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The Benefits of Being Greener: Unravelling the Association Between Carbon Performance and Market Value

Emmanuel A. Morrison[1] | Emmanuel Adegbite[2,3] | Musa Mangena[2] | Danson Kimani[4] | Douglas A. Adu[2]

[1]Department of Finance, Performance and Marketing, Teesside University International Business School, Teesside University, Tees Valley, UK | [2]Accounting Department, Nottingham University Business School, Nottingham, UK | [3]James Cook University, Singapore, Singapore | [4]Sheffield University Management School, University of Sheffield, Sheffield, UK

Correspondence: Douglas A. Adu (douglas.adu@nottingham.ac.uk)

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ABSTRACT

This study examines the interrelations among pay incentives, board sustainability committee initiative, carbon performance and market value. Using data from listed firms in emerging economies, we find that pay incentives and board sustainability committee initiative increase the firms' process-based carbon performance but have no similar effect on outcome-based carbon performance. We detect that board sustainability committee initiative has a positive moderating effect on the association between pay incentives and outcome-based carbon performance. We also find that higher level of process-based carbon performance is associated with low market value, but outcome-based carbon performance does not seem to impact on market value. Accordingly, two factors, namely, enhanced board sustainability committee initiatives and increased process-based carbon performance, are found to be channels through which carbon performance affects market value. Our findings call for firms, practitioners and policymakers to design and implement effective board sustainability committee initiative and pay incentive mechanisms to improve actual carbon performance.

1 | Introduction

The issue of how pay incentives and board sustainability initiative influence greenhouse gas emissions has become a top challenge not only for regulators and governments but also for firms around the globe (Orazalin et al. 2024). Similarly, there has been a growing debate regarding the impact of greenhouse gas emissions reduction initiatives on the market value of firms (Haque and Ntim 2020). At the firm level, the problem stems from uncertain outcomes that are linked to greenhouse gas emission reduction since these initiatives have substantial impact on the profitability, competitiveness and financing decisions of the firms (Li et al. 2025).

However, previous research has not systematically examined the ways in which pay incentives and board sustainability committee initiative affect greenhouse gas emissions and market value of firms, in an environment where institutions are underdeveloped and law enforcement seems to be weak (see Orazalin 2020), with the exception of the recent study by Saa et al. (2025). Meanwhile, market value–related issues constitute one of the most dominant channels that prior studies have identified to drive firms to cut their greenhouse gas emissions in developed countries (Morrison et al. 2024; Haque and Ntim 2020). Furthermore, the existing literature on business strategy and climate change maintains that pay incentive alignment and board sustainability committee initiative are two most vital governance mechanisms that can serve as crucial catalysts for enhanced greenhouse gas emission reduction and help combat climate change (Orazalin et al. 2024). Hence, how pay incentives alignment and board sustainability committee initiative affect greenhouse gas performance, and the impact of greenhouse gas emission on market value, is crucial.

In this study, we first ask whether pay incentives and board sustainability committee initiative are related to greenhouse gas emissions, and if so, through which channels. Second, we ask whether and how greenhouse gas emissions are associated with market value of firms. We depart from recent study by Saa et al. (2025) and use two distinctive indicators of greenhouse gas emissions measures—namely, process-based greenhouse gas emission initiatives (PGHGI) and outcome-based greenhouse gas emission (GHGE) to enhance our investigations as the use of process-based carbon performance alone such as PGHGI is often susceptible to social desirability bias such as greenwashing (Li et al. 2025; Haque and Ntim 2020; Orazalin et al. 2024). In fact, because it is accurate and dependable and quantifies a firm's actual initiatives, the Framework of the International Integrated Reporting Council (IIRC 2021) calls for the use of outcome-based greenhouse gas emission reduction activities as a reference point for investors' decision-making (Baboukardos 2018; Li et al. 2025).

The study investigates the above questions from three theoretical perspectives, namely, resource-based view, stakeholder theory and neoinstitutional theory. First, resource-based view argues that firms can enhance their carbon performance and gain competitive advantage by undertaking planet-friendly strategies that necessitate rare resources and abilities (Orazalin et al. 2024; Hart and Dowell 2011). In this case, resource-based view supports the implementation of PGHGI, which can enhance GHGE, and eventually improve market value (Hart 1995; Barney 1991). By contrast, cost view of resource-based view posits that the adoption of PGHGI that demand substantial resources is linked to increased levels of opportunity costs and risks, and hence, might be detrimental to market value (Orazalin et al. 2024).

Second, stakeholder theory maintains that greenhouse gas emission reduction activities improve the link between firms and their stakeholders (Freeman 1984). Within this perspective, firms with effective governance structures can consolidate links with their stakeholders by adopting greenhouse gas emission reduction strategies and eventually enhance their market value by harmonising the conflicting interests of their stakeholders (Michelon and Parbonetti 2012; Freeman 1984). In this case, stakeholder theory lends support to the adoption of PGHGI and the implementation of governance structures including sustainability-linked pay incentives and the board sustainability committee initiative, as a way of strengthening stakeholder engagements, enhancing corporate image with beneficial impact on the market value of the firm (Orazalin et al. 2024). Based on neoinstitutional theory, firms that are subjected to heightened institutional forces might rely on process-based carbon initiatives such as PGHGI and establish governance structures such as sustainability-linked pay incentive and board sustainability committee initiative as a means of enhancing their legitimacy (Ashforth and Gibbs 1990). However, improved GHGE reduction and market value stem from firms' substantive legitimacy actions that lead to operational efficiency (Ashforth and Gibbs 1990).

To investigate the relationship among pay incentives, board sustainability committee initiative, greenhouse gas emissions and market value, we collect data from firms in emerging economies from 2002 to 2022. The selection of emerging economies as our empirical setting is informed by three reasons. First, it has been suggested that emerging economies such as sub-Saharan Africa, as well as portions of Latin America and Southeast Asia, are increasingly facing increased challenges in negotiating the need to economically 'catch-up' with developed economies while operating in environments that are frequently politically divisive (Latin America) or heavily reliant on forest products and other natural resources (Goodell and Du 2024). These suggest that emerging economies are at a critical juncture, attempting to balance the goal of economic growth with the environmental imperative of lowering greenhouse gas emissions (Jiang et al. 2023). Second, the issue of balancing effort in emerging economies is exacerbated by restrictions such as limited financial resources, technology differences and emerging regulatory infrastructures (Goodell and Du 2024; Morrison et al. 2024).

On the flip side, emerging economies have a rare opportunity to bypass conventional carbon–intensive development routes in favour of new decarbonisation techniques that pave the road for a sustainable future (Zhong et al. 2024). Moreover, Saa et al. (2025) and Li et al. (2025) find differences in regulatory frameworks, legal enforcement costs of greenhouse gas emissions protection policies and industrial structures of emerging economies when compared to those in developed economies where several studies on this topic have concentrated on. Noticeably, these variations might result in diverse perceptions of how stakeholders view and report corporate carbon performance (Li et al. 2025). For instance, Haque and Ntim (2020) and Morrison et al. (2025) find that pay incentives have a positive impact on process-based carbon performance but have no similar impact on actual carbon performance from industrialised countries in Europe. By contrast, evidence in Africa suggests that pay incentive has a negative impact on process-based carbon performance (Saa et al. 2025), indicating different intervening mechanisms of pay incentives on carbon performance between Europe and Africa. Orazalin et al. (2024) detect that board sustainability committee presence has a positive effect on market value in 35 industralised countries. To address the mixed results documented in prior empirical investigations, we focus on emerging economies in our study.

Our study makes several unique contributions to the existing research. First, this paper is among the first to assess the impacts of both PGHGI and GHGE on market value and then examine the moderating influence of both pay incentives and board sustainability committee initiative on the associations in emerging economies. Although a few prior studies have essentially investigated the relationship between GHGE and financial outcomes, there has been limited investigations on the value significance of PGHGI (Morrison et al. 2025; Saa et al. 2025).

Besides, previous research has revealed that greenhouse gas emission initiatives/disclosures tend to be prone to social desirability bias (Li et al. 2025; Orazalin et al. 2024) due to the inclination for firms to misrepresent their disclosures through self-reporting and impression management, which can result in needless inferences (Zerbe and Paulhus 1987). To the best of the authors' knowledge, this research is among the first investigations that use both process-based and outcome-based carbon performance indicators in exploring the link between carbon performance and market value, in so doing offering a nuanced insight of a topic that has provided mixed findings.

Second, this study sheds light on the crucial role of pay incentives and board sustainability committee initiative in promoting climate change investments. More precisely, we explore whether sustainability-based compensation and board sustainability committee initiative can moderate the relationship between carbon performance and market value. While there is increasing investigation on the association between climate change initiatives and financial outcomes, there is inadequate investigations on whether governance attributes such as sustainability-based compensation and board sustainability committee initiative can influence the impact of carbon performance on market value (Orazalin et al. 2024; Haque and Ntim 2020).

Third, this paper is among the first to assess the effect of executive compensation on carbon performance and afterwards consider the moderating impact of sustainability-based compensation and board sustainability committee initiative on these associations. Notwithstanding the growing calls for climate change studies, the link between board sustainability committees and carbon performance has received limited attention (Morrison et al. 2025; Saa et al. 2025). Further, we explore whether the predicted connections vary in Paris Agreement and Kyoto Protocol periods. Finally, we distinctively explore whether the predicted relationships differ between nations that have instituted carbon tax policy and nations with no carbon tax policy.

The rest of our paper is organised as follows: Section 2 presents the background of this study. Theoretical literature review is then provided in Section 3, succeeded by a review of prior studies leading to the development of the hypotheses in Section 4. Section 5 provides the research methodology. In Section 6, we discuss the results of this study. Finally, we provide conclusion to this study in Section 7.

2 | Corporate Governance Mechanisms, Executive Compensation and Greenhouse Gas Reforms in Emerging Economies

The increasing issues regarding the growing levels of greenhouse gas emissions globally have led the worldwide society to respond to global warming threats by engaging in several initiatives (Orazalin et al. 2024). As a result, national authorities and global agencies are concerned in mitigating the risks posed by global warming (Baboukardos 2018) through the implementation of diverse low greenhouse gas emission programmes (Haque and Ntim 2020). In particular, in 1997, an official all-encompassing low greenhouse emission pact known as the 'Kyoto Protocol' was initiated (Morrison et al. 2024). As part of the Protocol, countries in emerging economies have implemented several integrated sustainability guidelines to combat global warming (Olekanma et al. 2024). The Paris Climate Agreement, instituted in 2015, followed the 'Kyoto' Protocol beginning in 2016. The pact mandates national contributions to cut emissions and support adaptation to climate change. Many countries have enacted domestic laws and policies to address climate change (Haque and Ntim 2020).

The transition to a low-carbon business environment is not only an environmental requirement but also a fundamental economic transformation critical for mitigating climate change and achieving sustainable development globally (Banerjee et al. 2024). According to Wang et al. (2023) and Aqeeq et al. (2023), emerging economies, defined by fast industrialisation and growth, are at a critical juncture in the transition to a low-carbon business environment. Particularly, global regions such as sub-Saharan Africa, as well as portions of Latin America and Southeast Asia, are facing increased challenges in negotiating the need to economically 'catch-up' while operating in environments that are frequently politically divisive (Latin America) or heavily reliant on forest products and other natural resources (Goodell and Du 2024).

In response to these challenges, this study focused on African, Latin American and Southeast Asian countries in their shift towards a low-carbon business environment. In addition, and more importantly, this study focused on these emerging countries because they have weaker institutional systems than developed economies (Ntim 2016). Most of these countries' governments are also exceedingly corrupt and bureaucratic (Ntim and Soobaroyen 2013). These emerging countries also have low levels of 'transparency, accountability and voice' and lax regulation (Ntim and Soobaroyen 2013). Several worldwide financial crises during the 1990s and 2000s stressed the importance of strong corporate governance, openness and responsible business (Mallin 2002). Considering these trends, numerous nations have implemented corporate governance reforms (Grey et al. 2024). It is crucial to emphasise that recent corporate governance reforms, particularly those adopted in Anglo-Saxon countries, have mostly addressed financial concerns (Saa et al. 2025; Ntim 2016). By contrast, the African, Latin American and Southeast Asian countries' corporate governance reforms have mostly concentrated on the nonfinancial and financial parts of governance, such as corporate carbon emission (Ntim et al. 2013). The recognised Kings Report of South Africa, issued in 1994 as a result of repeated issues regarding the necessity for increased transparency in accountability and financial reporting, was among the first corporate governance reforms in these emerging economies (Ntim and Soobaroyen 2013).

