
Embracing Corporate Diversity: Insights from Different Cultures Driving Innovation and Sustainable Governance

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Abstract: This research investigates the role of board cultural diversity in promoting corporate innovation and fostering sustainable corporate governance. The global sample comprises 45,298 firm-year observations from 8,025 listed firms across 41 countries for the period 2013-2022. The sample was tested as a whole and after being split into groups with high and low board cultural diversity. The theoretical framework draws on multiple approaches, namely stakeholder, institutional, legitimacy, resource dependence, and agency theories. The findings reveal that firms with culturally diverse boardrooms exhibit higher levels of innovation and better governance ratings than those with lower board cultural diversity. Furthermore, the impact of innovation on sustainable corporate governance is positive when board cultural diversity is high ($\beta: 0.103^{***}$), whereas it is negative when diversity is low ($\beta: -0.0570^{*}$). The findings were validated through a variety of robustness tests, including GMM, subsample analyses, the use of a substitute independent variable, time-averaging of the dependent variable, two-way clustering, and alternative fixed effects. Executives can apply these findings when designing board structures to include non-local members, whereas policymakers may establish incentives or guidelines to facilitate the appointment of non-local directors, enhance diversity, and promote innovation.

Keywords: Board cultural diversity, corporate innovation, ESG, patents, sustainable governance.

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INTRODUCTION

Sustainability has become a central focus within the corporate sector, as organizations increasingly acknowledge the necessity of implementing sustainable practices to maintain competitiveness and address contemporary environmental, social, and governance (ESG) challenges (Srouji, Hamdallah, Al-Hamadeen, Al-



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Okaily, & Elamer, 2023). Its primary objective is to promote economic growth while preserving the environment and addressing social needs (Mat Aron et al., 2020). In this regard, our study reveals how board cultural diversity promotes innovation and advances sustainable corporate governance. Our research provides new insights into the role of board diversity with respect to cultural background, whose influence has been studied less than that of other factors, such as board independence and size (Gallego-Álvarez & Rodríguez-Domínguez, 2025). By highlighting the significance of diversity at the leadership level, this study also offers further direction for research into the transformative potential of diversity across entire organizations for attaining sustainability objectives at all levels. The corporate sector has a leading role to play in addressing environmental and social concerns through sustainable governance policies and practices (Zhang & Chen, 2023). The three distinct aspects of ESG provide a framework for assessing an organization's environmental, social, and governance performance (He, Zhao, & Zheng, 2023). The Sustainable Development Goals (SDGs) provide a framework for addressing sustainability concerns (Gutiérrez-Ponce, 2023). Sustainability can result from the convergence of R&D initiatives and the adoption of sustainable corporate governance policies, a crucial approach in today's business landscape. Corporate sustainability is a multifaceted concept that necessitates the growth and maintenance of interconnected economic, social, and environmental resources and relies on the ability to balance these pillars (Bartolacci, Caputo, & Soverchia, 2020).

Corporate sustainability can have different facets. For instance, sustainable innovation pertains to the renewal or improvement of products, services, and technological or organizational processes, resulting in enhanced economic growth alongside improved environmental and social performance (Cillo, Messeni Petruzzelli, Ardito, & Del Giudice, 2019). Moreover, the alignment of corporate governance practices with the SDGs and environmental and social goals can be called sustainable corporate governance. Through sustainability in innovation and corporate governance, firms can reduce their adverse environmental impact while improving their economic performance, thereby creating a win-win scenario for all stakeholders (Khalil & Nimmanunta, 2023). In the corporate sector, innovation offers solutions to enhance resource productivity and lower firms' costs while investing in environmentally crucial initiatives, whereas a company's ESG performance is considered a standard for evaluating the social, environmental, and governance responsibility of businesses globally (Yu, Wu, Chen, Wang, & Mardani, 2024). A positive relationship between innovation and sustainable corporate governance is crucial; however, it is complex and multifaceted. An uncorrelated or negative relationship between innovation and sustainable corporate governance would pose obstacles to achieving the SDGs. More importantly, at the micro level, a firm's level of board cultural diversity can either strengthen or weaken this relationship. However, until recently, discussions on ESG have largely overlooked the importance of board cultural diversity, a crucial and apparent contribution made by corporations toward ESG. Creativity and innovation are enhanced by the cultural diversity of board members or executives, leading to a greater comprehension of the marketplace and sustainable practices essential for addressing concerns related to sustainable performance, financial performance, and sustainable innovation.

Several gaps have been identified in the literature on innovation, sustainable corporate governance, and board cultural diversity. According to Huang and Wei (2023), researchers have made significant efforts to explore the antecedents, drivers, and motives of corporate social responsibility; however, a noteworthy gap in research on CSR activities remains unexplored. Furthermore, Rehman, Malik, Md Isa, and Jais (2023), while investigating the varying impacts of financial inclusion on the environment, suggested that future studies should explore the role of various factors, such as innovation, research and development, trade, and the business environment, in shaping sustainable outcomes. Doni and Fiameni (2024) also emphasized the importance of exploring how innovation can help integrate ESG and sustainability policies into business activities and strategies. Similarly, Barykin et al. (2023) noted that investigating socioeconomic realities related to the advancement of sustainable innovation holds significance. The intricate processes and numerous factors involved in such innovation can potentially complicate economic and social progress. Therefore, conducting a rigorous analysis of the ESG and economic implications of sustainable innovation is crucial to paving the way for a sustainable future. Furthermore, Zheng, Feng, Jiang, and Chang (2023) argued that there is a scarcity of research investigating the equilibrium co-movement between sustainable innovation and ESG. Additionally, sustainable innovation can potentially enhance a firm's technological level and competitive advantage. This

can reduce environmental harm and create value for stakeholders. In their study of the digital economy, Luo et al. (2023) emphasized the importance of thoroughly investigating sustainable innovation in both emerging and developed markets. Prior research in this field has been subject to certain limitations that have hindered its theoretical scope and data availability, particularly with regard to culture and innovation (Yeganeh, 2023). Moreover, Al-Hiyari, Ismail, Kolsi, and Kehinde (2023) found that the relationship between ESG and investment efficiency is influenced by board cultural diversity. Hence, this study addresses calls in the literature and bridges this gap by investigating the impact of innovation on sustainable corporate governance while taking board cultural diversity into account.

In light of the literature, this study measures sustainable corporate governance (SCG) using companies' ESG (environmental, social, and governance) governance pillar scores (Rahi, Chowdhury, Johansson, & Blomkvist, 2023). Moreover, this study uses R&D intensity as a proxy for firm-level innovation (Benfratello, Bottasso, & Piccardo, 2022). As noted in the literature, R&D intensity is expected to have a significant and positive effect on CSR (Bromiley, Rau, & Zhang, 2017). Both innovation and sustainable corporate governance are crucial variables with respect to the UN's 17 SDGs, specifically the goals labelled "industry, innovation and infrastructure" and "sustainable cities and communities." Board cultural diversity is used as a moderating variable to examine how cultural orientation affects firm innovation and corporate governance. Board cultural diversity is defined as the percentage of board members whose cultural backgrounds differ from that of the corporate headquarters' location. This diversity may lead to greater differentiation among companies, enhanced creativity, and higher-quality decisions. Patent value is used as an alternative measure of innovation and is calculated by dividing patent value by total assets and multiplying the result by 100.

