicates that most firms have a certain degree of diversity in the functional backgrounds of their top management teams, although there are still individual differences.

For the control variables, the mean value of Firm Age is 11.32 years, with a standard deviation of 7.2, which is consistent with findings from prior studies. The mean value of financial leverage (Lev) is 0.43, with a standard deviation of 0.2, indicating a moderate level of debt among the sample firms. The mean value of cash holdings (Cash) is 0.16, suggesting some variation in liquidity management among the firms. The mean value of fixed asset ratio (Fix) is 0.21, with a standard deviation of 0.16, reflecting differences in asset structure. The mean value of the largest shareholder's ownership (Hold) is 34.08%, indicating a relatively high level of equity concentration in the sample firms. The mean value of board independence (Indep) is 0.38, suggesting that the proportion of independent directors on most boards is close to 40%.

4.2. Correlation

Table 2 presents the correlation matrix, providing insights into the relationships among the key variables in this study. The results indicate that ESG is positively correlated with ROA (0.14, $P < 0.1$), suggesting that firms with stronger ESG performance tend to

achieve higher profitability. Executive team functional diversity (DIV) exhibits a weak negative correlation with ROA (-0.01) and a small positive correlation with ESG (0.04, $P < 0.1$). The near-zero correlation between DIV and ROA suggests that, at the bivariate level, diversity may not have a straightforward impact on firm performance.

4.3. Regression Results

The regression results presented in Table 3 provide evidence that ESG performance is positively associated with corporate performance, as measured by ROA. Across all models, the ESG coefficient remains positive and statistically significant at the 10% level, confirming the beneficial impact of ESG engagement on firm profitability.

Model (1) includes ESG as the sole explanatory variable to examine its impact on ROA. The regression results indicate that ESG scores exhibit a significantly positive effect on ROA (coefficient = 0.007, $P < 0.01$), suggesting that firms with stronger ESG activity tend to achieve better performance.

Model (2) extends the baseline specification by incorporating a set of control variables to account for firm-specific characteristics that may influence ROA. The coefficient on ESG remains positive and highly significant (coefficient = 0.005, $P < 0.01$) after controlling for these firm attributes. From an economic perspective, a one-point increase in ESG leads to an approximately 12.5 %¹ improvement in corporate performance. This attenuation suggests that while part of ESG's positive effect on firm performance is mediated through firm characteristics, ESG retains an independent and robust influence on corporate performance, assuming that Hypothesis 1 (H1) has been validated.

1 The result is calculated by ESG coefficient in model (2) to mean of ROA, $0.005/0.04 \times 100\% \approx 12\%$.

Table 3: Regression results for hypotheses 1 and 2

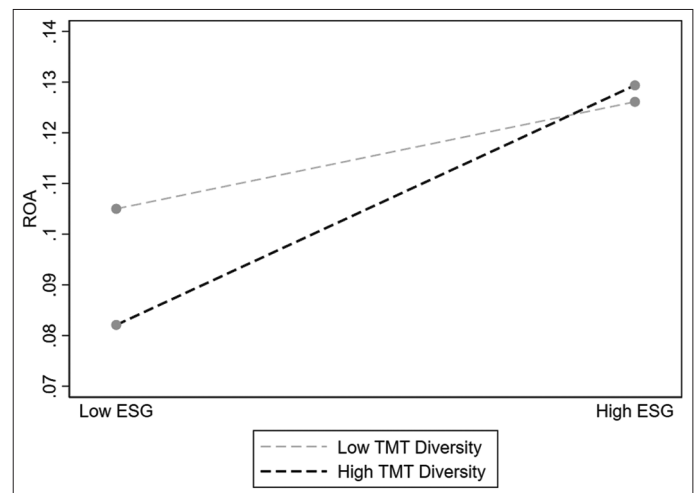
Variables	(1) ROA	(2) ROA	(3) ROA	(4) ROA
ESG	0.007*** (-8.365)	0.005*** (-6.549)	0.005*** (-6.516)	0.002*** (-5.761)
DIV			-0.002* (-1.745)	-0.009* (-1.768)
ESG*DIV				0.001** (-2.321)
Tobinq		0.005*** (-5.851)	0.005*** (-5.842)	0.005*** (-5.837)
Age		0.011** (-2.242)	0.011** (-2.231)	0.011** (-2.23)
Lev		-0.166*** (-15.201)	-0.166*** (-15.206)	-0.166*** (-15.200)
Cash		0.028*** (-3.927)	0.028*** (-3.968)	0.028*** (-3.955)
Fix		-0.090*** (-7.232)	-0.090*** (-7.247)	-0.090*** (-7.250)
Hold		0.001*** (-8.376)	0.001*** (-8.369)	0.001*** (-8.368)
Indep		0.002 (-0.163)	0.002 (-0.171)	0.002 (-0.155)
_cons	0.054 (-1.313)	0.082* (-1.679)	0.088* (-1.787)	0.111** (-2.121)
Year	Yes	Yes	Yes	Yes
Industry	Yes	Yes	Yes	Yes
N	29462	29462	29462	29462

This table shows the main regression results for hypotheses 1 (model 2) and 2 (model 4). The dependent variable is the ROA, the independent variable is ESG, and the moderating variable is TMT functional diversity (DIV). The regression includes industry fixed effects and robust standard errors clustered at the firm level. ***, ** and * denote statistical significance at 1%, 5%, and 10%, respectively. The t-values are in parentheses

Model (3) introduces the executive team's functional diversity (DIV) as an additional explanatory variable. The coefficient of DIV is negative and weakly significant ($\beta = -0.002$, $P < 0.1$), suggesting that higher functional diversity may slightly reduce ROA. This effect becomes more pronounced in Model (4) ($\beta = -0.009$, $P < 0.1$), indicating that, in isolation, functional diversity within the executive team might not directly enhance firm performance.