Many countries in emerging countries, notably South Africa, Indonesia, Malaysia, Nigeria and Philippines, have published code of good governance (Saa et al. 2025). In particular, South Africa's King Report on governance code (1994) and those for Thailand (1998), Nigeria (2003), Egypt (2006), Kenya (2002), Mexico (1999), Indonesia (2000), Malaysia (2000), Morocco (2008), Brazil (2004) and Philippines (2001) were all produced to strengthen financial disclosure and reporting. It is noteworthy to state that revised governance codes were issued in these emerging economies to overcome the limitations of the earlier rules and include international best practices, including the Sustainable Development Goals (SDGs). The revised King Reports of South Africa (2016, 2010 & 2002), including that of Nigeria (2011 and 2018), Egypt (2016), Kenya (2002 and 2014), Indonesia (2001, 2006 and 2014), Thailand (2002, 2006, 2011 and 2017), Malaysia (2007, 2012, 2017 and 2021), Morocco (2022), Philippines (2009, 2016 and 2019) and Brazil (2009 and 2015), are all essentially concerned with encouraging greenhouse gas emission activities (Kouloukoui et al. 2020; Blesia et al. 2023; Saa et al. 2025). In effect, the revised codes (hereafter known as the 'Combined Code') include comprehensive sections on sustainability/greenhouse gas activities (Saa et al. 2025). A core tenet of this 'Combined Code' is the anticipation that efficient internal governance structures will influence pay incentives, promote the establishment of board sustainability committee initiatives and encourage participation of firms in greenhouse emission reduction activities, with the potential to improve market value. However, there are still critical policy questions about whether the 'Combined Code'—a voluntary compliance setting—can enhance process-based carbon performance and outcome-based carbon performance standards in these emerging economies. We believe that this provides a unique setting for investigating the interconnections among pay incentives, board sustainability committee initiative, carbon performance and market value.

3 | Theoretical Framework

Despite the growing interest from academics and businesses in greenhouse gas emissions reduction over the past decade (Haque and Ntim 2020; Morrison et al. 2025; Saa et al. 2025), no comprehensive and unified theoretical framework has yet been developed to analyse and interpret corporate motivations for engaging in process-based and outcome-based carbon performance (Morrison et al. 2024). Synthesis of the literature reveals that previous researchers have utilised various economic- and social-based theoretical perspectives, including resource dependence, legitimacy and stakeholder theories to explore corporate engagement in greenhouse gas emission reduction (Oh et al. 2011; Lopatta et al. 2017). For instance, economic- and social-based theoretical perspectives have been employed to explain corporate motivation for participating greenhouse gas emission abatement (Dam and Scholtens 2012). However, these perspectives have demonstrated limited capacity to comprehensively elucidate the underlying drivers of greenhouse gas emission reduction in emerging economies (Ntim et al. 2013; Saa et al. 2025).

At the same time, prior studies suggest that variations in firms' greenhouse gas emission can be better understood through a multitheoretical lens (Orazalin et al. 2024; Morrison et al. 2025). For this reason, we adopt a multitheoretical perspective in response to recent calls for multitheoretical approaches to investigate the relationship among pay incentives, board sustainability committee initiative, carbon performance and market value. One key explanation is that single theories, on their own, may not fully capture the complexities of how pay incentives, board sustainability committee initiative and carbon performance interact to influence corporate actions and outcomes such as market value. However, combining insights from a multitheoretical perspective can provide unique understandings towards explaining and interpreting process-based and outcome-based carbon performance in a distinct regulatory and institutional setting, such as in emerging economies (Saa et al. 2025). Additionally, a multitheoretical lens can help elucidate the probable interactions among pay incentives, board sustainability committee initiative, carbon performance and market value (Orazalin et al. 2024).

As the preceding discussion suggests, each theoretical perspective has apparent limitations in its ability to fully explain firm's carbon performance activities. Given the diverse nature of firms' motivation for process-based carbon performance (PGHGI) and outcome-based carbon performance (GHGE) activities, we argue that a multitheoretical perspective is the most appropriate foundation. Such an approach allows for a comprehensive understanding of complex, multidimensional connections—both direct and indirect—among pay incentives, board sustainability committee initiative, carbon performance and market value. These relationships inherently involve diverse stakeholders and institutions with differing interests, operating within unique regulatory and institutional contexts (Saa et al. 2025). Importantly, in response to the growing call for the adoption of a multitheoretical approach (Orazalin et al. 2024; Morrison et al. 2024), we address the limits of earlier research by adopting a multitheoretical perspective.

First, neoinstitutional theory is a multidimensional theory that draws on both classic economic (agency and resource dependence) (Haque and Ntim 2020) and social (legitimacy and stakeholder) theories (Suchman 1995). This theory has two main perspectives. These are the economic efficiency view and the social legitimacy perspective (Haque and Ntim 2020). The economic efficiency approach involves firms engaging in cost-effective sustainable business strategies such as process-based carbon performance activities (improved PGHGI) that can improve outcome-based carbon performance (low GHGE), hence improving the transition to a low-carbon business environment (Mazouz and Zhao 2019; Olekanma et al. 2024). In terms of social legitimacy, firms may attempt to comply with institutional powers in order to acquire and retain corporate legitimacy (Suchman 1995).

Prompted by the growing discussion on climate change, firms with a greater degree of legitimacy can have a greater access to economic resources (Pfeffer and Salancik 1978), recruit and retain top people and improve stakeholder relations (Oliver 1991), thereby help them compete efficiently in the marketplace (Olekanma et al. 2024), which can enhance the market value. In this context, firms pursuing legitimacy are stimulated to engage and disclose their process-based carbon performance activities as credible means to manage stakeholders' concerns about greenhouse gas emissions–related problems (Ashforth and Gibbs 1990). Enhanced greenhouse gas disclosures, for example, can help firms to strengthen their corporate legitimacy and reputation with beneficial impact on market value. In this setting, we argue that firms can take cost-effective steps to mitigate climate change by deploying a low-carbon economy approaches (PGHGI) such as the establishment of board sustainability committee and setting of carbon metric in managerial performance (sustainability-based compensation), which can lead to low greenhouse gas emissions (GHGE).

Second, resource-based view states that the competitive edge and long-term performance of firms are driven by unique, valuable resources and capabilities that are difficult to replicate (Barney 1991). The theory posits that firms can improve their contributions to a low-carbon economy and maintain their competitive advantage by implementing proactive sustainable development plans that necessitate specialised resources and competences (Hart 1995). One of these solutions might be to undertake process-based carbon performance initiatives, which can increase outcome-based carbon performance, reduce operational and legal expenses, limit firm risks, build stakeholder connections and offer long-term sustainable benefits such as increased market value (Hart and Dowell 2011; Olekanma et al. 2024). In support of the above discussion, process-based greenhouse gas emission activities (such as PGHGI) have the ability to combine resources for sustainable development, cut greenhouse gas emissions and waste (lowering GHGE) and improve internal climate resilience (Weber and Neuhoff 2010).

However, resource-based view argues that company's strategic management of resources (including skills) tend to have both benefits and costs. The benefit viewpoint emphasises the good result from a firm's unique and valuable resources and abilities being appropriately managed and used (Haque and Ntim 2020). In this setting, firms with access to high-value assets are more likely to engage in process-based carbon performance aimed at improving economic efficiency as credible means to obtain a long-term competitive edge that market players can value (Hart 1995; Haque and Ntim 2020). Alternatively, the cost viewpoint stresses the potential challenges and downsides of process-based carbon performance such as resource acquisition, development and management (Orazalin et al. 2024). In this case, engaging in process-based carbon performance incurs considerable expenditures for any firm, and economic efficiency can be attained steadily over a period of time, as improvement in low outcome–based carbon performance demands large economic resources to design and implement (He et al. 2021; Olekanma et al. 2024).

Third, based on stakeholder theory perspective (Freeman 1984), a firm's involvement in environmental projects improves relationships with the stakeholders of the firm. Within this framework, companies with an enhanced corporate sustainability strategy such as the establishment of a board sustainability committee and sustainability-linked pay incentives may build strong stakeholder relationships by implementing environmentally friendly practices (Michelon and Parbonetti 2012). Prior research suggests that a strong commitment to greenhouse gas emission reduction can benefit stakeholders like employees and consumers (Olekanma et al. 2024). For instance, studies suggest that corporate executives favour firms with a strong commitment to climate change initiatives (Berrone and Gomez-Mejia 2009; Backhaus et al. 2002). It is worth noting that, other researchers observe that consumers respond positively to a business's strong engagement in sustainability by actively searching out environmentally friendly products/services and willing to offer greater prices for them (Du et al. 2007; Berrone and Gomez-Mejia 2009). In this case, stakeholder theory encourages the development of corporate sustainability strategies such as board sustainability committees, and the implementation of sustainability-based compensation in order to enhance corporate image and strengthen stakeholder relationships.

The multitheoretical foundation of neoinstitutional, resource-based view and stakeholder perspectives suggests that firms can respond to various stakeholder requirements and a low-carbon economy legislation by implementing corporate sustainability measures such as establishing board sustainability committees and the linking of pay with carbon performance. Adoption of these measures may significantly reduce greenhouse gas emissions through increased operational efficiency (low emissions) and lower operational expenditures (Orazalin et al. 2024) and improve the firm's image and market value (Burke et al. 2019; Haque and Ntim 2020; Walls et al. 2012).

4 | Literature Review and Hypothesis Development

4.1 | Executive Compensation, Greenhouse Gas Initiatives and Greenhouse Gas Emissions

Based on the advantage attribute of resource-based view, corporate executives play a pivotal function in making choices and implementing significant decisions that can affect both process-based carbon performance (PGHGI) and outcome-based carbon performance (GHGE) (Morrison et al. 2024; Saa et al. 2025). Within this setting, it can be asserted that corporate executives can increase firms' engagement in low-carbon activities that can have beneficial impact on carbon performance (Olekanma et al. 2024; Morrison et al. 2024). The above suggestion assumes that an appropriate executive compensation strategy can shift corporate executives' attention towards process-based carbon performance (PGHGI) and help contribute to reduction in outcome-based carbon performance (GHGE) (Olekanma et al. 2024; Haque and Ntim 2020).

While a firm's PGHGI and GHGE abatement programmes may provide long-term value creation, such investments are generally regarded as expensive (Morrison et al. 2024). This is due to the suggestion that these projects might demand a large outflow of funds while yielding uncertain financial advantages in the meantime (Saa et al. 2025). Furthermore, scholars suggest that PGHGI-related activities, especially GHGE abatement projects/initiatives, are labour intensive and require highly skilled workers to plan and execute (Olekanma et al. 2024; Haque and Ntim 2020). Some of these investments include developing renewable energy, providing green products/services and reducing risks associated with global warming disasters (Olekanma et al. 2024). The result is that firms might need to use suitable remuneration packages to attract and/or encourage these skilled people with greater levels of competence and an innovative perspective (Saa et al. 2025; Morrison et al. 2024). Arguably, undertaking these expensive investments will require the cooperation of top managers (Olekanma et al. 2024; Orazalin et al. 2024). As a result, efficiency perspective of neoinstitutional theory and resource-based view proposes that firms should design executive compensation so that it encourages executives to make greater commitment to a low-carbon business transition initiative, particularly GHGE reduction investments (Morrison et al. 2025).

Aside from increasing corporate legitimacy (social legitimacy view of neoinstitutional theory), investing in PGHGI and GHGE reduction projects has the potential to provide firms with economic benefits (efficiency) in key issues such as operational efficiency (Orazalin et al. 2024). Other researchers argue that firms with highly rewarded corporate executives will likely face increased societal and media attention (Morrison et al. 2024).

This suggestion is based on the notion that companies who offer appealing remuneration packages might face public scrutiny (stakeholder theory) (Haque and Ntim 2020) to continue to actively participate in addressing GHGE problems in order to avoid unfavourable media attention, which can promote organisational legitimacy (neoinstitutional theory) (Olekanma et al. 2024; Grey et al. 2024).