This section provides an overview of the findings. This study investigates variations in innovation and progress in sustainable corporate governance between firms with high and low board cultural diversity. To examine whether the differences in the means and medians between high- and low-BCD firms are statistically significant, we employed a t-test and a Wilcoxon rank-sum test for mean and median differences, respectively. Both tests reveal that the differences in the means and medians of innovation and sustainable corporate governance between high- and low-BCD firms are statistically significant at the 1% level. Sample composition, including the number of firms, firm-year observations, and country-level arithmetic means, was also estimated across sampled countries to provide a comprehensive understanding of the findings and facilitate a comparative analysis of board cultural diversity, innovation, and sustainable corporate governance across these countries. Moreover, we estimated baseline results using fixed-effects and correlated random-effects regression models to investigate the impact of innovation on SCG. Our regression and trend analyses reveal that firms with higher BCD are more inclined toward innovation, which in turn promotes sustainable corporate governance. These findings emphasize the significance of fostering BCD to promote innovation and adopt sustainable practices. To validate our baseline findings and confirm their reliability, we employed multiple robustness tests, including an alternative proxy for innovation, supplementary analyses such as two-step system GMM, and subsample analyses excluding Chinese and Japanese firms and including U.S. firms.

Our research makes significant contributions to the existing body of knowledge in several ways. First, our study expands the literature on the factors contributing to SCG by examining innovation as a major determinant while considering the varying role of corporate BCD. Second, our study develops a multidimensional theoretical framework based on five theoretical approaches, stakeholder, institutional, legitimacy, resource dependence, and agency theories, to explain the association between innovation and SCG. Finally, the micro-level pathway through which BCD influences sustainable governance through innovation offers new insights into a firm's internal dynamics for improving overall sustainability. Collectively, these contributions extend the understanding of BCD, innovation, and SCG. Although our findings are globally generalizable, they are particularly relevant to emerging markets and the Global South, including Indonesia, because they emphasize the significance of BCD in promoting corporate innovation and fostering SCG. In rapidly developing markets, culturally diverse leadership teams are better able to address local and global challenges because of their strong adaptability and can contribute to global sustainability. Such diversity can provide firms with strategic and competitive advantages in their regions. Hence, this study offers practical implications by investigating the relationship among BCD, innovation, and SCG. Our findings can help corporate

leaders improve governance, respond to the dynamic nature of culture, and enhance sustainability, as this research shows that BCD fosters innovation and corporate governance. Governments worldwide can use these findings to interpret cultural impacts, whereas policymakers can use these insights to formulate policies that balance economic growth, sustainability, and cultural diversity. The results can also help researchers further identify the factors that enable corporate governance to contribute to overall ESG performance. Collectively, these findings contribute to the debate on promoting corporate sustainability and on how innovation can help companies attain sustainability.

The remainder of the paper is organised as follows. The next section provides a brief review of the literature on board cultural diversity, innovation, and sustainable corporate governance. The subsequent section describes the methodology, including the variables and their respective data sources. The following section presents and discusses the empirical findings. Finally, the last section concludes the paper by outlining the key conclusions, policy recommendations, and avenues for future research.

BACKGROUND AND HYPOTHESIS

The relationship among board cultural diversity, innovation, and sustainable corporate governance is inherently complex and therefore requires a particular combination of theoretical approaches to form a well-balanced and synergistic theoretical framework. This study applies institutional theory, stakeholder theory, legitimacy theory, resource dependence theory, and agency theory to define the related mechanisms and effects, providing adequate insight into the intricate relationship among board cultural diversity, innovation, and sustainable corporate governance.

Stakeholder theory holds that companies should consider the expectations and interests of shareholders, customers, employees, and the communities in which they operate (Tang, Liu, Hong, & Yang, 2023). A culturally diverse board enables a company to respond more effectively to this range of stakeholder interests in innovation and sustainability, thereby creating legitimacy, a core concept of legitimacy theory (Lian, Li, & Cao, 2023). According to legitimacy theory, aligning an organization's operations with societal expectations not only protects the company's reputation but also fosters stakeholder trust, especially when board diversity signals a commitment to inclusivity, innovation, and sustainability (Tang, Wang, Jiang, Liu, & Wang, 2023). Resource dependence theory supports this idea by suggesting that a diverse board facilitates a company's access to important external resources and networks (Lu & Li, 2023). As a result, it supports sustainable innovation and helps the firm acquire the legitimacy and capital necessary to implement sustainable corporate governance and an ESG agenda.

On the other hand, institutional theory encompasses these concepts and argues that organizations are influenced by normative, regulative, and cognitive forces (Lin, Lee, & Ahlstrom, 2023). It is also argued that culturally diverse boards are better equipped to manage these institutional forces, adapt to changing social standards, and incorporate ESG into their strategic frameworks. Agency theory examines the internal dynamics between managers (the agents) and shareholders (the principals) and explains the role of board diversity in resolving agency problems, ensuring that managers' activities align with the interests of shareholders while promoting innovation and sustainability (Srouji et al., 2023).

Overall, these five theoretical approaches constitute an integrative and mutually reinforcing framework that reflects the dynamic interdependence of business, stakeholders, and the institutional environment. Taken together, stakeholder and legitimacy theories reveal how organizations respond to stakeholder expectations and societal norms to achieve legitimacy and support. Resource dependence theory links these actions to the acquisition of necessary external resources, while institutional theory explains the effects of formal and informal pressures on innovation and governance. In contrast, agency theory explains how culturally diverse management can help solve agency problems and address shareholder concerns. The proposed theoretical synthesis helps reveal more accurately the mechanisms by which board cultural diversity encourages innovation and sustainable governance, bringing financial, social, and environmental goals together.

While the model and methodology proposed in this paper make a unique and unprecedented contribution to the literature, we now turn to a discussion of relevant research supporting our model.

Using stakeholder theory to explain this relationship, Firoozi and Keddie (2022) found that geographical diversity on the board of directors has a positive effect on certain aspects of CSR, based on a sample of Canadian companies from 2009 to 2017. The findings of this study go beyond what is currently known about the demographic characteristics of directors and the way these characteristics influence their decisions concerning CSR. This is a significant point, as there is an increasing trend toward appointing directors who live far from corporate headquarters.

The study by Yang, Yang, Zhou, and Liu (2024) used data from A-share listed companies in China between 2004 and 2020 to analyze the relationship between the Environmental (E), Social (S), and Governance (G) dimensions and Green Innovation (GI). The findings show a positive correlation between the E, S, and G factors and GI. The results imply that companies should prioritize E, S, and G considerations alongside operational efficiency to achieve sustainable development. It is essential to consider the costs associated with each ESG dimension, as ignoring these factors can result in suboptimal resource allocation and impair the organization's overall effectiveness.

Gallego-Álvarez and Rodríguez-Domínguez (2025) examine the influence of board diversity, including cultural background, experience, tenure, and gender, on the implementation of environmental practices by firms from 29 countries. Using a Tobit model to analyze a sample of 55 environmental activities, they find that culturally diverse boards are more involved in environmental initiatives.

