

Corporate Climate Based Initiatives and Carbon Performance: Evidence from Asian Economies

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Abstract

Investors nowadays are increasingly concerned about global environmental problems in the context of sustainability and climate change. Drawing on insights into stakeholders' expectations regarding climate responsibility, this paper investigates the impact of firms' climate-based initiatives and their carbon performance on market value, while accounting for the moderating role of female representation on corporate boards. It seeks to show how gender diversity strengthens the impact of environmental strategies on business performance in several developing economies, contributing to SDG 13 (Climate Action) and SDG 12 (Responsible Consumption and Production) through the lens of social and economic perspectives. Given current research on emerging economies, this study analyses the impact of carbon performance and climate-based initiatives across three South Asian countries: Pakistan, India, and Sri Lanka. A secondary data approach has been employed, using data from Bloomberg, annual reports, and sustainability reports. Panel data has been used for the five-year period from 2019 to 2023. STATA has been used to test the hypothesis employing the Panel Data technique. The results of this study show that climate-based initiatives positively affect the firm's market value by improving sustainability efforts. Further, we find that higher emissions scores are associated with lower market value. The presence of female directors on the board strongly influences this relationship. The inclusion of female directors is a key driver of converting sustainability actions into financial benefits through efficient resource utilization and effective board oversight. It supports stakeholders by showing how gender-diverse governance improves sustainable outcomes and guides corporate leaders and policymakers in aligning climate actions with market value.

Keywords: Carbon Performance, Climate-Based Initiatives, Market Value, Sustainability

Introduction

In the current era of a sustainable business environment, global warming and rapid climate change have necessitated urgent actions to save the ecosystem and prolong the earth's viability. In line with the ambit of SDG-13 Climate Action, these climate actions and effective natural resource management support current and future economic growth (Sabotič et al., 2024). Natural resource

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management is challenging due to the widespread scarcity of resources and the combustion of petroleum (He et al., 2024). Global resource degradation is caused by a variety of factors, including population growth, insufficient understanding of conservation, rising fuelwood use, poor financial markets, natural disasters, ineffective extraction processes, and a lack of green finance (Anderson et al., 2025; Sarwar et al., 2025b).

Higher inflation rate reduces the real value of money, which lowers personal disposable income and purchasing power, decreases the value of pensions, savings, and treasury notes (Azeem et al., 2025; Usman et al., 2025). Conservation of natural resources is crucial for long-term ecological survival (Shaukat et al., 2024). The decline of natural resources is mostly caused by industrialization, population growth, and ecological footprints. Global ecological footprints are measured in hectares of arable land (Sarwar et al., 2023; Shah & Shahid, 2024). These nations, however, managed their natural resources sensibly. Rapid population expansion complicates efforts to conserve resources. Increased international migration poses additional issues, leading to economic and environmental damage (Sibt-e-Ali et al., 2018). According to 2024 estimates, the UAE and Qatar host over 75% of the world's foreign migrants. Bahrain, Jordan, and Oman are among the countries with the highest influx of foreign migrants in the globalized globe (Aggarwal & Agarwala, 2023). Stabilizing global emissions to combat climate change is a significant problem. Government leaders are highly concerned with the issue (IEA, 2019). Manufacturing has a variety of negative environmental impacts, according to recent studies. Pollution is generated directly by the vapors, fluids, and solid waste produced during manufacturing processes. Within the ambit of SDG 12 Responsible Consumption and Production, manufacturing has an indirect impact on the environment through product use and disposal (Machado et al., 2020).

Since the climate change has grown to be an emerging concern in the present time of globalized business environment demanding the organizations to act against carbon emissions along with the application of climate based initiatives, in an effort to meet the rising expectations of stakeholders to minimize the carbon footprint and adopt sustainable programs that will be beneficial towards compliance to global regulatory standards and also positively impact the value of the companies and their long run financial performance (Zafar et al., 2025). Existing research has explored this connection, but there is a lack of research that examines the combined effect of carbon performance and climate initiatives on market value. In addition, there is limited research on this association. There is limited research on how board gender diversity enhances decision-making, risk management, and sustainability, but there is limited evidence on how it influences carbon performance and the impact of climate change initiatives on market value. This study addresses a research gap by examining the effects of corporate carbon performance and climate-based initiatives on a firm's market value. It addresses the level at which the relationship is directly or indirectly moderated by Board diversity (BOD). It examines whether firms with high emissions scores are undervalued by stakeholders, as reflected in a decline in market value. Considering the organizations' climate-based initiatives, do they lead to high market value?