Empirical studies reinforce the significance of executive compensation in enhancing corporate carbon performance, with few studies establishing a beneficial association between remuneration schemes and carbon performance (e.g., Saa et al. 2025; Haque 2017). For instance, Haque and Ntim (2020) report that executive compensation is positively related with greenhouse gas performance of firms in 13 industrialised European countries, adding to the increasing build of literature that illustrates the effectiveness of executive compensation in eco-friendly stewardship. In accordance with neoinstitutional, resource-based view and stakeholder theoretical perspectives, and the above discussion, the study proposes the first hypothesis as follows:

H1a. *Executive compensation is positively associated with PGHGI and GHGE (GHGE) reduction.*

Moving on, advocates of sustainability-based compensation policy strongly argue that it is the process instead of the quantum of compensation that is most practical in aligning firm leaders' interests with those of shareholders (Jensen and Murphy 1990; Acharya et al. 2011). In that instance, implementing sustainability-based compensation policy might be critical in encouraging top senior managers to undertake PGHGI and GHGE reduction investments, hence increasing corporate legitimacy (social legitimacy view of neoinstitutional theory) (Haque and Ntim 2020). To ensure long-term economic performance and continued existence, companies are increasingly leveraging sustainability-based compensation to motivate top senior managers to invest in PGHGI and GHGE reduction (Morrison et al. 2024; Haque and Ntim 2020). To illustrate, Newsweek's Green Rankings 2015 reveals that over 50% of US enterprises and over 70% of international companies incorporate some sustainability-related criteria into their executive compensation packages. As a result, when sustainability-based compensation policy is in place, the board might be better able to assess a company's PGHGI and GHGE risks (Haque and Ntim 2020). Importantly, this will allow the board compensation committee to create a comprehensive executive compensation structure, potentially improving firms' PGHGI and GHGE reduction.

Empirical research on the moderating effect of sustainability-based compensation on the executive compensation–PGHGI and executive compensation–GHGE nexus is scarce (Saa et al. 2025). In a similar analysis, Haque and Ntim (2020) detect that ESG-linked remuneration scheme has a beneficial moderating impact on the link between executive compensation and process-based carbon performance in countries in Europe. Noticeably, these investigations do not explore whether sustainability-based compensation moderates the executive compensation and PGHGI associations. We thus propose the hypothesis below:

H1b. *Sustainability-based compensation has a positive moderating effect on the association between executive compensation and PGHGI, and executive compensation and GHGE reduction.*

4.2 | Board Sustainability Committee Initiatives, Greenhouse Gas Initiatives and Greenhouse Emissions

Scholars argue that the design of PGHGI and GHGE reduction investments begins with embracing sustainability features (Olekanma et al. 2024). Arguably, enhanced accountability and monitoring such as the establishment of a board sustainability committee can motive an increase in PGHGI and GHGE reduction (Orazalin et al. 2024; Morrison et al. 2025). In support, stakeholder theory posits that the establishment of sustainability committees can enhance a firms' relationship with its stakeholders (Orazalin 2020). For instance, stakeholders demand for increased openness on a low-carbon business environment concerns are propelling board sustainability committee to the forefront of the international programme (Orazalin et al. 2024). According to the stakeholder viewpoint, the institution of sustainability committees reflects a company's commitment to PGHGI and GHGE reduction actions as well as the establishment of stronger stakeholder partnerships (Morrison et al. 2025). For example, the board sustainability committee may assist the firm in developing PGHGI plans to improve the company's performance in GHGE abatement (Orazalin 2020), as well as the management of GHGE risks and climate-related challenges (Burke et al. 2019).

Board sustainability committee has been linked to increased carbon performance/disclosures, including attempts to reduce greenhouse gas emissions (Orazalin et al. 2024; Morrison et al. 2025). According to Luo and Tang (2021), the board sustainability committee focuses on the benefits of ecologically accountable efforts and encourages firms to participate in PGHGI and GHGE abatement activities in response to stakeholder demand (stakeholder theory). In this case, stakeholder theory maintains that firms with a board sustainability committee tend to undertake PGHGI to meet stakeholder pressure and support GHGE reduction investments (Orazalin et al. 2024). In support, recent researchers have identified the formation of a sustainability committees as crucial board governance instrument, particularly regarding GHGE activities (Orazalin 2020; Orazalin et al. 2024).

Similarly, the social legitimacy view of neoinstitutional theory posits that a firm can gain societal legitimacy by voluntarily adopting proven institutional guidelines, values and regulations (Scott 2001; DiMaggio and Powell 1983). In this situation, conforming to the global demand for firms to establish sustainability committees may increase legitimacy (neoinstitutional theory) by strengthening the firms' reputation (Morrison et al. 2024). Prior empirical research has largely suggested that board sustainability committees can impact on green performance of firms (e.g., Morrison et al. 2025; Orazalin et al. 2024). For instance, based on European firms, Morrison et al. (2025) reveal that the board sustainability committees are associated with increased carbon performance.

Given the critical role of a sustainability committee in advancing environmental activities (Orazalin et al. 2024; Morrison et al. 2025), encouraging low-carbon business environment initiatives and addressing climate change risks, we expect that board sustainability committee initiatives are likely to influence PGHGI and GHGE. Accordingly, the study proposes the hypothesis below:

H2a. *Firms with high board sustainability committee initiative (BSCI) are more likely to have higher PGHGI and GHGE reduction.*

H2b. *Board sustainability committee initiative (BSCI) moderates the relationship between sustainability-based compensation and PGHGI, and the link between sustainability-based compensation and GHGE reduction.*

4.3 | Greenhouse Gas Initiatives, Greenhouse Gas Emission and Market Value

According to stakeholder theory, firms' market value is largely shaped by its long-term connections with stakeholders (Orazalin et al. 2024; Olekanma et al. 2024). In this context, maintaining relationships with important stakeholders may safeguard banks' access to crucial resources (stakeholder theory), such as deposits (Morrison et al. 2025). In addition, conforming to climate change regulations, including 'Kyoto' Protocol, Paris Agreement and the SDGs, might boost not only business legitimacy by enhancing firm reputation but also economic efficiency such as gaining access to critical assets/resources (Orazalin et al. 2024). Arguably, this approach might reduce the operational expenses of the company by boosting corporate efficiency and having a beneficial effect on market value (Campbell et al. 2007). Within this paradigm, firms may use PGHGI and GHGE investments as credible pathways to building and sustaining trust and goodwill with their stakeholders (Morrison et al. 2024; Haque and Ntim 2020). Firms with increased engagement in PGHGI and GHGE reduction, for example, may develop considerable goodwill, which might safeguard them from unforeseen challenges and open up new business opportunities with a beneficial impact on market value (Olekanma et al. 2024).

Noticeably, PGHGI and GHGE reduction can be considered as critical initiatives that direct the flow of key resources to the firm. In this context, firms that invest in PGHGI and GHGE such as recycling and reusing materials may attract and earn business from low-carbon-friendly investors (Morrison et al. 2024; Saa et al. 2025). For example, Morrison et al. (2024) stress the need for firms to consider PGHGI and GHGE reduction projects as intangible resources that might aid in more efficient resource utilisation, hence improving the market value of the firms. At the same time, social legitimacy perspective of neoinstitutional theory suggests that engaging in PGHGI and GHGE reduction might assist in enhancing the status of the firm, which will increase legitimacy (Haque and Ntim 2020). In this case, firms might potentially increase market value by gaining the support of numerous significant stakeholders, resulting in economic efficiency (neoinstitutional theory) through the acquisition of vital assets/resources (Olekanma et al. 2024).

In support, Liu et al. (2017) contend that firms that fail to meet greenhouse gas emission objectives must pay fines or acquire emission allowances on the market for carbon trading. In this context, in order to attain set emission levels and escape penalties, it has been suggested that companies should capitalise on carbon performance–related projects by using low-emission equipment, as well as invest in green technologies (Liu et al. 2017). As a result, improved PGHGI and GHGE reduction decreases financial burdens and may even produce revenues for firms that do well and improve their image (Brammer and Pavelin 2005).

Other scholars, on the flip side, contend that the utilisation of a firm's assets to undertake initiatives that generate stockholder worth is the only way for it to have long-term worth (Saa et al. 2025). This is predicated on the assumption that (Friedman 1970) the fundamental commercial purpose is to maximise shareholder wealth and that environmental investments including PGHGI and GHGE reduction can potentially harm this intention. Because of this, challengers of climate change investments contend that implementing energy efficient and a low-carbon–related initiatives can increase operational costs and put firms at a competitive disadvantage (Friedman 1970; Preston and O'bannon 1997; Barnett and Salomon 2006; Aupperle et al. 1985).

The empirical evidence on the connection between carbon performance and market value is mixed (Zhou et al. 2022; Matsumura et al. 2014; Liu et al. 2017; Busch and Hoffmann 2011). For example, Liu et al. (2017) find that carbon performance has a detrimental effect on market value in companies in the United Kingdom. By contrast, Haque and Ntim (2020) observe that carbon performance has no impact on the market value of companies in Europe, whereas Busch and Hoffmann (2011) document that carbon performance has a beneficial effect on market value.

H3. *PGHGI and GHGE abatement have a positive effect on market value.*

4.4 | Greenhouse Gas Initiatives, Greenhouse Gas Emissions and Market Value: Moderating Effect of Sustainability-Based Compensation

Prior research indicates that incentive-based strategies can improve long-term business practices (Tauringana and Chithambo 2015; Okafor and Ujah 2020). According to efficient perspective of neoinstitutional theory, the market may encourage long-term value creation and advance PGHGI and GHGE reduction by offering greater assessment and increased allocation of resources to companies with higher PGHGI and GHGE reduction, and vice versa (Haque and Ntim 2020). Noticeably, this can boost firms' market value. As a result, it is anticipated that well-meaning companies will utilise remuneration-related approaches such as sustainability-based compensation to urge top senior managers to commit to boosting GHGE reduction (Morrison et al. 2024). Importantly, notable business executives may be unwilling to participate in PGHGI and GHGE reduction activities (Haque 2017). These investments might need a huge cash outlay amidst unclear financial returns, at least in the interim (Haque and Ntim 2020).

In this case, linking corporate executive compensation to carbon emission abatement improvement can be a powerful incentive for top managers to undertake in climate change–related actions, which might enhance market value (Haque and Ntim 2020; Adu et al. 2024). As a result, top managers will be encouraged to actively engage in the planning and execution of these costly investments in order to improve carbon performance (Morrison et al. 2025). Based on neoinstitutional standpoint, this can increase the company's credibility (Mahoney and Thorn 2006) and market value (Haque and Ntim 2020; Campbell et al. 2007). Hence, this study asserts that sustainability-based compensation may encourage corporate executives to assess the company's climate change risks, allowing the companies to develop a comprehensive remuneration plan that will increase PGHGI and GHGE reduction (Saa et al. 2025).

Synthesis of literature in the field reveals that studies that investigate the moderating effect of pay incentives on the link between carbon performance and market value are scarce. Related research by Haque and Ntim (2020) demonstrates that executive compensation has no effect on the relationship between carbon performance and market value in nonfinancial Europe. Based on the preceding arguments, which stress the value of sustainability-based compensation in encouraging low-carbon economy initiatives, addressing climate change issues, the study expects that sustainability-based compensation will probably influence the effect of PGHGI and GHGE on market value. Consequently, we propose the set of hypotheses below:

H4a. *The association between PGHGI and market value is moderated by sustainability-based compensation.*

H4b. *The association between GHGE and market value is moderated by sustainability-based compensation.*

4.5 | Greenhouse Gas Initiatives, Greenhouse Gas Emissions and Market Value: Moderating Effect of Board Sustainability Committee Initiatives

Recent study has not fully addressed the significance of a board sustainability committee in relation to PGHGI and GHGE, despite its importance in corporate governance arrangements (Orazalin et al. 2024; Adu et al. 2024). Sustainability committees are established to advance sustainable business practices (García-Sánchez et al. 2019), to improve the monitoring role of the board (Dixon-Fowler et al. 2017) and to satisfy stakeholder demands (Morrison et al. 2024; Burke et al. 2019; Orazalin et al. 2024). In this regard, board sustainability committee is critical in implementing PGHGI and promoting best GHGE investments that can increase stakeholder participation (stakeholder theory), address climate change risks and contribute substantially to transitioning to a low-carbon business environment (Adu et al. 2024; Peters and Romi 2014; Luo and Tang 2021).