Similarly, Al-Sarraf, Al-Swidi, and Al-Hakimi (2025) examine the influence of board diversity on ESG performance using data from FTSE All-Share firms for the period 2011–2021. Using OLS regressions and GMM, the analysis shows that all three types of diversity, including cultural, independence, and expertise diversity, have a positive influence on the governance dimension. The conclusions drawn from the findings emphasize the significance of board diversity in enhancing governance practices and offer important insights into the field of corporate governance. Moreover, Wan Ismail, Kamarudin, Hassan, and Ahmad (2026) also find that board cultural diversity positively affects ESG performance, using OLS and dynamic system GMM estimators based on a panel dataset of 18 countries comprising 5,294 firm-year observations from 2009 to 2020.

Moreover, Purwanti et al. (2026) examine the impact of informal cultural settings on formal corporate governance systems in the banking sector of Indonesia and Malaysia. They find that board diversity and independence have a positive effect on ESG disclosure only in Indonesia, where power distance is moderate, and not in Malaysia, where power distance is high. These findings demonstrate the important moderating role of culture.

Even though some studies have examined innovation in relation to environmental, social, and governance (ESG) factors, there remains a considerable gap in understanding the non-economic impacts of innovation, particularly from the perspective of stakeholders. The current study emphasizes that cultural diversity on the board is important for fostering innovation and, therefore, contributes to improved corporate governance and the achievement of ESG and Sustainable Development Goals (SDGs). In view of the above theoretical framework and the reviewed literature, the following hypothesis is proposed:

H_i: The impact of Innovation on Sustainable Corporate Governance varies significantly across firms with high and low board cultural diversity.

Q1: Does board cultural diversity influence the impact of innovation on sustainable corporate governance?

RESEARCH METHOD

Data Composition

Our research utilizes a global panel dataset to investigate the association between innovation and sustainable corporate governance while accounting for varying levels of BCD. The dataset covers 41 countries and includes 45,298 firm-year observations from 2013 to 2022, representing 8,025 non-US listed firms. To enhance data reliability, firms with missing values for the Firm Size variable and those lacking Standard Industrial Classification (SIC) codes are excluded. Moreover, firms in the utilities (SIC codes: 4900-4999) and financial (SIC

codes: 6000-6900) sectors are also excluded. Winsorization is applied to all continuous variables at the 1st and 99th percentiles.

Variables

Innovation

Innovation can be defined as the application of novel ideas and technologies in fundamentally new ways, resulting in the creation of additional value that contributes to the continued prosperity of a nation, its organizations, and stakeholders (Lee & Trimi, 2021). In light of the literature, this study uses R&D intensity as a proxy for firm-level innovation (Benfratello et al., 2022). R&D intensity is measured as R&D expenditure divided by sales and multiplied by 100. Although this is a common measure of innovation, it has a limitation that it captures only innovation inputs and does not reflect innovation outputs. Consequently, patent value is used as an alternative variable and is measured as patent value divided by total assets and multiplied by 100. It represents the net book value of patents. The data were obtained from Thomson Reuters Eikon (Refinitiv).

Sustainable Corporate Governance

The corporate governance pillar of the ESG score, termed Sustainable Corporate Governance (SCG), is used as the dependent variable, as established in the literature, where overall corporate sustainability or sustainable performance has been measured using companies' ESG (environmental, social, and governance) scores (Rahi et al., 2023). The governance score is derived from ESG governance, which ensures that companies operate in the interests of their owners and maintain transparency in their reporting. To carry out the data collection and scoring process, Thomson Reuters Eikon (Refinitiv) has divided governance performance into three subcategories: Shareholders, management, and CSR strategy scores. The calculation of the governance score through Thomson Reuters Eikon (Refinitiv) requires the aggregation and analysis of results from 56 different metrics based on the company's public disclosures (Naeem, Cankaya, & Bildik, 2022). The SCG data was acquired from Thomson Reuters Eikon (Refinitiv). R&D intensity is expected to have a significant positive effect on corporate social responsibility (Bromiley et al., 2017).

Control Variables

The model includes four firm-level and three country-level controls. Firm-level controls include Return on Assets (ROA), Firm Size (measured as the natural logarithm of total assets in US dollars), Firm Leverage (measured as the ratio of total debt to equity), and Tobin's Q (measured as the ratio of total market value to total asset value). Data for these variables were obtained from Thomson Reuters Eikon (Refinitiv). Moreover, country-level controls comprise Economic Growth (measured as the percentage change in real gross domestic product), GDP Per Capita (measured as the ratio of gross domestic product in US dollars to the midyear population), and Inflation (measured as the percentage change in the Consumer Price Index). These country-level control variables were obtained from the World Bank Open Data website.

Moderating Variable

Cultural diversity among board members and executives enhances organizational creativity and innovation, resulting in an improved understanding of the marketplace. In this study, board cultural diversity serves as a moderating variable. Board cultural diversity is defined as the proportion of board members who come from cultural backgrounds that differ from that of the corporation's headquarters location (Gallego-Álvarez & Rodríguez-Domínguez, 2025). In the case of Thomson Reuters Eikon (Refinitiv), the BCD variable can be considered the percentage of board members who have cultural backgrounds different from that of the corporate headquarters location and is therefore used to operationalize cultural background. Firms are categorized into two groups: those with high and low board cultural diversity. We used the BCD variable to separate the sample into low-BCD and high-BCD firms on the basis of the median value, following the methodology of Mian, Irfan, and Mian (2023), who segregate their sample based on median firm-level information-environment proxies. This median-splitting method is also supported by Kim, Miller, Wan, and

Wang (2016). This classification enables a more detailed analysis of the impact of board cultural diversity on firm innovation and sustainable corporate governance.

Model

This study uses a panel regression model to examine how innovation influences sustainable corporate governance in firms with high or low board cultural diversity. The baseline regression specification is as follows:

$$SCG_{i,j,k,t+1} = \alpha + Innovation_{i,t} + Controls_{i,j,t} + YearFE_t + IndustryFE_k + \varepsilon_{i,j,k,t} \quad (1)$$

The regression model in Equation 1 includes Sustainable Corporate Governance as the dependent variable for firm_i in year_{t+1}. Moreover, Innovation is an independent variable, along with firm_i and country_j level control variables. YearFE_t denotes time-fixed effects, and IndustryFE_k denotes Fama and French 48-industry fixed effects (Fama & French, 1997). To address potential endogeneity concerns arising from simultaneity and reverse causality, a one-year lead of the dependent variable is implemented in all model specifications. This method reduces the likelihood that the dependent variable is influenced by variables affected by its own values, thereby improving the accuracy and reliability of the results. Additionally, to reduce the risk of omitted-variable bias at the firm or country level, the Correlated Random Effects (CRE) model is employed as an alternative approach. The application of this methodological approach makes it possible to account for unobserved factors that are correlated with the independent and dependent variables and, hence, obtain more accurate findings. The use of this approach is important when dealing with a high degree of heterogeneity across firms or countries, as it makes it possible to estimate firm- or country-specific effects that may otherwise be obscured by omitted variables John, Kaviani, Kryzanowski, and Maleki (2021). Moreover, Table 5, Panel C, contains the results in which the average of lead 1 and 2 of SCG is used as the dependent variable to address potential endogeneity concerns caused by simultaneity (Durnev & Kim, 2005). Lastly, to address endogeneity concerns, we also use the two-step system GMM estimator, as reported in Table 6.