In the context of developing economies, this field has limited research; the focus of this study is confined to the three developing economy corporations, including Pakistan, India, and Sri Lanka. These economies are diverse, but their selection as representatives on these grounds is justifiable, as they share common topographies such as emerging capital markets, sustainability issues, climate change, and economic vulnerability. These economies are confronted with identical climate conditions, including floods, heat waves, and other factors, yet regulatory systems and institutional change are not encompassed (Sarwar et al., 2025a). In addition, these economies share similar patterns of GDP contribution, with India being the highest contributor. Their variety enables

attempts to better understand how corporate carbon projects interact with market value in emerging economies characterized by growth prospects, regulatory change, and climatic exposure. Conclusively, these results will help to expand the domain of corporations' responsible production and climate actions under the ambit of SDG 12 and SDG 13 for future research.

Literature Review

In today's era of globalization, countries confront two challenges: urbanization and climate change. Urbanization, as part of socio-economic growth, puts pressure to build habitable places for a growing population (Hakro et al., 2025). However, this has a significant influence on landscapes, ecosystems, and the environment. Numerous studies show that cities and urbanization cause environmental changes, including the formation of urban heat islands or archipelagos (Aljarf & Russell, 2023). Rising flood risk is associated with increased rainfall intensity and spatial extent (Azer & Samir, 2024). Sustainable human resource management focuses on implementing all three components of the triple bottom line approach through HRM practices, i.e., equal focus on people, profit, and the planet (Shahzad, 2025). Since corporate environmental responsibility promotes international efforts to reduce carbon emissions, the link between carbon emission disclosure and business financial success is a crucial area of study (Haque et al., 2024). Thus, to effectively address and adapt to climate change while encouraging climate action across society, it is essential to understand what motivates people to support and take climate action (Bhatti et al., 2021). Companies must link their operations to sustainability goals to maintain transparency in emission reporting (Khan et al., 2021).

Corporate Carbon Performance Emission (CCPE)

Executive attitudes and traits, particularly those of the CEO (chief executive officer), such as CEO power, CEO remuneration, and CEO dualism, are crucial to company emission-reduction plans (Raghunandan & Rajgopal, 2022). In developing countries, the reporting of carbon emissions remains discretionary rather than mandatory, leading to inconsistent reporting practices.

Corporate Climate-Based Initiatives (CCBI)

It refers to the initiatives an organization takes using Assessment Scales for corporate climate change (Walenta, 2020). These initiatives focused on the organization's commitment to emission reduction, action taken to improve resource efficiency, and organizational involvement towards reduced ecological footprints (Orazalin et al., 2024)

Board Gender Diversity

It refers to the inclusion of female directors in the board structure, thereby enhancing decision-making capacity and stimulating sustainability-based strategies (Quddoos et al., 2020). Their inclusion promotes sustainable business growth (Orazalin et al., 2024).

Market Value (MV)

Although climate risk sensitivity is consistent across industries, high-risk organizations often have lower market values. Market valuation sensitivity to climate risk increased following the 2015 Paris Agreement, demonstrating greater awareness of climate risk as a significant influencing factor for firms (Loukil et al., 2019). This study enhances environmental accounting by examining market assessments of climate risk, which influence firms throughout value chains and go beyond

voluntary sustainability disclosures such as those made under the Carbon Disclosure Project (CDP) (Kamarudin et al., 2022; Sarwar & Khan, 2022).

Corporate Carbon Performance, Emission, and Market Value

With growing recognition that addressing environmental challenges and achieving business goals can coexist, environmental management is becoming increasingly significant in modern management practices (Vivek et al., 2024). Evidence suggests that proactive environmental management can confer a competitive advantage by enhancing efficiency and reducing pollution-related inefficiencies, whereas traditional environmental regulations were reactive and compliance-driven (Puschmann & Quattrocchi, 2023).

H1: The market value of a company is adversely affected by its carbon performance emissions.