For instance, previous research indicates that creating a sustainability committee improves the quality of governance (Adu et al. 2024), promotes climate change approaches (Orazalin et al. 2024) and improves the efficiency of greenhouse gas emission mitigation projects (Mackenzie 2007). Others find that sustainability committees have the tendency to increase corporate accountability and transparency (Michelon and Parbonetti 2012). A board sustainability committee can also help satisfy stakeholders' interests (Al-Shaer and Zaman 2019), improve sustainability performance (Kılıç et al. 2021) and achieve higher market value (Burke et al. 2019). Hence, in the eyes of investors, shareholders and market participants (stakeholder theory), board sustainability committee has evolved into a pivotal pedal for PGHGI and GHGE abatement with the potential to generate sustainable value for owners and stakeholders (Orazalin et al. 2024; Haque and Ntim 2020).

There is, however, limited research on the moderating influence of the board sustainability committee on the link between carbon performance and market value relationship (Orazalin et al. 2024; Morrison et al. 2025). In a similarly connected study, Orazalin et al. (2024) find that board sustainability committees have a beneficial effect on market value but has no effect on carbon performance. Noticeably, this study does not investigate whether board sustainability initiative (BSCI) can moderate the PGHGI/GHGE reduction and market value associations. Based on the importance of BSCI in promoting low-carbon economy initiatives (Adu et al. 2024) and generating stockholder worth (Orazalin et al. 2024; Morrison et al. 2025), the study anticipates that a BSCI is likely to affect the PGHGI–MV and the GHGE–MV associations. The study hence formulates the final set of hypotheses below:

H5a. *Board sustainability committee initiative (BSCI) moderates the association between PGHGI and market value.*

H5b. *Board sustainability committee initiative (BSCI) moderates the relationship between GHGE and market value.*

5 | Methodology

5.1 | Sample and Data

The sample is based on listed non-financial firms in Africa, Latin America and Southeast Asia. Specifically, these countries are Brazil, Chile, Egypt, Indonesia, Kenya, Malaysia, Mexico and Morocco. The rest of the countries include Nigeria, South Africa, Thailand, Philippines and Uganda (refer to Table 1). The selection on the nations was motivated by the availability of data in the LSEG Workspace database. In addition, these emerging countries are concerned about climate change and sustainability as they seek to contribute to a low-carbon economy through decarbonisation. Further and as discussed in Section 2, the choice of these emerging economies was based on comparable governance reforms undertaken in these nations in the last decade. Consistent with previous studies, this study focused on nonfinancial firms with consistent data over at least five consecutive years (Orazalin et al. 2024). The 13 emerging economies have data on PGHGI and GHGE in the LSEG Workspace database. The sample spans the years 2002–2022. The study focused on nonfinancial companies due to their unique regulatory and governance characteristics (Luo and Tang 2021). The required data, which include data on GHGE, PGHGI, executive compensation, board sustainability committee initiative, sustainability-based compensation,

TABLE 1 | Sample distribution by country.

Country	Firms	Observations	Percentage (%)	Cumulative (%)
Brazil	48	1008	17.78	17.78
Chile	18	378	6.67	24.44
Egypt	8	168	2.96	27.41
Indonesia	16	336	5.93	33.33
Kenya	1	21	0.37	33.7
Malaysia	34	714	12.59	46.3
Mexico	17	357	6.3	52.59
Morocco	4	84	1.48	54.07
Nigeria	1	21	0.37	54.44
Philippines	10	210	3.7	58.15
South Africa	90	1890	33.33	91.48
Thailand	22	462	8.15	99.63
Uganda	1	21	0.37	100
Total	270	5670	100	

corporate governance and firm-specific variables, were sourced from the LSEG Workspace database. Worldwide Governance Indicators established by Kaufmann et al. (2011) were then used to acquire data on country governance indicators, while the World Bank database was utilised to obtain GDP growth rates and inflation as the country-specific control variables. The sample consists of 270 firms in 46 discrete industries representing 5670 company-year observations.

Table 1 illustrates the sample distribution by country. Noticeably, South Africa has the highest observations of 1890 representing 33.33% of the sample, followed by Brazil with 1008 observations while SSA countries have the lowest representation with Nigeria, Kenya and Uganda each accounting for 0.37%. The results in Appendix A.1, reveal that carbon emission intensive industries such as food products, and metals and mining, heavily dominate the sample with 8.15% and 7.78%, respectively, while personal care products and others rank last with 0.37%.[1]

5.2 | Empirical Models

The association among pay incentives, board sustainability committee initiative, carbon performance and market value is jointly and dynamically determined (Guest 2009). Various endogenous issues could arise due to possible omitted variables that can simultaneously affect pay incentives, board sustainability committee initiative, carbon performance and market value (Sarhan et al. 2019). Moreover, endogenous issues may arise from firm-specific traits such as leverage, managerial skills and opportunities, which change overtime (Adu et al. 2024; Sarhan et al. 2019). Thus, and given the panel nature of the data and following well-established studies, we estimate a firm fixed–effects regression model in order to account for potentially omitted variables and unobserved firm–specific heterogeneities (Adu et al. 2024; Raharjo et al. 2014; Sarhan et al. 2019). The Hausman test is used to determine which model, the random effects or the fixed-effects model, best explains our data (Raharjo et al. 2014). The Hausman test results indicate that a fixed-effects model is suitable for our unbalanced panel data. First, using fixed-effects panel regression, the model below is employed to examine the relationship among executive compensation, PGHGI, GHGE and the moderating impact of sustainability-based compensation on the executive compensation–PGHGI and executive compensation–GHGE associations:

$$GHGP_{it} = \alpha_0 + \beta_1 * EC_{it} + \beta_2 * SBC_{it} + \beta_3 * \left(EC_{it} * SBC_{it}\right) + \beta_4 * BMEET_{it} + \beta_5 * BSIZE_{it} + \beta_6 * BIND_{it} + \beta_7 * BGEN_{it} + \beta_8 * CEOCD_{it} + \beta_9 * FSIZE_{it} + \beta_{10} * PROF_{it} + \beta_{11} * LEVE_{it} + \beta_{12} * SLACK_{it} + \beta_{13} * CAPIN_{it} + \beta_{14} * GDP_{kt} + \beta_{15} * INF_{kt} + \beta_{16} * WGI_{kt} + \varepsilon_t \quad (1)$$

where greenhouse gas emission performance ($GHGP_{it}$) represents either PGHGI or GHGE of firm, EC denotes executive compensation, i at period t. EC*SBC represents the interaction between executive compensation (EC) and sustainability-based compensation (SBC). The definitions for all remaining variables are provided in Table 2.

The second model below is employed to examine the relationship among EC, PGHGI, GHGE and the moderating influence of SBC on the EC–PGHGI and EC–GHGE associations:

$$GHGP_{it} = \alpha_0 + \beta_1 * EC_{it} + \beta_2 * BSCI_{it} + \beta_3 * \left(EC_{it} * BSCI_{it}\right) + \beta_4 * BMEET_{it} + \beta_5 * BSIZE_{it} + \beta_6 * BIND_{it} + \beta_7 * BGEND_{it} + \beta_8 * CEOCD_{it} + \beta_9 * FSIZE_{it} + \beta_{10} * PROFT_{it} + \beta_{11} * LEVE_{it} + \beta_{12} * SLACK_{it} + \beta_{13} * CAPIN_{it} + \beta_{14} * GDP_{kt} + \beta_{15} * INF_{kt} + \beta_{16} * WGI_{kt} + \varepsilon_t \quad (2)$$

TABLE 2 | Descriptions of variables.

Variable	Symbols	Description	Source
Greenhouse gas emissions	GHGE	The natural logarithm of total GHG emissions, encompassing both Scope 1 (direct emissions from sources that are owned or controlled by the company) and Scope 2 consists of indirect emissions stemming from the use of purchased electricity, cooling, heat, steam and similar sources in tonnes. Higher positive GHG emissions values signify elevated levels of greenhouse gas emissions, indicating weaker GHG performance and vice versa.	LSEG Workspace
Process-based GHG initiatives	PGHGI	The index represents a sector-adjusted weighted average, derived from 40 specific firm-level elements pertinent to GHG initiatives and practices (refer to Appendix A.2). Its scale extends from 0 (indicating an absence of PGHGI) to 40 (signifying fully implemented PGHGI).	LSEG Workspace
Executive compensation	EC	The natural logarithm of the aggregate fixed and variable compensation disbursed to all senior executives, reported in USD. The fixed component encompasses the base salary and additional non-monetary benefits, including housing, healthcare and transportation. The variable component encompasses bonuses and other long-term incentive schemes, such as equity ownership and extended share options.	LSEG Workspace
Sustainability-based compensation	SBC	A dummy variable that equals 1 if the firm has sustainability-based incentives, and 0 if otherwise.	LSEG Workspace
Board sustainability committee index	BSCI	The index represents a sector-adjusted weighted average index derived from seven firm–specific items (refer to Appendix A.3) related to sustainable reporting initiatives by the board sustainability committee. It ranges between 0 (no board sustainability committee initiatives) and 7 (fully instituted board sustainability committee initiatives).	LSEG
Market value	MV	Derived as total assets minus book value of equity plus market value of equity divided by total assets	LSEG Workspace
Control variables			
Number of board meetings	NBMEET	The natural logarithm of the number of board meetings during the year	LSEG Workspace
Board size	BSIZE	The natural logarithm of the total number of board directors at the end of the fiscal year	LSEG Workspace
Board independence	BIND	The proportion of board members who are independent	LSEG Workspace
Board gender diversity	BGEND	The proportion of female board members	LSEG Workspace

(Continues)

TABLE 2 | (Continued)

Variable	Symbols	Description	Source
CEO Chairman duality	CEOCD	A binary variable is applied, where it is assigned a value of 1 when the CEO and the board chair are distinct individuals, and 0 in cases where they are the same person.	LSEG Workspace
Company-level control variables			
Firm size	FSIZE	The natural logarithm of total assets	LSEG Workspace
Profitability	PROFT	The ratio of net income to total asset value	LSEG Workspace
Leverage	LEVE	The ratio of total debt divided to the aggregate value of total assets	LSEG Workspace
Slack	SLACK	The ratio of cash and cash equivalents divided to the aggregate value of total assets	LSEG Workspace
Capital intensity	CAPIN	The ratio of property, plant and equipment to the aggregate value of total assets	LSEG Workspace
Country-level variables			
GDP growth	GDP	The total production value, encompassing the gross value added by local producers, inclusive of product taxes, while deducting subsidies not included in the product values	World Bank
Inflation rates	INF	The yearly percentage change in the prices of goods and services, which can either remain constant or fluctuate within the year	World Bank
World governance index	WGI	A composite index constructed to represent country governance quality. Computed based on CG factors including regulatory quality, rule of law, government effectiveness and political stability. This metric ranges between 0 (poor governance quality) and 1 (highest possible level of governance excellence).	Worldwide Governance Indicators

where EC*BSCI represents the interaction between EC and BSCI. All other variables stay unchanged as stated in Equation (1).

The third model below is employed to investigate the association among PGHGI, GHGE, MV and the moderating impact of SBC on the PGHGI–MV and GHGE–MV associations:

$$MV_{it} = \alpha_0 + \beta_1 * GHGP_{it} + \beta_2 * SBC_{it} + \beta_3 * \left(GHGP_{it} * SBC_{it}\right) + \beta_4 * BMEET_{it} + \beta_5 * BSIZE_{it} + \beta_6 * BIND_{it} + \beta_7 * BGEND_{it} + \beta_8 * CEOCD_{it} + \beta_9 * FSIZE_{it} + \beta_{10} * PROFT_{it} + \beta_{11} * LEVE_{it} + \beta_{12} * SLACK_{it} + \beta_{13} * CAPIN_{it} + \beta_{14} * GDP_{kt} + \beta_{15} * INF_{kt} + \beta_{16} * WGI_{kt} + \varepsilon_t \quad (3)$$

where market value (MV_{it}) represents Tobin's Q of firm i at period t. GHGP*SBC represents the interaction between GHGP and SBC. All other variables stay unchanged as stated in Equation (1).