RESULTS

This section presents empirical findings that examine the association between innovation and sustainable corporate governance, considering the level of board cultural diversity across 8,025 listed firms from 41 countries.

Descriptive Analysis

Descriptive statistics for the overall data set and the sub-samples are presented in Table 1. The overall data set is categorized into two sub-samples depending on whether a firm's board cultural diversity score is higher or lower than the median board cultural diversity score (i.e., 22.22). Firms with board cultural diversity scores below the median are categorized as having low board cultural diversity, whereas the remaining firms are categorized as having high board cultural diversity. Statistical significance of differences between the two sub-samples has been tested by applying the T-test for arithmetic means and the Wilcoxon Rank-sum test for medians. Both tests revealed significant differences at the 1% level between the means and medians of firms with high and low board cultural diversity. Moreover, analyses of the 25th and 75th percentiles confirm this finding, as greater board cultural diversity is associated with increased innovation and improved corporate governance.

Table 1: Descriptive statistics

Variables	N	Mean	Mean Difference	Median	Median Difference	25 th Percentile	75 th Percentile	SD	Sample
SCG	45298	55.38		56.87		38.47	73.34	22.17	Overall
	8434	66.95	6.311***	71.14	7.85***	53.77	83.33	20.47	High BCD
	8963	60.64	(0.315)	63.29		46.07	77.75	21.02	Low BCD
Innovation	45298	6.52		2.48		0.64	5.64	16.48	Overall
	8434	7.67	1.272***	2.66	0.32***	0.71	7.34	17.71	High BCD
	8963	6.40	(0.263)	2.34		0.55	5.31	16.92	Low BCD
BCD	17397	31.06		22.22		12.5	44.44	24.16	Overall
	8,434	50.17	37.083***	45.45	32.95***	33.33	62.5	21.71	High BCD
	8,963	13.08	(0.235)	12.5		9.09	16.67	4.81	Low BCD
Patents	20288	3.79		1.005		0.146	4.41	6.38	Overall
	4655	6.18	1.617***	2.11	0.36***	0.529	8.3	8.66	High BCD
	4547	4.56	(0.161)	1.75		0.346	5.88	6.56	Low BCD
Economic Growth	42008	2.03		2.01		0.78	3.20	3.60	Overall
	7988	1.47	-0.235***	1.88	-0.292***	1.06	2.77	3.21	High BCD
	8400	1.70	(0.052)	2.17		0.98	2.86	3.49	Low BCD
GDP Per Capita	42008	10.37		10.61		10.36	10.78	0.75	Overall
	7988	10.76	0.239***	10.75	0.046***	10.65	10.95	0.51	High BCD
	8400	10.52	(0.009)	10.71		10.59	10.80	0.65	Low BCD
Inflation	42008	1.48		1.30		0.51	2.29	1.27	Overall
	7988	1.29	-0.295***	1.11	-0.386***	0.51	1.88	1.13	High BCD
	8400	1.59	(0.019)	1.49		0.51	2.30	1.29	Low BCD
Firm Size	45298	15.48		15.48		14.40	16.65	1.78	Overall
	8434	16.05	0.086**	15.94	-0.035**	14.73	17.55	1.79	High BCD
	8963	15.97	(0.027)	15.98		14.73	17.25	1.78	Low BCD
ROA	45223	5.30		5.22		2.52	8.85	9.06	Overall
	8425	5.86	1.113***	5.73	0.72***	2.52	9.69	8.95	High BCD
	8948	4.74	(0.135)	5.01		2.42	8.1	8.84	Low BCD
Tobin's Q	44150	1.71		1.05		0.66	1.97	1.87	Overall
	8183	1.78	0.292***	1.22	0.232***	0.75	2.18	1.72	High BCD
	8718	1.49	(0.025)	0.99		0.66	1.68	1.53	Low BCD
Firm Leverage	44917	0.67		0.88		0.16	0.44	0.805	Overall
	8354	0.76	0.042***	0.52	-0.029***	0.26	0.97	0.82	High BCD
	8828	0.80	(0.013)	0.55		0.25	1.06	0.87	Low BCD

Note: The Mean differences and Median differences columns present the results of the t-test and Wilcoxon rank-sum test, indicating the actual differences in mean and median values, respectively, between firms with high- and low-BCD, with statistical significance flagged (denoted by ** $p < 0.05$, *** $p < 0.01$) and standard errors reported in parentheses. Abbreviations include: S.D. (Standard Deviation), SCG (Sustainable Corporate Governance), and BCD (Board Cultural Diversity).

Table 2: Country-level descriptives and sample composition

Country	Firms		Observations		Mean			
	N	%	N	%	SCG	Innovation	BCD	Patents
Luxembourg	14	0.17	106	0.23	67.66	0.63	87.59	0.67
Saudi Arabia	8	0.1	38	0.08	39.58	1.33	76.77	0.95
Netherlands	104	1.3	842	1.86	67.11	7.34	60.41	2.26
Belgium	75	0.93	528	1.17	59.41	24.74	50.03	8.97
Italy	129	1.61	806	1.78	63.31	5.94	48.16	3.24
Switzerland	271	3.38	1696	3.74	52.95	10.62	47.99	3.82
Indonesia	24	0.3	162	0.36	53.18	0.76	46.86	0.55
Finland	132	1.64	881	1.94	57.16	4.54	44.38	4.27
Denmark	108	1.35	882	1.95	57.74	10.01	42.52	6.58
Iceland	6	0.07	12	0.03	69.78	4.47	40	6.33
Norway	80	1	433	0.96	63.07	2.32	35.64	2.89
United Kingdom	540	6.73	3212	7.09	63.26	5.33	35.49	8.24
South Korea	139	1.73	919	2.03	48.86	4.7	34.86	1.56
Taiwan	129	1.61	910	2.01	46.88	4.97	33.31	0.75
France	302	3.76	2249	4.96	56.4	6.98	30.61	7.14
Ireland	26	0.32	237	0.52	57.69	1.26	29.63	10.96
Brazil	22	0.27	164	0.36	69.06	1.86	28.7	4.46
Australia	326	4.06	1421	3.14	51.68	24.25	24.97	4.23
South Africa	67	0.83	409	0.9	65.04	0.38	21.77	4.92
Hong Kong	511	6.37	2907	6.42	59.96	7.22	21.54	2.74
Germany	746	9.3	4463	9.85	61.86	5.86	20.97	4.47
Poland	16	0.2	59	0.13	44.61	0.25	20.72	0.61
Sweden	303	3.78	1524	3.36	56.95	10.28	20.46	5.55
Austria	74	0.92	472	1.04	56.55	1.77	19.88	2.25
Canada	272	3.39	1400	3.09	48.26	12.22	19.76	6.91
Malaysia	61	0.76	149	0.33	49.63	0.36	17.91	0.54
China	1958	24.4	7538	16.64	49.02	4.85	17.5	0.63
Turkey	47	0.59	208	0.46	51.61	0.78	17.43	2.04
Israel	26	0.32	156	0.34	48.54	7.57	17.18	0.78
Cayman Islands	5	0.06	10	0.02	82.31	1.17	16.67	0.79
Thailand	11	0.14	53	0.12	58.29	2.15	16.61	2.99
Spain	95	1.18	674	1.49	52.89	5.83	15.89	3.14
New Zealand	35	0.44	195	0.43	47.01	12.08	15.69	2.11
India	307	3.83	865	1.91	52.3	1.44	14.17	2.66
Philippines	8	0.1	68	0.15	32.81	0.05	13.2	1.1
Japan	999	12.45	8395	18.53	53.82	4.07	13.01	3.49
Russia	6	0.07	35	0.08	37.94	0.34	12.97	3.48
Singapore	18	0.22	104	0.23	55.38	13.04	11.13	0.31
Slovenia	2	0.02	10	0.02	54.89	9.97	10.56	1.71
Hungary	7	0.09	35	0.08	49.13	7.69	5.58	0.19
Mexico	16	0.2	71	0.16	54.01	0.19	4.35	3.41
Total	8025	100	45298	100	55.31	5.65	28.36	3.29

Note: Abbreviations include: SCG (Sustainable Corporate Governance) and BCD (Board Cultural Diversity).