The interaction term ESG*DIV in Model (4) is positive and statistically significant ($\beta = 0.001$, $P < 0.05$), suggesting that executive team diversity positively moderates the relationship between ESG and ROA. This implies that firms with greater executive diversity can better leverage ESG initiatives to enhance financial performance. The findings align with resource dependence theory, which argues that diverse TMT provide a broader range of perspectives and skills, thereby improving the strategic implementation of ESG practices. Hypothesis 2 (H2) is validated.

Building on the regression results, the interaction between ESG performance and TMT functional diversity (DIV) is further illustrated in Figure 1. The graph presents the moderating effect of DIV on the ESG-ROA relationship by comparing firms with high and low diversity levels. The figure demonstrates that ESG has a positive effect on ROA across both high and low diversity conditions. The slope of the black dashed line (representing high diversity) is steeper than that of the dashed gray line (representing low diversity). This pattern indicates that the positive effect of ESG on firm performance is more pronounced when executive team diversity is higher, reinforcing the premise of Hypothesis 2 (H2).

Figure 1: Moderating effect of TMT functional diversity

Overall, these results confirm the hypothesis that ESG engagement enhances firm performance and that executive team diversity strengthens this relationship. This finding suggests that while diversity alone may not directly contribute to better financial performance, as indicated by its negative main effect in the regression results, it plays a crucial role in amplifying the benefits of ESG engagement.

5. DISCUSSION

The empirical findings of this study align with previous literature, confirming that ESG engagement positively influences firm performance. The significant and positive coefficient of ESG across all models supports the notion that ESG practices contribute to corporate performance. These results are consistent with prior studies that have demonstrated the financial benefits of ESG practices, reinforcing the argument that socially responsible strategies can drive long-term value creation for firms (Bissoondoyal-Bheenick et al., 2023; Shaikh, 2022; Fu et al., 2024).

However, the impact of TMT functional diversity (DIV) on firm performance presents a more complex picture. The results suggest that DIV has a negative direct effect on ROA, which contrasts with some existing literature that highlights the benefits of diverse expertise in decision-making and problem-solving (Guest, 2009; Cheng et al., 2008). One possible explanation for this finding is that higher diversity in functional backgrounds may lead to increased cognitive and strategic differences among executives, potentially slowing down decision-making processes and reducing organizational efficiency. Additionally, greater functional diversity could generate coordination challenges and conflicts within the top management team, limiting the effectiveness of strategic initiatives. In line with upper echelons theory, while diversity can enrich perspectives, excessive heterogeneity may also introduce difficulties in reaching consensus, thereby affecting short-term financial performance (Nielsen and Nielsen, 2013; Cannella, 2008; Carpenter, 2002).

Despite the negative direct impact of DIV, its moderating role in the ESG-performance relationship is found to be positive and

significant. This suggests that while a diverse executive team might struggle with internal efficiency, it enhances the firm's ability to leverage ESG initiatives for improved firm performance. One plausible explanation is that a functional diverse executive team brings a broader range of expertise and strategic viewpoints, enabling the firm to integrate ESG practices more effectively into business operations. This aligns with a series of researches which suggest that diverse leadership can improve a firm's ability to respond to external pressures, manage risks, and access valuable resources from different stakeholder groups (Richard, 2000; Ndofor et al., 2015; Rivas, 2012). Furthermore, ESG-related strategies often require cross-functional knowledge and innovative problem-solving, areas where a functional diverse executive teams may excel. By facilitating better alignment between ESG initiatives and corporate strategy, functional diversity strengthens the positive impact of ESG on firm performance, reinforcing the idea that sustainability-driven firms benefit from diverse perspectives at the leadership level.

6. CONCLUSION

This study examines the relationship between ESG and firm performance, with a particular focus on the moderating role of TMT functional diversity. Based on an empirical analysis of Chinese A-share listed firms from 2009 to 2020, we derive the following key findings:

First, ESG performance exhibits a significantly positive association with firm performance. Our regression results indicate that firms demonstrating strong ESG practices achieve better performance, as measured by return on assets (ROA). This finding supports the notion that ESG activities enhance corporate performance, suggesting that firms committed to social responsibility and sustainable development can generate higher returns.

Second, TMT functional diversity is found to play a moderating role in the ESG-firm performance relationship. While TMT diversity alone has a limited direct impact on firm performance, its presence amplifies the positive effect of ESG on profitability. This implies that management teams with diverse functional backgrounds provide broader perspectives and expertise, thereby facilitating the effective implementation of ESG strategies.

Based on these findings, this paper suggests several implications to policy makers and corporate managers regarding ESG practices. Firstly, firms should consider to place greater emphasis on diversity in TMT functional backgrounds when recruiting and appointing senior executives. A leadership team comprising experts from diverse fields-such as finance, technology, marketing, and human resources-can offer a broader range of perspectives and experiences. This diversity can enhance the comprehensiveness and practicality of ESG strategies, ultimately driving firm performance.

Secondly, a diverse TMT fosters cross-functional coordination, promoting the efficient execution of ESG strategies. Firms should establish robust cross-departmental collaboration mechanisms to ensure seamless integration and execution of ESG initiatives across different organizational units.

Last, to ensure effective ESG strategy execution, firms should invest in ESG-related capability building by providing internal training or recruiting external ESG professionals. Strengthening ESG expertise within the TMT can enhance strategic execution, better equip firms to navigate complex ESG challenges, and improve competitiveness in the evolving global sustainability landscape.

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