The last model below is employed to investigate the association among PGHGI, GHGE, MV and the moderating impact of BSCI on the PGHGI–MV and GHGE–MV associations:

$$MV_{it} = \alpha_0 + \beta_1 * GHGP_{it} + \beta_2 * BSCI_{it} + \beta_3 * \left(GHGP_{it} * BSCI_{it}\right) + \beta_4 * BMEET_{it} + \beta_5 * BSIZE_{it} + \beta_6 * BIND_{it} + \beta_7 * BGEND_{it} + \beta_8 * CEOCD_{it} + \beta_9 * FSIZE_{it} + \beta_{10} * PROFT_{it} + \beta_{11} * LEVE_{it} + \beta_{12} * SLACK_{it} + \beta_{13} * CAPIN_{it} + \beta_{14} * GDP_{kt} + \beta_{15} * INF_{kt} + \beta_{16} * WGI_{kt} + \varepsilon_t \quad (4)$$

where GHGP*BSCI represents the interaction between GHGP and BSCI. All other variables stay unchanged as stated in Equation (1).

5.3 | Main Variables

Market value is assessed using Tobin's Q as market-based performance measure. Tobin's Q is considered a market performance/long-term performance (e.g., Grey et al. 2024; Haque and Ntim 2020). Based on previous studies (e.g., Haque and Ntim 2020; Orazalin et al. 2024), the process-based GHG initiatives index is developed to measure the PGHGI[2] PGHGI is an index adjusted for sector specifics and weighted based on 40 unique process-based GHG initiatives at the firm level, where higher PGHGI values indicate increased advocacy for process-based GHG–related issues. The list of 40 provisions for the index is contained in Appendix A.2. Consistent with similar studies (Moussa et al. 2020; Orazalin et al. 2024), this study utilises the natural logarithm of the GHGE, encompassing both Scope 1 and Scope 2 emissions in tonnes as a measure for carbon emission.[3] For EC, consistent with similar studies (Haque and Ntim 2020), this study employs the natural logarithm of the whole fixed and variable remuneration in USD, paid to all corporate executives, as disclosed by the firms as a measure of EC and SBC is a binary variable set to 1 if the firm incorporates sustainability-based compensation, and 0 otherwise. Additionally, the BSCI also represents seven broad firm–specific board sustainability committee initiatives as captured in Appendix A.3.

5.4 | Control Variables

A variety of control variables are used in this investigation to consider the possible influence of distinct country- and firm-specific characteristics. Following related studies, this study utilises a range of corporate governance characteristics including board independence, board size and the duality of CEO–Chairman roles (Orazalin et al. 2024; Grey et al. 2024). Furthermore, consistent with previous studies, the study employs various control variables at the firm level, including factors like company size, leverage, profitability and capital intensity (Siddique et al. 2021; Berrone and Gomez-Mejia 2009). Finally, the study employs country-level governance and macroeconomic indicators such as inflation and GDP growth rates, as in previous studies (Marin and Vona 2021; Haque and Ntim 2020).

6 | Empirical Results

6.1 | Descriptive Statistics

Table 3 shows the descriptive statistics of the variables. Values of the PGHGI extend from a minimum of 0 to a maximum of 35, with a mean value of 7.95. The GHGE varies from 1.63 to 24.42, with a mean value of 14.93 and a standard deviation of 1.75. In addition, the result in Table 3 also reveals that approximately 18% of companies have linked a proportion of their corporate executives' remuneration to achieving sustainability objectives. This evidence is consistent with prior studies conducted by Haque and Ntim (2020) in European firms and Orazalin et al. (2024) in an international sample.

Additionally, consistent with similar studies (e.g., Orazalin et al. 2024; Grey et al. 2024), the pairwise correlation coefficients displayed in Table 4 indicate that BSCI, EC and SBC are positively correlated with PGHGI and GHGE. The correlation coefficients across independent variables do not surpass 0.80; the upper limit of allowable correlation might indicate the integrity

TABLE 3 | Summary statistics.

Variable	Observations	Mean	Standard dev.	Minimum	Maximum
GHGE (ln)	2441	14.927	1.746	1.634	24.415
PGHGI	5670	7.950	8.824	0.000	35.000
EC (In)	2189	14.927	1.746	1.634	24.415
SBC	3098	0.196	0.397	0.00	1.00
BSCI	5670	2.600	2.796	0.000	8.000
MV	4171	2.071	0.695	1.210	8.460
ROA	3314	0.063	0.076	0.420	1.000
BMEET (ln)	2120	1.974	0.517	0.693	3.932
BSIZE (ln)	3314	2.340	0.336	0.000	3.497
BIND (%)	2120	46.275	20.157	0.000	100.000
BGEN (%)	3094	14.942	12.715	0.000	75.000
CEOCD	3098	0.188	0.390	0.000	1.000
FSIZE (ln)	3987	21.977	1.370	6.059	26.513
SLACK (ratio)	3612	0.059	0.077	−0.692	0.768
LEVE (%)	3987	0.075	0.170	0.000	4.110
PROFT (%)	3987	23.32	13.29	−0.040	824.3
CAPIN (ratio)	5144	5.942	45.903	−18.253	15.843
GDP (%)	5505	3.374	4.098	−9.518	34.000
INF (%)	5505	10.492	13.007	−1.139	48.000
WGI (%)	5670	0.343	0.281	−1.231	0.740

TABLE 4 | Pairwise correlation.

Variables	GHGE	PGHGI	BSCI	MV	SBC	EC	NBMEET	BSIZE	BIND	BGEND	CEOCD	FSIZE	SLACK	LEVE	PROFT	CAPIN	GDP	INF	WGI
GHGE	1.000																		
PGHGI	0.390**	1.000																	
EC	0.123**	0.114**	1.000																
SBC	0.005	0.124**	0.088*	1.000															
BSCI	0.199**	0.599**	0.117**	0.149**	1.000														
MV	0.085**	−0.055**	−0.055**	−0.174**	−0.085**	1.000													
NBMEET	0.197**	0.184**	−0.005	−0.034	0.196**	0.253**	1.000												
BSIZE	0.193**	0.184**	0.091**	0.092**	0.149**	−0.049**	0.068**	1.000											
BIND	−0.048**	−0.004	0.009	0.212**	0.085**	−0.186**	−0.225**	−0.011	1.000										
BGEND	−0.125**	0.071**	−0.042	0.302**	0.156**	−0.270**	−0.155**	0.119**	0.348**	1.000									
CEOCD	−0.033	0.012	0.092**	−0.048**	−0.062**	0.080**	0.011	0.013	−0.027	−0.144**	1.000								
FSIZE	0.557**	0.429**	0.167**	−0.086**	0.366**	0.133**	0.327**	0.297**	−0.189**	−0.206**	0.103**	1.000							
PROFT	−0.006	0.016	0.003	−0.009	0.016	−0.030	0.015	0.004	0.043*	0.009	−0.011	−0.016	1.000						
LEVE	0.011	0.341**	−0.082**	0.005	0.300**	0.008	−0.017	0.046**	0.085**	0.112**	0.035	0.147**	−0.008	1.000					
SLACK	−0.149**	0.003	0.035	−0.003	0.005	−0.196**	−0.189**	−0.121**	0.031	0.069**	−0.055**	−0.178**	0.003	−0.121*	1.000				
CAPIN	−0.035	−0.028*	0.009	0.019	−0.014	−0.042**	−0.063**	−0.007	0.037**	0.079**	−0.045**	−0.064**	0.000	0.009	−0.007	1.000			
GDP	0.031	−0.118**	0.016	−0.085**	−0.121**	0.123**	0.081**	−0.098**	−0.073**	−0.082**	0.020	−0.022	0.004	−0.090*	0.096*	−0.033*	1.000		
INF	0.009	−0.282**	0.037	−0.025	−0.310**	0.153**	−0.019	−0.044**	−0.002	0.004	0.072**	−0.208**	−0.009	−0.116*	−0.028	−0.035*	0.362*	1.000	
WGI	0.136*	−0.032**	−0.010	−0.275**	−0.029**	0.479**	0.311**	−0.097**	−0.330**	−0.420**	0.076**	0.134**	−0.036*	−0.209*	−0.065*	−0.091*	0.137*	0.148*	1

***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

of the multicollinearity problems (Shrestha 2020). Further, the VIF[4] of 1.86 and 1.71 for PGHGI and BSCI, respectively, are well below the threshold of 10.

6.2 | Multivariate Results and Discussion

6.2.1 | Pay Incentives and Process-Based and Outcome-Based Carbon Performance

In analysing the fixed regression results of the various relationships, the country, industry and year effects are controlled to ensure that the observed associations are not confounded by these external, time-invariant factors. First, Table 5 displays the findings of the fixed-effects regression of EC, SBC and BSCI against PGHGI with each column representing different models. Column (1) shows that EC has no significant impact on PGHGI, indicating that H1a is rejected. This suggests that EC on its own may not have any substantial influence on the firm's process-based carbon activities. The real-world corporate governance mechanism implication of this evidence is that the design of executive compensation in these emerging economies is not aligned to encourage corporate executives to engage in process-based carbon performance–related activities. Hence, executive compensation has limited impact in shaping the firms' process-based carbon performance.

TABLE 5 | Impacts of the pay incentives and board sustainability committee initiative on process-based greenhouse gas initiatives.

Dependent variable Models	PGHGI (1)	PGHGI (2)	PGHGI (3)	PGHGI (4)	PGHGI (5)
Independent variables					
EC	−0.107 (−1.06)			−0.158 (−1.51)	0.034 (0.14)
SBC		1.810*** (4.60)		1.812 (0.44)	
BSCI			1.622*** (20.34)		1.927*** (3.07)
EC*SBC				0.259 (0.96)	
SBC*BSCI					−0.026 (−0.63)
BMEET	0.292 (0.54)	0.457 (1.03)	−0.019 (−0.05)	0.067 (0.12)	−0.309 (−0.66)
BSIZE	1.718* (1.72)	0.554 (0.61)	−0.088 (−0.11)	1.592 (1.62)	0.05 (0.06)
BIND	0.038** (2.15)	0.036** (2.42)	0.024* (1.86)	0.037** (2.12)	0.034** (2.18)
BGEND	0.116*** (6.19)	0.121*** (7.4)	0.071*** (5)	0.114*** (6.18)	0.059*** (3.59)
CEOD	0.88 (1.01)	0.377 (0.54)	0.924 (1.55)	0.873 (1.02)	1.485** (1.97)
FSIZE	5.674*** (12.39)	5.605*** (12.97)	3.881*** (10.2)	5.453*** (12.01)	3.962*** (9.66)
PROFT	−1.60 (−0.51)	−7.737*** (−2.71)	−5.652** (−2.31)	−1.14 (−0.37)	−1.067 (−0.4)
LEVE	3.112*** (3.92)	3.994*** (5.05)	2.736*** (4.04)	3.475*** (4.43)	2.663*** (3.87)
SLACK	0.001 (0.22)	0.001 (0.53)	0.001 (0.22)	0.001 (0.70)	0.001 (0.27)
CAPIN	0.006 (0.59)	0.003 (0.27)	0.009 (1.01)	0.005 (0.5)	0.01 (1.20)
GDP	−0.244*** (−6.50)	−0.145*** (−4.35)	−0.116*** (−4.04)	−0.23*** (−6.21)	−0.169*** (−5.17)
INFL	0.232*** (7.56)	0.138*** (5.19)	0.124*** (5.48)	0.219*** (7.19)	0.172*** (6.41)
WGI	16.453*** (3.28)	15.499*** (3.33)	4.695 (1.18)	19.581*** (3.93)	6.595 (1.50)
Constant	−14.552*** (−12.46)	−12.922*** (−12.88)	−8.212*** (−9.96)	−19.806*** (−12.05)	−8.402*** (−8.98)
Year, industry and country dummies	Fixed	Fixed	Fixed	Fixed	Fixed
No. of observations	982	1287	1287	982	982
R-squared	0.382	0.348	0.520	0.402	0.539

Note: This table reports the regression results of pay incentives and board sustainability committee initiative on greenhouse gas initiatives. All variables are defined and measured in Table 2. *t*-statistics estimated using robust standard errors are reported in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

By contrast, the estimated results in Column (2) report that sustainability-based compensation (SBC) has a positive effect on PGHGI ($p < 0.01$), hence, providing support to H1a. The findings corroborate prior research that reveals that pay incentives can encourage business leaders to engage in certain initiatives to enhance their firms' process-based carbon activities (Morrison et al. 2025; Haque and Ntim 2020). This finding indicates that the setting of process-based carbon–related goals in remuneration of executives can lead to an increase in PGHGI. One possible explanation is that using sustainability targets in top executives' remuneration drives their attention towards making stronger commitments to PGHGI-related investments (Haque and Ntim 2020; Saa et al. 2025). The results show that incentivising executives with sustainability-related compensation effectively promotes process-based carbon performance activities (Delmas et al. 2015). Our results offer empirical support to our multitheoretical framework that incorporates insights from resource-based, stakeholder and neoinstitutional perspectives. Specifically, the results lend support to the theoretical reasoning that appropriate pay incentives are more likely to boost business leaders (resource-based view) to engage in PGHGI to address the demands of stakeholders and promote a low-carbon business environment initiatives (Morrison et al. 2024) to gain legitimacy, create shareholder value and ultimately enable the firms to access critical resources (neo-institutional theory) (Morrison et al. 2025; Orazalin et al. 2024).