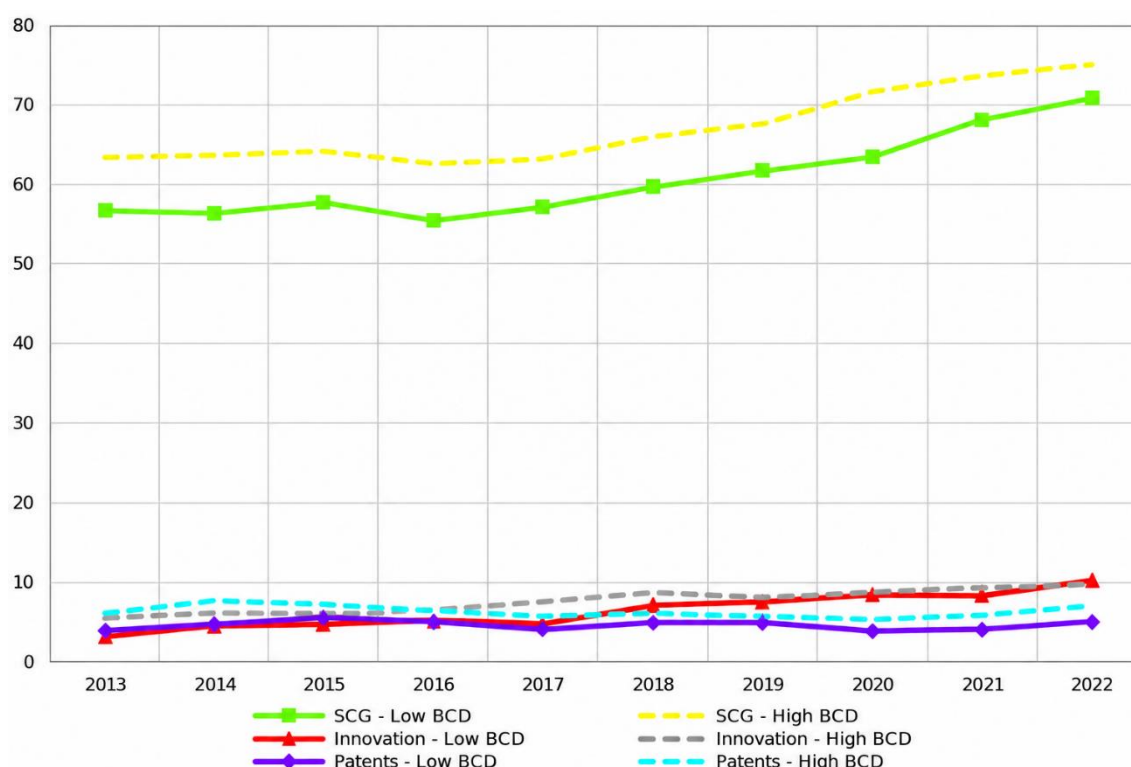


Figure 1: SCG, innovation and patents in high and low BCD from 2013 to 2022

The proportions of firm-year observations and the numbers of firms in each country, along with the arithmetic means of the main variables, are shown in Table 2. The descriptive statistics indicate that China has the largest number of firms, with 1,958 firms (24.40%) and 7,538 firm-year observations (16.64%) in the total sample. However, Japan has the largest proportion of firm-year observations, with 8,395 (18.53%) observations, and 999 firms (12.45%). To address possible biases arising from differences in sample sizes, this paper also performs sub-sample regressions excluding China and Japan.

Trend Analysis

The analysis of the association between innovation and sustainable corporate governance over the 10 years from 2013 to 2022 revealed several interesting insights regarding board cultural diversity, as reflected in Figure 1. Companies with high board cultural diversity outperformed those with low board cultural diversity in innovation, sustainable corporate governance, and patenting. This suggests that companies with high board cultural diversity not only innovate more but also achieve higher ESG scores for sustainable corporate governance. The differences in performance among these firms are quite pronounced, indicating that firms with high board cultural diversity have an advantage in innovation. This is also crucial for sustainable corporate governance and ESG-oriented businesses. The observed trends provide a foundation for further investigation into the complex association between innovation and sustainable corporate governance. Moreover, understanding the mechanisms underlying this process can help explain the dynamics and development of businesses and the economy as a whole, as well as support decision-making to ensure sustainable economic development.

Table 3: Baseline Results - Impact of innovation on SCG in high and low BCD Firms

Variables	Panel A: Fixed Effects Regression Analysis			Panel B: Correlated Random Effects Regression Analysis		
	(1) Overall Sample SCG	(2) High BCD SCG	(3) Low BCD SCG	(4) Overall Sample SCG	(5) High BCD SCG	(6) Low BCD SCG
Innovation	0.0809*** (0.0166)	0.103*** (0.0290)	-0.0570* (0.0309)	0.0809*** (0.0168)	0.103*** (0.0298)	-0.0570* (0.0309)
Firm Size*	5.035*** (0.153)	4.313*** (0.291)	3.326*** (0.326)	5.035*** (0.155)	4.313*** (0.308)	3.326*** (0.321)
ROA ⁺	0.101*** (0.0245)	0.181*** (0.0422)	0.0390 (0.0492)	0.101*** (0.0249)	0.181*** (0.0437)	0.0390 (0.0511)
Tobin's Q ⁺	0.00626 (0.141)	-1.043*** (0.280)	0.239 (0.311)	0.00626 (0.142)	-1.043*** (0.290)	0.239 (0.315)
Firm Leverage ⁺	0.290 (0.289)	-0.0722 (0.530)	-0.845* (0.460)	0.290 (0.290)	-0.0722 (0.571)	-0.845* (0.480)
Economic Growth ⁺	-0.238*** (0.0829)	-0.0548 (0.121)	-0.546*** (0.155)	-0.238*** (0.0859)	-0.0548 (0.128)	-0.546*** (0.155)
GDP Per Capita*	7.038*** (0.432)	2.281** (1.112)	6.090*** (0.955)	7.038*** (0.445)	2.281** (1.134)	6.090*** (0.961)
Inflation ⁺	3.499*** (0.193)	1.720*** (0.454)	3.369*** (0.468)	3.499*** (0.197)	1.720*** (0.474)	3.369*** (0.469)
p-value of Difference: Innovation (High BCD) > Innovation (Low BCD)		[0.001]***			[0.001]***	
Constant	-100.00*** (5.446)	-27.34** (13.06)	-59.53*** (11.92)	-100.00*** (5.620)	-27.34** (13.17)	-59.53*** (11.85)
Observations	35023	6976	7015	35023	6976	7015
Adjusted R ²	0.194	0.287	0.278	0.182	0.233	0.210
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes

Note: Standard errors, clustered at the firm level, are reported in parentheses below each coefficient estimate. The p-values of Difference test are reported in square brackets and also flagged with their respective statistical significance. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Observations of economic growth, inflation, ROA, and Tobin's Q are winsorized as labeled with (+), whereas the natural logarithm of GDP per capita and firm size was used as labeled with (*). Abbreviations include: SCG (Sustainable Corporate Governance), BCD (Board Cultural Diversity), and FE (Fixed Effect).