Corporate Climate-Based Initiative and Market Value

To evaluate the significance of institutional pressure within the Carbon Disclosure Project, a non-profit that maintains a database of self-reported business carbon emissions, determine whether a firm's location and pressure from shareholder activists increase the likelihood that it voluntarily publishes its carbon emissions (Reid & Toffel, 2009). The study explores whether these initiatives and prizes increase shareholder value. Proponents argue that CEIs (Certificate of Employment Intermediaries) may boost market value and return on investment by lowering expenses (such as energy, materials, and abatement costs), improving customer perception, enhancing community relations, increasing staff morale, and opening new market opportunities (Orazalin et al., 2024).

H2: Initiatives focused on corporate culture show a favorable correlation with market value.

Board Gender Diversity, Carbon Performance, and Market Value

Equal opportunities in the workplace are a fundamental human right. Is it possible for women to reach the highest levels of decision-making (Zakaria et al., 2021) on the corporate board? Even though Canada's board composition falls short of the global standard, it is important to avoid the 'old boys' network' approach when seeking board nominations.

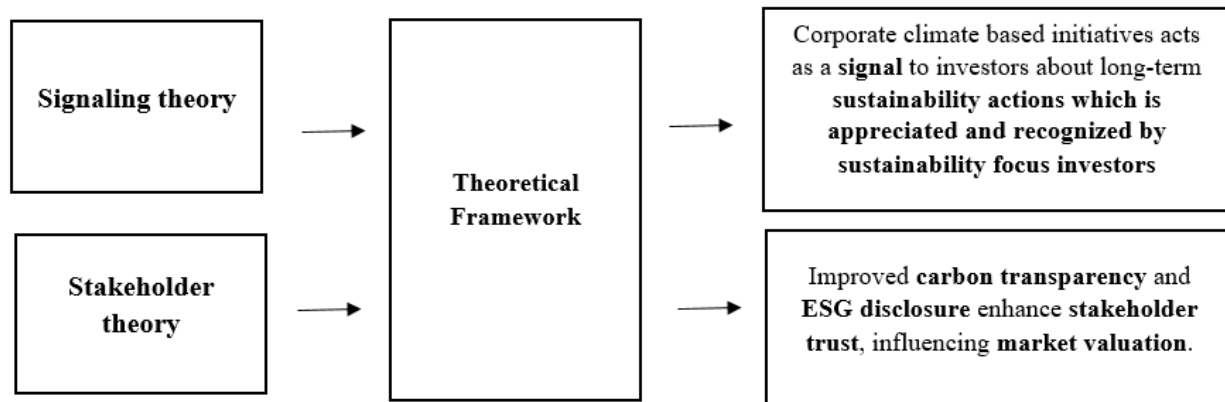
H3a: The negative correlation between corporate carbon performance emissions and firm market value is mitigated by gender diversity; the effect is less pronounced in companies with more gender diversity.

Market Value, Climate-Based Initiatives, and Gender Diversity

There is increasing social, economic, and legal pressure on corporations to improve governance effectiveness in reducing greenhouse gas emissions (Velte, 2025). To reduce emissions, scholars and professionals are concentrating on enhancing corporate governance (CG) practices (Nuber & Velte, 2021). CG mechanisms are responsible for developing strategies to mitigate adverse effects on performance, society, and the environment (Walls et al., 2012). For corporate boards to develop effective plans to address complex environmental concerns, they must be well represented (Liao et al., 2015).

H3b: The positive correlation between corporate climate-based activities and firm market value is supported by board gender diversity, and it is more pronounced in organizations with a higher level of gender diversity.

Given the ambit of the above-discussed variables and their relationships, the following theories address the interplay among them.

Figure 1: Theoretical Framework

Research Methodology

Research Sample

This research investigates by divulging the secondary data approach by obtaining observations from ESG databases (Bloomberg), annual reports and sustainability reports of non-financial companies. Data was collected from three developing (Pakistan, India & Sri Lanka). It inculcates the comparison of the developing countries from 2019–2023 make up the entire sample size, and 300 observations are used to determine the results covering the 5 years span. Panel logistic regression is used in the STATA program to accomplish the statically analysis. The findings prove valuable for enterprises and interested parties seeking to understand how a firm's worth connects with its environmental initiatives and carbon-emission performance.