By contrast, Column 4 of Table 5 reports the result of the moderating impact of SBC on the EC–PGHGI nexus. The findings reveal that the coefficient for the moderating term (SBC*EC) has a positive but insignificant association with PGHGI, indicating that SBC has no moderating role on the EC-PGHGI link. The

TABLE 6 | Impacts of the pay incentives and board sustainability committee initiative on greenhouse gas emissions.

Dependent variable Models	GHGE (1)	GHGE (2)	GHGE (3)	GHGE (4)	GHGE (5)
Independent variables					
EC	−0.035 (−1.28)			−0.034 (−1.19)	−0.261*** (−2.61)
SBC		−0.088 (−0.03)		−0.048 (−0.04)	
BSCI			0.018 (0.70)		−0.536** (−2.18)
EC*SBC				−0.002 (−0.02)	
SBC*BSCI					0.038** (2.35)
BMEET	−0.155 (−1.09)	−0.189* (−1.76)	−0.20* (−1.86)	−0.146 (−1.02)	−0.174 (−1.23)
BSIZE	0.234 (0.86)	0.129 (0.60)	0.122 (0.57)	0.239 (0.88)	0.188 (0.69)
BIND	0.001 (−0.08)	−0.001 (−0.36)	−0.002 (−0.44)	−0.001 (−0.08)	−0.001 (−0.06)
BGEND	0.001 (−0.07)	−0.003 (−0.82)	−0.003 (−0.88)	−0.001 (−0.06)	−0.001 (−0.30)
CEOD	0.189 (0.91)	0.079 (0.5)	0.091 (0.57)	0.188 (0.91)	0.223 (1.08)
FSIZE	0.901*** (6.91)	0.851*** (7.72)	0.835*** (7.51)	0.903*** (6.87)	0.87*** (6.63)
PROFT	1.722** (2.26)	1.226* (1.92)	1.244* (1.95)	1.697** (2.22)	1.721** (2.27)
LEVE	0.075 (0.40)	0.058 (0.35)	0.07 (0.42)	0.062 (0.33)	0.085 (0.45)
SLACK	−0.001 (−0.16)	−0.001 (−0.19)	−0.001 (−0.09)	−0.001 (−0.23)	−0.001 (−0.14)
CAPIN	0.001 (0.02)	0.001 (0.07)	0.001 (0.04)	0.001 (0.06)	−0.001 (−0.01)
GDP	0.009 (1.02)	0.002 (0.21)	0.002 (0.33)	0.009 (0.97)	0.01 (1.13)
INFL	−0.003 (−0.42)	0.002 (0.31)	0.001 (0.14)	−0.003 (−0.35)	−0.004 (−0.61)
WGI	−0.72 (−0.55)	−1.264 (−1.13)	−1.206 (−1.08)	−0.854 (−0.65)	−1.18 (−0.90)
Constant	−6.637** (−2.31)	−5.196** (−2.14)	−4.939** (−2.02)	−6.667** (−2.29)	−2.443 (−0.74)
Year, industry and country dummies	Fixed	Fixed	Fixed	Fixed	Fixed
No. of observations	789	982	982	789	789
R-squared	0.087	0.079	0.079	0.088	0.097

Note: This table reports the regression results of executive compensation, pay incentives and board sustainability committee initiatives on greenhouse gas emissions. All variables are defined and measured in Table 2. *t*-statistics estimated using robust standard errors are reported in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

findings suggest that H1b is rejected. This evidence corroborates our earlier findings that show that EC has no effect on PGHGI. The real-world corporate governance structure implications of this suggest that in order to improve process-based carbon performance in these emerging economies, there should be more focus on linking substantial portion of the pay of the corporate executives to carbon performance in their firms as highlighted by Saa et al. (2025).

Second, Table 6 reports the fixed-effects regression of EC and SBC against GHGE. The result in Column (1) reveals that EC has a negative but insignificant effect on GHGE, thereby suggesting that H1a is rejected. Similarly, Column (2) shows that SBC has a negative but insignificant impact on GHGE. The evidence does not provide empirical support to H1a. This is in line with the suggestion by Cordeiro and Sarkis (2008) that the executives of corporation might design sustainability compensation contracts, as a figurative instead of a substantial business management strategy to improve legitimacy of the firm. One probable explanation for this is the apparent absence of formal guidelines for the development and implementation of sustainability-based compensation strategies, which would allow for the setting of firm-specific outcome–based carbon performance goals, the tracking of incremental progress towards the goal, and the undervaluation (rewarding) of non-compliance (Haque and Ntim 2020).

Furthermore, the findings in Column (4) of Table 6 report that the moderation variable EC*SBC has a negative but weak moderating impact on GHGE. This finding indicates that H1b is rejected. These results are in line with the suggestion that pay incentives that are not directly linked with actual carbon emission reduction might be ineffective at mitigating climate change–related risks and enhancing sustainability performance of companies (Saa et al. 2025; Morrison et al. 2025). The results seem to suggest that corporate executives might influence the arrangement of pay incentive. In this case, it is possible that pay incentives might not be linked to the actual reduction in GHGE.

6.2.2 | Board Sustainability Committee Index, Greenhouse Gas Initiatives and Greenhouse Gas Emissions

Table 5 reports the regression findings on the association among BSCI, EC, PGHGI and GHGE. The result in Column (3) of Table 5 reveals that BSCI has a positive effect on PGHGI ($p < 0.01$). This evidence provides empirical support to H2a. The result suggests that firms with high score in sustainability committee initiatives tend to design and implement effective PGHGI activities (Morrison et al. 2025; Orazalin 2020), which can help the board to address PGHGI risks/challenges (Orazalin and Mahmood 2021), with beneficial impact of enhancing process-based GHG information quality (Adu et al. 2024; Kılıç et al. 2021). The evidence supports stakeholder and neoinstitutional perspectives that BSCI can play a vital role in implementing PGHGI and promoting best process-based carbon performance activities that may improve stakeholder engagement and generate collective values for owners (Luo and Tang 2021; Peters and Romi 2014). This is consistent with earlier studies that detect that corporate governance attributes such as sustainability committees have beneficial effect on carbon performance (Orazalin et al. 2024; Morrison et al. 2025).

Further, the result in Column (5) of Table 5 suggests that the coefficient for the moderating term (EC*BSCI) is negatively but insignificantly associated with PGHGI, indicating that BSCI has no moderating role on the EC–PGHGI association. This evidence does not provide empirical support to H2b. This evidence is consistent with the symbolic aspect of neoinstitutional theory in that the market-oriented incentive–based structures, such as EC, is likely to have no impact on process-based carbon performance such as PGHGI (Haque and Ntim 2020).

Also, the result in Column (3) of Table 6 reveals that BSCI is positively but insignificantly associated with GHGE, demonstrating that H2a is rejected. Our findings are different from studies that report that board sustainability committees are associated with increased climate change initiatives (e.g., Orazalin et al. 2024; Luo and Tang 2021). More importantly, our evidence from emerging economies is in sharp contrast with the evidence reported in European countries by Morrison et al. (2025) that board sustainability committees are associated reduction in carbon emissions. The real-world corporate governance structure implication of our results is that the existence of board sustainability committee initiative alone may not be adequate in aligning corporate actions with societal environmental standards and leading to substantive reduction in outcome-based carbon performance in our research setting.

Further, Column (5) of Table 6 displays that the coefficient for the moderating variable (EC*BSCI) is positively associated with GHGE ($p < 0.05$), demonstrating that BSCI has a moderating role on the EC–GHGE nexus. The results do not lend support to H2b. Our result implies that the association between EC and GHGE is contingent on the BSCI. The real-world corporate governance structure implication of our evidence is that firms with higher EC*BSCI are associated with higher GHGE. This suggests that in firms where EC is not aligned with sustainability targets, any beneficial impact of a board sustainability committee initiative is limited. This is particularly expected given the weak institutional and regulatory frameworks in the emerging countries where influential corporate executives may generously reward themselves with excessive compensation that is not linked to corporate outcomes at the expense of shareholders and other stakeholders.

6.2.3 | Process-Based and Outcome-Based Carbon Performance and Market Value

Table 7 offers the estimated results on the effect of BSCI, PGHGI and GHGE on market value (MV). The findings in Column (2) of Table 7 show that PGHGI are negatively associated with MV ($p < 0.01$), revealing that companies with greater PGHGI have reduced MV. The results suggest that H3 is not empirically supported. Our findings appear to be consistent with scholars who challenge climate change–related investments by suggesting that implementing energy efficient and low-carbon–related initiatives can increase operational costs and put firms at a competitive disadvantage (Friedman 1970; Preston and O'bannon 1997;

TABLE 7 | Impacts of greenhouse gas initiatives, greenhouse gas emissions, pay incentives and board sustainability committee initiative on market value.

Dependent variable Models	MV (1)	MV (2)	MV (3)	MV (4)	MV (5)	MV (6)	MV (7)	MV (8)
Independent variables								
GHGE	0.019 (1.30)				0.020 (1.33)		−0.004 (−0.14)	
PGHGI		−0.007*** (−3.00)				−0.007*** (−3.11)		0.001 (0.07)
SBC			0.048 (1.64)		0.018 (0.09)	0.127 (1.59)		
BSCI				−0.012* (−1.75)			−0.077 (−1.27)	0.016 (1.27)
GHGE*SBC					0.001 (0.09)			
PGHGI*SBC						−0.004 (−0.88)		
GHGE*BSCI							0.004 (1.01)	
PGHGI*BSCI								0.002** (1.89)
BMEET	−0.079* (−1.80)	−0.057* (−1.73)	−0.064* (−1.94)	−0.056* (−1.70)	−0.082* (−1.87)	−0.062* (−1.88)	−0.074* (−1.69)	−0.055* (−1.66)
BSIZE	0.028 (0.32)	0.021 (0.31)	0.015 (0.23)	0.022 (0.33)	0.028 (0.31)	0.020 (0.29)	0.039 (0.44)	0.02 (0.29)
BIND	0.002 (1.61)	0.001 (1.19)	0.001 (0.91)	0.001 (1.06)	0.002 (1.57)	0.001 (1.12)	0.002* (1.71)	0.001 (1.26)
BGEND	−0.001 (−0.15)	−0.001 (−0.19)	−0.001 (−0.88)	−0.001 (−0.55)	−0.001 (−0.15)	−0.001 (−0.11)	0.001 (0.08)	−0.001 (−0.19)
CEOD	0.101 (1.56)	0.121** (2.33)	0.121** (2.33)	0.114** (2.19)	0.104 (1.6)	0.123** (2.37)	0.094 (1.45)	0.12** (2.30)
FSIZE	0.097** (2.09)	0.113*** (3.28)	0.07** (2.16)	0.089*** (2.67)	0.095** (2.03)	0.112*** (3.25)	0.101** (2.14)	0.113*** (3.27)
PROFT	−1.449*** (−5.56)	−1.254*** (−5.88)	−1.202*** (−5.64)	−1.217*** (−5.71)	−1.445*** (−5.54)	−1.259*** (−5.92)	−1.448*** (−5.56)	−1.275*** (−5.98)
LEVE	−0.013 (−0.20)	0.022 (0.38)	0.005 (0.08)	0.005 (0.08)	−0.007 (−0.10)	0.035 (0.59)	−0.011 (−0.16)	0.023 (0.38)
SLACK	−0.001 (−1.3)	−0.001 (−1.44)	−0.001 (−1.31)	−0.001 (−1.45)	−0.001 (−1.20)	−0.001 (−1.28)	−0.001 (−1.30)	−0.001 (−1.45)
CAPIN	0.003** (2.23)	0.001* (1.88)	0.001* (1.79)	0.001* (1.79)	0.003** (2.16)	0.001* (1.78)	0.003** (2.16)	0.001* (1.87)
GDP	0.001 (0.09)	−0.003 (−1.08)	−0.001 (−0.56)	−0.002 (−0.78)	0.001 (0.15)	−0.002 (−0.99)	−0.001 (−0.18)	−0.003 (−1.14)
INFL	0.004 (1.60)	0.006*** (3.16)	0.005** (2.50)	0.005*** (2.78)	0.004 (1.47)	0.006*** (3.02)	0.004* (1.86)	0.006*** (3.20)
WGI	−1.856*** (−4.12)	−1.433*** (−4.14)	−1.458*** (−4.19)	−1.458*** (−4.20)	−1.792*** (−3.94)	−1.334*** (−3.83)	−1.758*** (−3.87)	−1.363*** (−3.91)
Constant	−1.663* (−1.68)	−1.792** (−2.36)	−0.87 (−1.23)	−1.259* (−1.73)	−1.639* (−1.65)	−1.80** (−2.38)	−1.441 (−1.33)	−1.888** (−2.49)