Regression Analysis - High Dimensional Fixed Effect

Table 3 presents the results of the analysis of the influence of innovation on sustainable corporate governance. Sustainable corporate governance is used as the dependent variable in columns (1)–(6). Panel A reports results obtained using high-dimensional fixed-effects regression, which is appropriate for analysing data sets with numerous variables. Panel B shows results obtained using the Correlated Random Effects (CRE) approach, which accounts for correlations among observations within each cluster or group. The coefficients ($\beta = 0.0809^{***}$) in columns (1) and (4) show that the impact of innovation on sustainable corporate governance is positive and statistically significant for the overall sample. Furthermore, when the sample is divided according to high and low board cultural diversity, the impact of innovation on sustainable corporate governance is positive when board cultural diversity is high ($\beta = 0.103^{***}$) in columns (2) and (5), whereas it is negative when diversity is low ($\beta = -0.0570^*$) in columns (3) and (6). This highlights the importance of board cultural diversity in creating an innovative environment and underscores the need for business leaders to consider the long-term consequences of board cultural diversity for corporate governance and ESG performance. The findings about

the control variables also provide valuable insights. For instance, the coefficients for economic growth (High BCD: $\beta = -0.0548$; Low BCD: $\beta = -0.546^{***}$) are negative in both sample groups, irrespective of sample composition. One possible reason is that BCD and SCG are firm-level variables, whereas economic growth is a country-level variable; therefore, its effect may not be direct. However, it should be noted that the economic-growth coefficient is significantly negative in the low-BCD group, whereas it is negative but insignificant in the high-BCD group. In addition, the coefficients for GDP per capita (High BCD: $\beta = 2.281^{**}$; Low BCD: $\beta = 6.090^{***}$) and inflation (High BCD: $\beta = 1.720^{***}$; Low BCD: $\beta = 3.369^{***}$) are positive and significant in both sample groups. Regarding the firm-level controls, the coefficients for ROA (High BCD: $\beta = 0.181^{***}$; Low BCD: $\beta = 0.0390$) and firm size (High BCD: $\beta = 4.313^{***}$; Low BCD: $\beta = 3.326^{***}$) are positive. Interestingly, the coefficient for ROA becomes insignificant when BCD is low ($\beta = 0.0390$), which may indicate an undesirable outcome. Moreover, the coefficients for firm leverage (High BCD: $\beta = -0.0722$; Low BCD: $\beta = -0.845^*$) are negative but become significant at the 10% level when BCD is low. Finally, the coefficient for Tobin's Q is negative and significant at the 1% level when BCD is high ($\beta = -1.043^{***}$), but positive and insignificant when BCD is low ($\beta = 0.239$).

Test of Significant Difference - High Vs Low Board Cultural Diversity

Table 3 presents a comprehensive analysis of the test coefficients by comparing companies with high board cultural diversity with those with low board cultural diversity using a p-value of difference analysis. These results provide a detailed assessment of the significance of the observed differences between the two groups of firms. More specifically, the innovation coefficients reveal a clear difference between companies with high board cultural diversity in columns (2) and (5) and those with low board cultural diversity in columns (3) and (6). This finding is based on the p-value of difference test $[0.001]^{***}$ in column (2), where the effect of innovation on sustainable corporate governance in companies with high board cultural diversity ($\beta = 0.103^{***}$) in column (2) is statistically different from its effect in companies with low board cultural diversity ($\beta = -0.0570^*$) in column (3). The results indicate that the influence of innovation on sustainable corporate governance differs substantially among companies with varying degrees of board cultural diversity.

Alternative Regression Analysis - Correlated Random Effects

In this research, correlated random effects (CRE) regression is used as an alternative technique that can overcome the shortcomings of fixed- and random-effects regression models. CRE is an important technique through which the coefficients of time-varying and time-invariant variables can be estimated by considering fixed and random effects together. With CRE, we obtain more precise results that help us understand the complex relationships in our dataset (Altonji & Matzkin, 2005; Wooldridge, 2019). The results presented in Panel A of Table 3 were re-estimated using CRE and are reported in Panel B of the same table. Using the CRE approach, we address potential concerns regarding omitted-variable bias at the firm or country level John et al. (2021). Since there is a similarity in the innovation coefficient with respect to overall and high vs. low board cultural diversity in panels A and B of Table 3, it can be said that the results of the baseline model given in panel A of Table 3 are reliable and robust. This also indicates that omitted variables at the firm or country level do not influence these results. The distinction between the fixed-effects (FE) model (Equation 1) and the correlated random-effects (CRE) model can be clarified through Equation 2, where " $C_{i,j,k}$ is the unobserved effect and ensures that all firm- and country-specific time-invariant differences are accounted for." (John et al. (2021):-

$$\text{CRE Model} \quad SCG_{i,j,k,t+1} = \alpha + Innovation_{i,t} + Controls_{i,j,t} + C_{i,j,k} + YearFE_t + IndustryFE_k + \varepsilon_{i,j,k,t} \quad (2)$$

Robustness Analysis

To confirm the accuracy of the baseline results, this study also includes multiple robustness tests to ensure that the findings are not based on a single analysis and to address possible biases. These efforts collectively aim to offer a more comprehensive understanding of the relationship between innovation and SCG. In Table 4, 5, and 6, various robustness tests are conducted, and the results displayed in Table 3 consistently demonstrate robustness. The robustness tests include subsample analyses excluding China and Japan, the inclusion of U.S. firms, the use of a substitute independent variable, two-way clustering of standard errors, alternative fixed

effects with two-way clustering, the use of the average of leads 1 and 2 of the dependent variable, and the use of the dependent variable without leads. Finally, the robustness tests also include a two-step system GMM analysis, presented in Table 6.

Sub-Sample Analysis Excluding China And Japan

Table 4 examines SCG as the dependent variable across columns (1)–(12). This subsample analysis shows that the findings from the baseline model (Table 3) remain robust, even after excluding listed firms from China (Panel A) and Japan (Panel B). In Panel A, the subsample comprises 6,067 firms and 29,729 firm-year observations. Similarly, in Panel B, after removing listed Japanese firms, the subsample comprises 7,026 firms and 27,678 firm-year observations. The re-estimation results further confirm the robustness of the findings from the baseline analysis.

Sample Including US Firms

Panel C in Table 4 also presents consistent results that include US-listed firms. The US sample consists of a total of 29,135 firm-year observations across 4,667 firms, with mean scores for SCG (52.19), Innovation (24.25), BCD (16.78), and Patents (3.40). It is common practice to exclude overly large samples; for instance, Claessens, Djankov, Fan, and Lang (2002) excluded Japanese corporations because these firms dominated the sample and could excessively influence the descriptive statistics and findings.