Table 1: Sample Selection

Sample Selection	No of Companies	No of years	Sample Size
Years 2019-2022	90	5	450
Less: Missing values	3	1	3
Final Sample	57	4	447

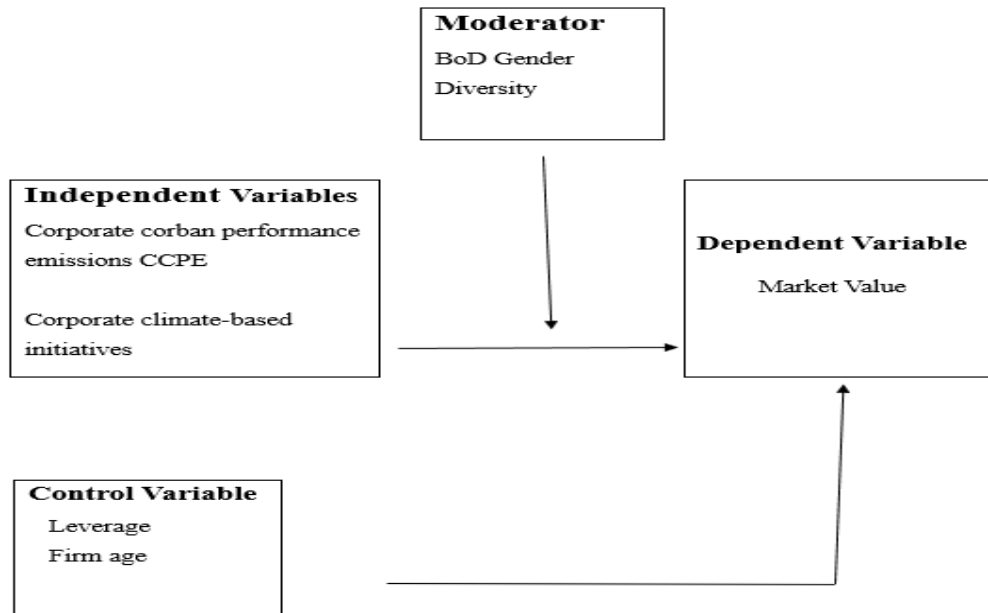
Note(s): Authors' compilation

Research Model

$$MV = \beta_0 + \beta_1 EM + \beta_2 CCI + \beta_3 BGD + \beta_4 (EM \times BGD) + \beta_5 (CCI \times BGD) + \epsilon$$

Conceptual Framework

Figure 2: Conceptual Framework



Variables Measurements

Table 2: Variables measurements

Variables	Proxies	Measurements	Source	References
Dependent Variable	Market Value	Tobin's Q Formula MV of Equity +Book Value of Debt / Total Assets	Annual Report	(Aljarf & Russell, 2023)
Independent Variable	CCPE	Carbon Emission Scores	Bloomberg (ESD Database)	(Aljarf & Russell, 2023)
Independent Variable	CCBI	Assessment Scales for corporate climate change initiatives *(40 Questions)	Annual report, sustainability reports, Websites	(Orazalin et al., 2024)
Moderator	BOD Gender Diversity	Percentage of female directors	Annual Report	(Orazalin et al., 2024)
Control Variable	Leverage	Debt-to-Assets Ratio	Annual Report	(Aljarf & Russell, 2023)
Control Variable	Firm age	Total Firm Age	Annual Report	(Azer & Samir, 2024)

Descriptive Statistics

Table 3: Descriptive Statistics

Variables	Obs	Mean	Std. dev	Min	Max
MV	447	36.04393	24.60487	0.76	92.43
Ccbi	447	16.09331	5.804818	6	39
Emissionsc-e	447	50.65118	26.17527	1.123	95.423
Leverage	447	46.59323	22.24394	7	91
Firmage	447	44.73332	28.19625	14	144
Bod	447	0.2152866	0.957216	0.07	0.5

The descriptive statistics reflect considerable variation across the sampled firms. MV has an average of 36.04 with a standard deviation of 24.60, ranging from 0.76 to 92.43, showing huge variation in the size and market performance of the firms. For Ccbi, which represents the corporate carbon-based initiatives, the mean is 16.09 (SD = 5.80; range = 6–39), indicating moderate but unequal engagement in climate-related activities. The average carbon emissions, Emissions c-e, are 50.65 (SD = 26.18, ranging from 1.12 to 95.42), which means that many firms still operate with a relatively high level of emissions despite growing environmental awareness. The mean leverage ratio is 46.59 (SD = 22.24, ranging between 7 and 91), showing a moderate level of dependence on debt financing, with variations indicating that capital structures and risk strategies continue to differ. Average firm age is 44.73 years (SD = 28.19, ranging between 14 and 144), with most firms being mature, likely having some form of governance system already established. Finally, Bod, the board gender diversity variable, has a mean of 0.21 and a standard deviation of 0.96, ranging from 0.07 to 0.50, hence explaining low female representation on boards. On the whole, the dataset reflects heterogeneous firm characteristics with respect to market performance, environmental behavior, and governance structure and denotes that firm sustainability maturity differs among emerging economies.