(Continues)

TABLE 7 | (Continued)

Dependent variable Models	MV (1)	MV (2)	MV (3)	MV (4)	MV (5)	MV (6)	MV (7)	MV (8)
Year, industry and country dummies	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
No. of obs.	982	1287	1287	1287	982	1287	982	1287
R-squared	0.096	0.080	0.075	0.075	0.097	0.085	0.100	0.083

Note: This table reports the regression results of process-based greenhouse gas initiatives, greenhouse gas emissions, pay incentives and board sustainability committee initiatives on MV. All variables are defined and measured in Table 2. *t*-statistics estimated using robust standard errors are reported in parentheses.
***$p<0.01$.
**$p<0.05$.
*$p<0.1$.

Barnett and Salomon 2006; Aupperle et al. 1985), which can reduce the MV of firms. The results corroborate the findings of prior studies that observe that environmental management strategies/performance of firms is associated with reduced financial outcomes (e.g., Barnett and Salomon 2006).

The results in Columns (1) of Table 7 suggest that GHGE has a negative but insignificant impact on MV, suggesting that H3 is rejected. The results are in line with the findings of previous studies that do not find any significant relationship between environmental performance and financial outcomes (e.g., Busch and Hoffmann 2011; Matsumura et al. 2014; Haque and Ntim 2020). For instance, our evidence is consistent with Haque and Ntim (2020) who discover that actual carbon performance has no influence on MV of companies in industrialised European countries. On the flip side, our results are in sharp contrast to the evidence of Busch and Hoffmann (2011) who detect a positive link between carbon performance and MV.

Further, the results in Columns (4) of Table 7 show that BSCI is negatively related to MV ($p<0.10$). This suggests that firms with high BSCI tend to engage in increased GHG investments, which can be costly and hence reduce the MV of the firms. The results differ from emerging literature that finds beneficial relationship between sustainability committees and financial outcomes (e.g., Adu et al. 2024). However, these results lend support to the evidence of Orazalin et al. (2024) who document a negative relationship the existence of board sustainability committees and MV in an international sample. Meanwhile, the study does find insignificant association between SBC and MV in Columns (3) of Table 7.

6.2.4 | Process-Based and Outcome-Based Carbon Performance and Market Value: Moderating Effect of Sustainability-Based Compensation

Table 7 also presents the results of the moderating impact of SBC on PGHGI, GHGE and MV relationships. The results in Columns (6) of Table 7 reveal that the interaction term PGHGI*SBC has no significant impact on MV, suggesting that H4a is not supported empirically. Our evidence is inconsistent with the suggestion that SBC can generate value by ensuring that firms engage in activities that promote PGHGI and contribute to achieving a low-carbon economy (Adu et al. 2024). Similarly, the findings in Columns (5) of Table 7 reveal that the coefficient for the moderating variable (GHGE*SBC) is positive but insignificant, demonstrating that SBC has no moderating role on the GHGE–MV nexus. These results suggest that H4b is rejected. Our findings suggest that the emerging economies' stock markets react indifferently to firms' PGHGI and GHGE, evidence that is different from the findings of European- and US-based investigations (Haque and Ntim 2020; Busch and Hoffmann 2011), that report a negative link between greenhouse emissions and MV.

6.2.5 | Process-Based and Outcome-Based Carbon Performance and Market Value: Moderating Effect of Board Sustainability Committee Initiative

In this study, we have reasoned that due to the vital role of sustainability committees, the BSCI may moderate the relationship between PGHGI and MV. The findings in Column (8) of Table 7 suggest that the moderating variable PGHGI*BSCI is positively associated with MV ($p < 0.10$), implying that H5b is supported. The result is consistent with stakeholder and neoinstitutional theoretical suggestions that BSCI can generate value by ensuring that firms engage in activities that promote process-based carbon performance and contribute to achieving a low-carbon economy (Morrison et al. 2025). This is in line with prior studies (e.g., Orazalin et al. 2024) that identify board sustainability committees as crucial CG mechanisms that can help corporate executives to focus on process-based GHG activities with beneficial effect on MV. On the flip side, our findings in Column (7) of Table 7 report that the coefficient for the interaction term (GHGE*BSCI) is positive but insignificant, demonstrating that BSCI has no moderating role on the GHGE–MV nexus. These results suggest that H5a is rejected. Together, our results imply that the firms may rely on undertaking process-based carbon performance activities through operational and strategic initiatives in the form of management practices and processes, without engaging in substantial commitments to limit their outcome-based carbon emissions (Haque and Ntim 2020).

6.3 | Additional Analyses

According to previous research, sustainable business management systems, governance structures and organisational performance are highly shaped by varying country and sector-level climate policies, institutional arrangements and regulatory contexts (e.g., Andreou and Kellard 2021; Orazalin et al. 2024). Within this context, it is vital to concentrate on differences in period and country settings when exploring the features and motivations of firms' energy transition initiatives and corporate carbon activities (e.g., Liu et al. 2021; Orazalin et al. 2024). Accordingly, the study performs a set of periods- and -country analyses.

First, the study re-estimates the results in Tables 5 and 6 to ascertain the effect of international climate change initiatives/reforms such as the Paris Agreement (2022–2016) and Kyoto Protocol (2015–2005). The results in Panel A of Table 8 show significant associations among SBC, BSCI, EC*BSCI and PGHGI in the Paris Agreement subsamples (Columns 2–5), and significant relations for only BSCI and EC*SBC in the Kyoto Protocol subsample (Columns 8–9). Overall, these results demonstrate the importance of the Paris Agreement in promoting PGHGI in these emerging economies.

Similarly, the results in Panel B of Table 8 show significant relationships among EC*SBC, EC*BSCI and GHGE in the Paris Agreement subsamples (Columns 4–5), and significant relations for only EC*BSCI in the Kyoto Protocol subsample (Column 10). The results emphasise the importance of the Paris Agreement in raising recognition among firms regarding the detrimental impacts of carbon emissions.

Second, we re-estimate the results in Tables 5–7 for countries that have implemented national carbon tax policies. The countries in the emerging economies that have implemented carbon tax policy are Chile, Mexico and South Africa. The countries in the sample that have not implemented carbon tax policy include Brazil, Egypt, Indonesia, Kenya, Malaysia, Morocco, Nigeria, Philippines, Thailand and Uganda. The results (for brevity, not reported but available on request) show no significant differences between the carbon tax policy subsample and no carbon tax policy subsample. Our results suggest that carbon tax policy did not substantially influence the estimated results in these emerging economies.

6.4 | Robustness Tests

A variety of additional analyses are performed in this study to ensure the reliability of the results. First, all the equations are estimated using a dynamic two-step system generalised method of moments (GMM), developed by Arellano and Bond (1991) and Blundell and Bond (1998). In the GMM regression of GHGP, EC is utilised as an endogenous variable; the specification of GHGE also includes EC as an endogenous variable. The results from GMM (in Tables 9 and 10) are comparable to those reported in Tables 5 and 6, demonstrating the robustness of the main results to sample selection bias and endogeneity. Similarly, we carried out additional tests to check the robustness of the results in Table 7. Specifically, we estimated GMM models, which for brevity are not reported, but will be available upon request. The findings of these analyses were consistent with the main results in Table 7.

Second, the analysis adopts two-stage least squares (2SLS) to ensure that the primary results are not influenced by any endogeneity. In line with previous research (Orazalin et al. 2024), the first lag and industry mean values of the key independent variables are utilised as instruments. Although not reported to conserve space, our findings are highly in line with our previous results in Tables 5 to 7. Overall, the results of the robust investigations suggested that the findings were not driven by any probable endogeneity and sample selection bias issues.

7 | Conclusion

The transition to a low-carbon economy is not only an environmental requirement but also a basic economic transformation critical for mitigating climate change and achieving sustainable development globally (Banerjee et al. 2024). In particular, the global community faces challenges in establishing sustainable business practices to enhance energy transition and lower carbon emissions. Various initiatives have been developed and implemented in the recent past by non-governmental bodies, policy organisations and governments with the aim of tackling climate change and contributing towards achieving the sustainable business environment.

These efforts include international agreements such as the Kyoto Protocol, Paris Agreement and the Net Zero Coalition, which aim to reduce carbon emissions while encouraging a low-carbon transition. There is, however, minimal evidence on the potential of corporate governance structures such as board sustainability committee initiatives and sustainability-based compensation in

TABLE 8 | Additional analyses.

Panel A: Impacts of executive compensation, pay incentives and board sustainability committee initiative on greenhouse gas activities

	PARIS (2022–2016)					KYOTO (2015–2005)				
Dependent variable Models	PGHGI (1)	PGHGI (2)	PGHGI (3)	PGHGI (4)	PGHGI (5)	PGHGI (6)	PGHGI (7)	PGHGI (8)	PGHGI (9)	PGHGI (10)
Independent variables										
EC	−0.072 (−0.77)			−0.101 (−1.05)	−0.042 (−0.16)	0.032 (0.18)			−0.210 (−1.04)	−0.054 (−0.16)
SBC		1.405*** (3.82)		1.605 (0.36)			1.518 (2.77)		−9.936 (−1.93)	
BSCI			1.137*** (9.49)		1.395** (2.07)			1.142*** (11.61)		0.739 (0.70)
EC*SBC				−0.235 (−0.08)					0.765** (2.26)	
EC*BSCI					−0.016** (−0.36)					0.021 (0.31)
Controls included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, industry and country dummies	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
No. of obs.	626	754	754	626	626	356	530	532	356	356
R-squared	0.314	0.308	0.389	0.330	0.409	0.227	0.245	0.425	0.259	0.390

Panel B

	PARIS (2022–2016)					KYOTO (2015–2005)				
Dependent variable Models	GHGE (1)	GHGE (2)	GHGE (3)	GHGE (4)	GHGE (5)	GHGE (6)	GHGE (7)	GHGE (8)	GHGE (9)	GHGE (10)
Independent variables										

(Continues)

TABLE 8 | (Continued)

Panel B

	PARIS (2022–2016)					KYOTO (2015–2005)				
EC	−0.025 (−0.72)			−0.026 (−0.73)	−0.060 (−0.48)	−0.024 (−0.34)			−0.023 (−0.33)	−0.591** (−2.27)
SBC		−0.087 (−0.77)		−0.707 (−0.46)			−0.040 (−0.32)		−0.377 (−0.14)	
BSCI			0.050 (1.20)		−0.005 (−0.02)			0.012 (0.34)		−1.547** (−2.23)
EC*SBC				0.042** (0.42)					0.023 (0.13)	
EC*BSCI					0.006** (0.27)					0.104** (2.27)
Controls included	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year, industry and country dummies	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed	Fixed
No. of obs.	578	686	686	578	578	211	295	295	211	211
R-squared	0.039	0.037	0.039	0.040	0.044	0.197	0.118	0.118	0.250	0.231

Note: This table displays the regression results executive compensation, pay incentives and board sustainability committee initiatives on energy transition initiatives for three different regimes: PARIS (2022–2016) and KYOTO (2015–2005). The definitions for all variables are provided in Table 2. The *t*-statistics calculated with robust standard errors are shown in brackets.
***$p<0.01$.
**$p<0.05$.
*$p<0.1$.