Substitute Independent Variable Analysis

The results reported in columns (10)–(12) of Table 4 are obtained using the ‘Patents’ variable as the independent variable. This finding demonstrates that the effect of innovation on SCG is qualitatively robust, irrespective of the innovation indicator used.

Analyses with Two-way Clustering, Alternative Fixed Effects, and Different Lead Specifications

In Table 5, Panels A and B present the results for two-way clustering of standard errors and two-way clustering with alternative fixed effects, respectively. Panel C includes results using the average of leads 1 and 2 of SCG as the dependent variable to address potential endogeneity concerns arising from simultaneity (Durnev & Kim, 2005). Lastly, Panel D tests the dependent variable without any leads, and the findings are qualitatively robust. Collectively, these results reinforce the reliability of the main findings reported in Table 3.

Table 4: Robustness Analysis: Alternative Samples and Independent Variables - Impact of Innovation on SCG in High and Low BCD Firms

Variables	Panel A: Excluding China			Panel B: Excluding Japan			Panel C: Including US			Panel D: Alternative Independent Variable		
	(1) Overall Sample SCG	(2) High BCD SCG	(3) Low BCD SCG	(4) Overall Sample SCG	(5) High BCD SCG	(6) Low BCD SCG	(7) Overall Sample SCG	(8) High BCD SCG	(9) Low BCD SCG	(10) Overall Sample SCG	(11) High BCD SCG	(12) Low BCD SCG
Innovation	0.0841*** (0.0175)	0.107*** (0.0295)	-0.0571* (0.0302)	0.0583*** (0.0165)	0.105*** (0.0292)	-0.0535* (0.0313)	0.0220*** (0.00355)	0.0230** (0.0103)	-0.00587 (0.00860)			
Patents										0.0254 (0.0586)	0.0870 (0.0824)	-0.236** (0.114)
p-value of Difference: Innovation (High BCD) > Innovation (Low BCD)		[0.000]***			[0.001]***			[0.000]***				
Patents (High BCD) > Patents (Low BCD)											[0.065]*	
Constant	-94.39*** (6.748)	-16.79 (13.84)	-40.38*** (12.25)	-86.22*** (5.396)	-27.61** (13.09)	-57.46*** (12.26)	-43.98*** (4.308)	-25.22** (11.00)	-21.60** (10.12)	-70.69*** (6.752)	-13.09 (16.52)	-9.088 (15.61)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	29729	6915	6640	27678	6946	6787	57764	9604	9335	15490	3858	3613
Adjusted R ²	0.218	0.295	0.291	0.223	0.287	0.282	0.197	0.275	0.235	0.212	0.266	0.331
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market FE	No	No	No	No	No	No	No	No	No	No	No	No
Standard Error (Cluster)	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm	Firm

Note: Standard errors are reported in parentheses below each coefficient estimate. The p-values of Difference test are reported in square brackets and also flagged with their respective statistical significance. * p < 0.10, ** p < 0.05, and *** p < 0.01. Abbreviations include: SCG (Sustainable Corporate Governance), BCD (Board Cultural Diversity), and FE (Fixed Effect).

Table 5: Robustness Analysis: Two-way Clustering, Alternative FE and Different Lead Specifications - Impact of Innovation on SCG in High and Low BCD Firms

Variables	Panel A: Two-way Clustering			Panel B: Two-way Clustering with Alternative FE			Panel C: Sub-sample with Average of Lead 1 & Lead 2			Panel D: Alternative Sample without Lead		
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
	Overall Sample SCG	High BCD SCG	Low BCD SCG	Overall Sample SCG	High BCD SCG	Low BCD SCG	Overall Sample SCG	High BCD SCG	Low BCD SCG	Overall Sample SCG	High BCD SCG	Low BCD SCG
Innovation	0.0809*** (0.00916)	0.103*** (0.0169)	-0.0570*** (0.0184)	0.0718*** (0.00947)	0.112*** (0.0161)	-0.0387* (0.0221)	0.0938*** (0.0183)	0.115*** (0.0292)	-0.0639* (0.0338)	0.0861*** (0.0147)	0.0896*** (0.0298)	-0.0294 (0.0304)
p-value of Difference:												
Innovation (High BCD) > Innovation (Low BCD)		[0.000]***			[0.000]***			[0.000]***			[0.026]**	
Constant	-100.00*** (2.706)	-27.34*** (7.226)	-59.53*** (6.381)	-92.38*** (17.06)	-85.74* (48.21)	-181.2*** (41.33)	-104.5*** (6.374)	-28.55** (13.77)	-62.68*** (13.26)	-101.0*** (4.788)	-26.59** (12.83)	-59.89*** (10.34)
Controls	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	35023	6976	7015	35023	6975	7014	28308	5918	5821	40515	7673	8025
Adjusted R ²	0.194	0.287	0.278	0.234	0.365	0.388	0.202	0.298	0.303	0.209	0.295	0.266
Year FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Market FE	No	No	No	Yes	Yes	Yes	No	No	No	No	No	No
Standard Error (Cluster)	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm & Year	Firm	Firm	Firm	Firm	Firm	Firm

Note: Standard errors are reported in parentheses below each coefficient estimate. The p-values of Difference test are reported in square brackets and also flagged with their respective statistical significance. * p < 0.10, ** p < 0.05, and *** p < 0.01. Abbreviations include: SCG (Sustainable Corporate Governance), BCD (Board Cultural Diversity), and FE (Fixed Effect).

Table 6: Robustness Analysis: Two-Step System GMM - Impact of Innovation on SCG in High and Low BCD Firms

Variables	Two-Step System GMM Analysis		
	(1) Overall Sample SCG	(2) High BCD SCG	(3) Low BCD SCG
L.SCG	0.590*** (0.149)	0.570*** (0.133)	0.815** (0.346)
Innovation	0.603* (0.349)	0.274*** (0.085)	-0.484* (0.276)
Firm Size*	1.906 (2.387)	1.666** (0.819)	-9.809 (11.512)
ROA ⁺	3.058* (1.654)	0.927*** (0.303)	-0.075 (0.713)
Tobin's Q ⁺	4.952 (4.976)	-2.174 (1.608)	-28.655 (20.226)
Firm Leverage ⁺	1.734 (5.923)	-2.351 (7.867)	-18.442 (14.400)
Economic Growth ⁺	-0.826* (0.480)	-0.135 (0.249)	1.960 (1.822)
GDP Per Capita*	-0.266 (2.338)	36.939** (14.401)	10.089 (7.631)
Inflation ⁺	-0.814 (2.187)	9.178*** (3.371)	8.414 (5.985)
Constant	-27.630 (50.507)	-398.154** (159.794)	135.065 (172.887)
Observations	14,967	3,385	2,899
Year FE	Yes	Yes	Yes
AR(1) (p-value)	0.000261	0.000	0.0316
AR(2) (p-value)	0.822	0.839	0.175
Sargan (p-value)	0.121	0.388	0.511
Hansen (p-value)	0.141	0.155	0.173

Note: Robust standard errors are reported in parentheses below each coefficient estimate. * $p < 0.10$, ** $p < 0.05$, and *** $p < 0.01$. Observations of economic growth, inflation, ROA, and Tobin's Q are winsorized as labeled with (+), whereas natural logarithm of GDP per capita and firm size are used as labeled with (*). Abbreviations include: SCG (Sustainable Corporate Governance), BCD (Board Cultural Diversity), and FE (Fixed Effect). L.SCG indicates the lagged value of SCG in the model.