Correlational Analysis

Table 4: Correlation Matrix

	MV	CCBI	Emission-e	Leverage	Firmage	Bod
MV	1.0000					
Ccbi	0.0333	1.0000				
Emission-e	-0.2234	-0.2429	1.0000			
Leverage	0.1936	-0.0222	-0.0188	1.0000		
Firmage	0.0211	0.1558	0.1205	-0.1260	1.0000	
Bod	-0.0744	0.1803	0.0267	-0.2335	0.0561	1.0000

In this study, the reported figures point mostly to weak or minor links some slightly positive and others slightly negative without any strong evidence of a consistent pattern. Values close to zero denote no significant relation. Therefore, in this analysis, 0.0333 is a very weak positive correlation while -0.2234 is a modest negative correlation. Similarly, 0.1936 is a modest positive, 0.0211 is a very weak positive, and -0.0744 is a very weak negative correlation. The coefficients -0.2429 and -0.2335 are modest negative while 0.1558 and 0.1803 are modest positive. Values such as -0.0188, 0.0267, and 0.0561 are very weak correlations.

Overall, the correlation matrix demonstrates how the variables interact. The results indicate that most of the correlations are weak, which means relatively little interdependence of variables—a good condition for regression analysis.

Fixed Effect Model

Table 5: Regression Results

MV	β Coefficient	P value
CCBI	0.475046	0.0106
Emission score	-0.0472247	0.0140
Leverage	-0.1136638	0.348
Firm age	0.0415831	0.431
CCbod	0.693048	0.089
Ebod	0.489684	0.032
_cons	-4.572224	0.186

Before proceeding further, all regression assumptions have been met. With respect to the Fixed effect model, the coefficient for CCBI in regression table 13 is $\beta = 0.4750$ ($p = 0.0106 < 0.05$), accepting *H1* at the 5% level of significance, indicating a positive and statistically significant relationship with market value. It highlights that companies' climate-based initiatives increase their market value, suggesting that these efforts have been recognized by the organization's stakeholders, especially shareholders. For the emission score, regression table 13 shows that $\beta = -0.04722$ ($p = 0.014 < 0.05$), indicating that firms with low emission performance exhibit a slight increase in market value. Although the magnitude is small, it indicates that the reduced emission score reflects operational efficiency, thereby enhancing market value. Moving forward, Leverage and firm age ($\beta = -0.1137$, $p = 0.348$) and Firm Age ($\beta = 0.0416$, $p = 0.431$) are statistically insignificant, indicating that both control variables do not hold a significant effect in this model. Whereas, CCbod (Interaction: CCBI $\times$ BOD) ($\beta = -0.6930$, $p = 0.089$) is positive and marginally significant at 10% significance level. It refers to the fact that the presence of BOD members strengthens the relationship between climate-based initiatives, indicating that female directors in the BOD lead to more climate initiatives, and that, eventually, market value increases. From the lens of stakeholder theory, a diverse board with more female directors strengthens investors' confidence by driving greater sustainability commitment. A diverse board plays a strategic role in integrating climate-based initiatives into corporate strategy. A strong governance mechanism leads to enhanced environmental and financial commitment. In addition, the EBOD interaction term Ebod ($\beta = 0.4896$, $p = 0.032$) shows a positive, statistically significant relationship, indicating that BOD diversity also enhances carbon performance, as reflected in lower emission scores. The presence of female directors enhances monitoring and oversight of responsible production and consumption, thereby supporting operational efficiency and SDG 12. This enhanced the company's market value by providing it with financial benefits from its environmental responsibility. In this arrangement, BOD gender diversity serves as a financial-enhancing moderator, translating sustainability performance into financial rewards.