Generalized Method of Moments Analysis

To address potential endogeneity concerns, we also employed the two-step system Generalized Method of Moments (GMM) estimator, as reported in Table 6. The innovation coefficients are significantly positive for the overall sample ($\beta = 0.603^*$) in column (1), as well as for firms with high board cultural diversity ($\beta = 0.274^{***}$) in column (2). On the other hand, we observe a significantly negative impact of innovation on sustainable corporate governance among firms with low board cultural diversity ($\beta = -0.484^*$), as shown in column (3). These results confirm the robustness of the findings reported in Table 3. Furthermore, a significant p-value for AR (1) indicates first-order autocorrelation, whereas an insignificant p-value for AR (2) confirms the absence of second-order autocorrelation. In addition, the insignificant p-values from the Sargan and Hansen test statistics confirm the absence of overidentification restrictions, thereby validating our GMM model.

DISCUSSION

Previous studies have confirmed a positive relationship between sustainable innovation and E, S, and G (Yang et al., 2024). However, our study further advances the understanding of the positive and negative facets of this

relationship by examining high and low board cultural diversity. Our findings are also consistent with the five theoretical perspectives employed in this study, which form an integrative framework based on their mutual reinforcement. The negative coefficient is not merely a statistical coincidence; it has real implications for how businesses should be managed. For companies with low BCD, increased innovation efforts might hinder sustainable development unless the board possesses sufficient knowledge, vision, and capacity to manage the process effectively. This finding demonstrates that simply increasing innovation is not sufficient, as companies must be able to implement their innovation initiatives effectively. The association between innovation and sustainable corporate governance among companies with low board cultural diversity may be explained by several closely related mechanisms. First, a lack of diverse perspectives makes it difficult for the board to implement innovation effectively because a homogeneous board may lack the expertise, experience, or connections needed to direct innovation programmes properly. Consequently, innovation may be poorly implemented and may not yield sustainable growth. Second, deficiencies in control and resource allocation may arise. Diverse boards are better able to distribute and prioritise resources and monitor innovation outcomes, whereas less diverse boards may allocate resources ineffectively, financing innovations that are misaligned with market demands or the company's capabilities. This, in turn, may lead to wasted resources and a lack of sustainable growth. Third, risk orientation may be problematic: boards with low BCD may either reject valuable innovation because of risk aversion or approve risky projects without proper evaluation, thereby negatively affecting SCG by impeding growth or selecting inappropriate business projects. Fourth, innovation and corporate strategy may not be properly integrated because a lack of diversity can limit the board's ability to see how innovation fits within the firm's overall growth strategy. Finally, there may be a signalling effect: low BCD may suggest that a firm is unable to manage growth and innovation effectively, which may have negative implications for financing, reputation, and growth.

Furthermore, in pursuit of the United Nations 2030 SDGs, sustainable innovation has emerged as a potential solution due to its positive economic and ecological externalities. However, the path towards sustainable development can be challenging. The concept of sustainable innovation experiences a major imbalance between the benefits obtained and the investments made (Gu & Yang, 2023). As mentioned previously, cultural diversity may help companies manage the complexities of ESG. In addition, culturally diverse leadership teams can provide critical resources, including new global perspectives and ideas, because of their working experience in international marketplaces. Recent research also suggests that increasing the cultural diversity of corporate boards can improve corporate governance. In fact, findings from the study by Al-Sarraf et al. (2025) revealed that cultural diversity exerts a positive influence on corporate governance. The authors highlighted the critical need to prioritize board diversity as a means of enhancing the effectiveness of corporate governance. Moreover, it can be inferred that sustainable innovation and corporate governance can potentially enhance a firm's technological level and competitive advantage. This reduces environmental damage and creates value for stakeholders associated with the firm.

Eventually, there may be a feedback loop between innovation and ESG frameworks in organizational settings. An effective connection between innovation and sustainable corporate governance is important, although complicated and multifaceted, because several moderating factors must be considered. These include, but are not limited to, cultural diversity, which policymakers should take into account because it can stimulate innovation. Diversity incorporates multiple perspectives and experiences necessary for the transition from traditional models of resource reliance to sustainable development practices (Abed, Al-Najjar, & Salama, 2025).

CONCLUSION

The research findings reveal the constructive role of board cultural diversity (BCD) in promoting innovation, fostering sustainable corporate governance (SCG), and advancing both. In particular, the impact of innovation on sustainable corporate governance is positive when the level of board cultural diversity is high ($\beta: 0.103^{***}$); however, it is negative when the level of board cultural diversity is low ($\beta: -0.0570^*$). The findings imply that a

higher level of BCD strengthens the association between the two variables, producing a positive impact. They highlight the need to promote both innovation and sustainable corporate governance practices by balancing board cultural diversity. Our study presents a comprehensive analysis with significant theoretical, managerial, and policy implications. On the theoretical side, this research extends the existing literature by analyzing the relationship between innovation and sustainable corporate governance in the context of board cultural diversity and its dynamics. The findings have significant theoretical implications because they focus on the factors that enable firms to become sustainable in light of insights from institutional, stakeholder, legitimacy, resource dependence, and agency theories. The study's conclusions offer useful implications for corporate executives and policymakers. First, executives may use these findings when structuring their boards of directors by setting goals or quotas for non-local or culturally diverse directors. Transparent procedures are needed for hiring such directors from different parts of the world. Companies are also recommended to provide onboarding and cross-cultural training for non-local directors. For Indonesian policymakers, practical actions may include creating tax incentives or public recognition for firms that achieve specified board-diversity targets. Policymakers around the world may also consider issuing guidelines requiring listed firms to publish information about their boards and diversity policies in their annual reports. Moreover, governments should collaborate with universities and business associations to create a pipeline of suitable candidates from other regions for directorship positions. Finally, regulatory bodies may consider developing regulations or guidelines aimed at promoting regional and cultural diversity on boards. Given the rapid economic development of countries such as Indonesia, these actions can help improve governance practices and make companies more adaptable to both local and global environments. Hence, the above discussion highlights the importance of BCD in encouraging innovation and promoting sustainability in corporate governance. In addition, investors should consider BCD when evaluating investment opportunities and making informed decisions that align with their values and promote a sustainable future. In addition to these contributions, it is essential to recognize the possible limitations of this study. First, the research is limited by its reliance on secondary data sources, which may introduce potential biases. Second, the study primarily considers board-level diversity and does not account for broader organizational or functional diversity, which could also affect innovation and ESG outcomes. Lastly, because the main theme of this study is corporate governance, it emphasizes innovation within the realm of sustainable corporate governance and board cultural diversity. For further research, scholars may analyze the causal relationship between board diversity and innovation alongside other variables in the ESG domain. Future researchers may extend this work by examining cross-industry comparisons to gain a new perspective on these dynamics. Longitudinal or mixed-method studies that combine qualitative and quantitative data are also promising research avenues. Additionally, future research should analyze the cultural and demographic diversity of the entire workforce and key managerial groups in terms of its impact on innovation and ESG performance.

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