Discussion

In today's era of sustainability and environmental performance, climate-based performance has become a significant and emerging concern for organizations. Organizations that perform well in

taking climate-based initiatives and reducing carbon emissions are better evaluated by investors and, as a result, their market value increases (Gulzar et al., 2024). The regression results of this study support this association. The results suggest that corporate climate-based initiatives positively affect the firm's market value, indicating that organizations' proactive actions to protect the environment and reduce depletion of natural resources send positive signals to investors, thereby enhancing market value. The results of this study are consistent with previous studies, indicating that climate-based initiatives are recognized by investors and are better appreciated in terms of good market reputations and enhanced firm value (Busch & Hoffmann, 2011; Krüger, 2015). Secondly, the findings also suggest that firms' reduced emission scores are associated with better market performance, as reflected in higher operational and production efficiency (Clarkson et al., 2015; Gallego-Álvarez et al., 2015). The interaction term further strengthens the relationship, suggesting that the presence of female directors on the board plays a critical role in board decision-making for the implementation of climate-based initiatives (Haris et al., 2025; Sarwar et al., 2024). Thus, enhancing reduced carbon-emission scores and showcasing the strategic alignment of the board in amplifying the financial benefits of environmental sustainability (Peters & Romi, 2015; Khan et al., 2019).

The findings of this study align with stakeholder theory and signaling theory, suggesting that organizations' improved carbon transparency and climate-based actions send positive signals to stakeholders, ultimately providing a competitive advantage in the market (Ahmad et al., 2025). From the perspective of signaling theory, the significance of climate-related corporate initiatives under the combined model highlights that broader, externally observable environmental strategies may exert a more consistent impact on firm valuation across emerging nations (Adu Sarfo et al., 2024; Liaquat et al., 2024; Talha et al., 2025). Overall, the findings suggest that incorporating climate-based initiatives and reducing carbon emissions, alongside diverse board governance, transform sustainability efforts, giving firms a sustainable competitive advantage that ultimately reflects in higher market valuation, particularly within the context of emerging economies (Li et al., 2022; Ntim & Soobaroyen, 2013).

Conclusion

This research examines the association between corporate climate-based initiatives and carbon emissions, with board gender diversity as a moderator, in emerging economies including Pakistan, India, and Sri Lanka. The findings suggest that companies' sustainability-based measures lead to better financial results. Furthermore, considering the moderating role of board gender diversity, the relationship between a firm's market value and the independent variables depends strongly on the conceptual framework applied. When examining variations across South Asian countries over time, governance factors, particularly those related to board composition, appear to play a significant role in shaping corporate value (Marrucci et al., 2024; Sheikh et al., 2024). The presence of female directors enhances market value, indicating that female directors on the board play a critical role in decision-making for implementing climate-based initiatives. Thus, enhancing reduced carbon-emission scores and showcasing the strategic alignment of the board in amplifying the financial benefits of environmental sustainability (Peters & Romi, 2015; Khan et al., 2019).

This interrelationship is supported by signaling theory, which treats the emission scores as signals to external stakeholders. It further supports the stakeholder theory, which underlies improved carbon transparency and ultimately influences enhanced climate-based initiatives. Thus, the study underscores the importance of methodological choice in panel-data analysis and suggests that both internal governance mechanisms and external sustainability efforts shape firm value in emerging

economies. Increased board diversity would benefit companies' overall operations by bringing a wide range of experience, information, abilities, and resources, and would, in turn, result in financial benefits.

Implications of the Study

The results of this study provide useful implications for managers of organizations to focus on climate-based initiatives. Such measures bring financial benefits by elevating public image, securing adherence to evolving rules, and addressing the rising expectations of stakeholders concerned about ecological issues in this era of climate-based sustainability. Businesses can increase their market value and gain a competitive advantage by incorporating sustainability into their operational and strategic decisions. In addition, the results of this study draw management's attention to the diversity in their board composition, strengthening their board structure to address environmental concerns. Additionally, policymakers can implement policies requiring female directors on boards to foster a sustainable business environment. Along with the consideration of sustainability-focused investors for making investments in sustainability-based projects.

Future Research Directions

Future research may include longitudinal analysis of carbon-based initiatives and their long-term benefits to organizations. It may compare developed and developing economies. As this study includes the three emerging economies, other studies may take other emerging economies to analyze the relationship. This study has treated board diversity as a moderator; future studies may treat other governance mechanisms as moderators, including board independence, audit committees, and sustainability committees. It is also suggested to conduct a sector-wise comparison to assess the sector and compare the industry-wide results. It is also suggested that digitalization measures be included in the analysis of the relationship with carbon performance.

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