TABLE 9 | GMM regression on the impacts of the pay incentives and board sustainability committee initiative on process-based greenhouse gas initiatives.

Dependent variable Models	PGHGI (1)	PGHGI (2)	PGHGI (3)	PGHGI (4)	PGHGI (5)
Independent variables					
EC	−0.012 (−0.09)			−0.157 (−114)	−0.115 (−0.48)
SBC		1.87*** (3.55)		−8.423* (−1.87)	
BSCI			1.728*** (11.32)		1.788** (2.45)
EC*SBI				0.686** (2.30)	
EC*BSCI					0.006 (0.12)
Control variables	Fixed	Fixed	Fixed	Fixed	Fixed
Country effects	Fixed	Fixed	Fixed	Fixed	Fixed
Industry effects	Fixed	Fixed	Fixed	Fixed	Fixed
Year effects	Fixed	Fixed	Fixed	Fixed	Fixed
Observations	982	1287	1287	982	982
Arellano–Bond (AR-1)	0.099	0.668	0.029	0.582	0.017
Arellano–Bond (AR-2)	0.320	0.228	0.129	0.996	0.881
Hansen test (*p*-value)	0.018	0.188	0.648	0.012	0.323

Note: This table reports the GMM regression results of executive compensation, pay incentives and board sustainability committee initiative on greenhouse gas initiatives. All variables are defined and measured in Table 2. *t*-statistics estimated using robust standard errors are reported in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

combating and/or mitigating climate change risks. This study aimed to remedy this void by evaluating the interrelationships among executive compensation, sustainability-based compensation, board sustainability committee initiative, process-based and outcome-based carbon performance, and market value utilising a dataset of 270 firms from 13 emerging countries representing 5670 firm-year observations from 2002 to 2022.

First, the results contribute to an emergent literature (Orazalin et al. 2024) by suggesting that pay incentives and board sustainability committee initiative have a positive impact on process-based carbon performance but no similar effects on outcome-based carbon performance. Second, the study contributes to corporate governance and climate change research (Orazalin et al. 2024; Orazalin 2020) by establishing that process-based carbon performance has detrimental impacts on market value. Distinct from previous studies that assess the direct relationships, this study identifies and test possible moderators of these relationships. The results of the study also show that the predicted associations vary across different operating periods. Overall, our study shows the key role sustainability–based compensation and board sustainability committee initiative can play in driving firm executives to engage in greenhouse gas emission reduction activities if they are appropriately designed.

Our study has substantial implications for business strategy that contributes to sustainable development. Specifically, the findings of this study have significant implications for firm managers, regulators and policymakers. First, the positive association between sustainability-based compensation and process-based carbon performance (but no similar effect with outcome-based carbon performance) calls into question the notion that all forms of sustainability-linked compensation can lead to greater commitment to low corporate greenhouse emissions. Our findings demonstrate that managers and corporate should focus more on outcome-based carbon performance in the design of sustainability-based compensation schemes. To that effect, corporate boards in these emerging countries are encouraged to reform their compensation structures in order to better align them with the SDGs. Second, firms are urged to keep their stakeholders, investors and society informed about the actual reduction in carbon emissions (outcome-based carbon performance). These kinds of programmes and transparency will help the firms to establish credibility and foster trust, which will offer business opportunities for them in various institutional and national contexts.

Third, our results imply that corporate boards and business managers should not overlook the negative consequences that excessive greenhouse gas emissions have on society and the

TABLE 10 | GMM regression on the impacts of the pay incentives and board sustainability committee initiative on greenhouse gas emissions.

Dependent variable Models	GHGE (1)	GHGE (2)	GHGE (3)	GHGE (4)	GHGE (5)
Independent variables					
EC	0.024 (0.80)			0.109 (0.35)	0.068 (0.61)
SBC		0.055 (0.37)		−2.976 (−1.43)	
BSCI			0.068 (1.39)		0.228 (0.82)
EC*SBC				0.194 (1.44)	
EC*BSCI					−0.008 (−0.43)
Control variables	Fixed	Fixed	Fixed	Fixed	Fixed
Country effects	Fixed	Fixed	Fixed	Fixed	Fixed
Industry effects	Fixed	Fixed	Fixed	Fixed	Fixed
Year effects	Fixed	Fixed	Fixed	Fixed	Fixed
Observations	789	982	982	789	789
Arellano–Bond (AR-1)	0.706	0.557	0.473	0.739	0.548
Arellano–Bond (AR-2)	0.358	0.435	0.419	0.368	0.287
Hansen test (p-value)	0.839	0.996	0.992	0.826	0.699

Note: This table reports the GMM regression results of executive compensation, pay incentives and board sustainability committee index on greenhouse gas emissions. All variables are defined and measured in Table 2. t-statistics estimated using robust standard errors are reported in parentheses.
***$p < 0.01$.
**$p < 0.05$.
*$p < 0.1$.

environment, which could adversely affect the market value of the firm. In particular, our evidence lends support to the call by Orazalin et al. (2024) that powerful investors such as institutional investors should raise awareness among all stakeholders about the detrimental impact of greenhouse emissions. Fourth, the government and regulators in these emerging economies need to establish clear guidelines/policies on process-based carbon performance reporting and board sustainability committees. For instance, new regulations may be introduced to encourage firms to establish a board sustainability committee committed to climate change–related activities. Fifth, given the high cost of outcome-based carbon performance investments, voluntary legislative actions are unlikely to be sufficient. In this circumstance, it is necessary to establish mandatory outcome–based carbon performance targets at the global, national and corporate levels.

Finally, the results of this study reveal that researchers investigating the interrelationship among pay incentives, board sustainability committee and carbon performance should not use a sole measure of carbon performance, as such investigation will offer less understating of how pay incentives and board sustainability committee impact on carbon performance. For example, research that are based on the use of process-based indicators of carbon performance alone might not provide adequate insights as to whether such activities lead to a reduction in actual greenhouse gas emissions (Saa et al. 2025; Haque and Ntim 2020).

Our study has some limitations, which provide opportunities for further research. First, due to data restrictions, this study captures the initiatives of board sustainability committees rather than individual committee members' attributes such as gender, educational degree, expertise, age and cultural background. Second, the measures for pay incentives, board sustainability committee and carbon performance might not accurately represent real-world practices. Third, future research could also explore which specific initiatives of board sustainability committee within the board sustainability committee initiatives are most influential in these relationships. Finally, analysis focuses on firms in emerging economies with publicly traded shares across multiple stock markets. Therefore, the findings may not be applicable to small- and medium-sized entities (SMEs). Future research might explore if these associations apply to SMEs and nonpublicly traded enterprises, potentially providing additional insights.

Author Contributions

Emmanuel A. Morrison: writing – review and editing, writing – original draft, methodology, investigation, formal analysis, conceptualization. **Emmanuel Adegbite**: supervision, methodology, writing – review and editing (contributed expertise in accounting and corporate governance and provided critical analysis of data and its linkage with extant literature). **Musa Mangena**: supervision, methodology, writing – review and editing (provided several important insights into data visualisation and enhancing the clarity and novelty of empirical results). **Danson Kimani**: supervision, methodology, writing – review and editing (added substantial theoretical contributions to the study by incorporating neoinstitutional theory, stakeholder theory and resource-based view perspectives). **Douglas A. Adu**: supervision, methodology, writing – review and editing (added substantial literature review content and the conclusions of the study).

Endnotes

[1] Refer to Appendix A.1 on sample distribution by industry.

[2] Process-based GHG initiatives (PGHGI) refer to executive-driven efforts encompassing actions, planning, frameworks, transparency measures and strategic policies aimed at improving greenhouse gas emission.

[3] Scope 1 encompasses emissions directly originating from sources owned or managed by the company, while Scope 2 consists of indirect emissions stemming from the use of purchased electricity, cooling, heat, steam and similar sources. Higher positive total GHG emissions (GHGE) values signify elevated levels of GHG emissions, indicating weaker GHG performance and vice versa.

[4] For each variable, the variation inflation factor (VIF) is estimated. A VIF value larger than 10 suggests the presence of multicollinearity (Vatcheva et al. 2016). The results (unpublished) demonstrate that the largest VIF is 2.32, and the average VIF is 1.41, establishing that multicollinearity is not an issue in this investigation.

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Appendix A

A.1 | Sample Distribution by Industry

Industry	Firms	Observations	Percentage (%)	Cumulative (%)
Aerospace and defense	1	21	0.37	0.37
Automobile components	1	21	0.37	0.74
Automobiles	2	42	0.74	1.48
Beverages	7	147	2.59	4.07
Broadline retail	4	84	1.48	5.56
Chemicals	10	210	3.7	9.26
Construction and engineering	7	147	2.59	11.85
Construction materials	6	126	2.22	14.07
Consumer staples distribution and retail	11	231	4.07	18.15
Containers and packaging	3	63	1.11	19.26
Diversified consumer services	2	42	0.74	20
Diversified REITs	8	168	2.96	22.96
Diversified telecommunication services	6	126	2.22	25.19
Electric utilities	13	273	4.81	30
Electrical equipment	2	42	0.74	30.74
Electronic equipment and instruments	2	42	0.74	31.48
Energy equipment and services	2	42	0.74	32.22
Food products	22	462	8.15	40.37
Gas utilities	2	42	0.74	41.11
Ground transportation	2	42	0.74	41.85
Health care providers and services	4	84	1.48	43.33
Hotels, restaurants and leisure	9	189	3.33	46.67
Household durables	3	63	1.11	47.78
Household products	2	42	0.74	48.52
IT services	2	42	0.74	49.26
Independent power and renewable electricity	8	168	2.96	52.22
Industrial conglomerates	9	189	3.33	55.56
Industrial REITs	1	21	0.37	55.93
Marine transportation	1	21	0.37	56.3
Media	4	84	1.48	57.78
Metals and mining	21	441	7.78	65.56
Multi-utilities	2	42	0.74	66.3
Oil, gas and consumable fuels	18	378	6.67	72.96
Paper and forest products	4	84	1.48	74.44
Passenger airlines	4	84	1.48	75.93
Personal care products	1	21	0.37	76.3

Industry	Firms	Observations	Percentage (%)	Cumulative (%)
Pharmaceuticals	6	126	2.22	78.52
Professional services	2	42	0.74	79.26
Real estate management and development	11	231	4.07	83.33
Retail REITs	3	63	1.11	84.44
Specialty retail	11	231	4.07	88.52
Tobacco	1	21	0.37	88.89
Trading companies and distributors	2	42	0.74	89.63
Transportation infrastructure	11	231	4.07	93.7
Water utilities	4	84	1.48	95.19
Wireless telecommunication services	13	273	4.81	100
Total	270	5670	100	

A.2 | Assessment Scales for Process-Based Greenhouse Gas Initiatives

General initiatives	Specific initiatives
Energy emission reduction commitments	1. Does the company have a policy to improve emission reduction?
	2. Has the company set targets or objectives to be achieved on emission reduction?
	3. Does the company report on its impact on biodiversity or on activities to reduce its impact on the native ecosystems and species, as well as the biodiversity of protected and sensitive areas?
	4. Does the company report on initiatives to reduce, reuse, recycle, substitute or phase out SOx (sulfur oxides) or NOx (nitrogen oxides) emissions?
	5. Does the company report on initiatives to reduce, substitute or phase out volatile organic compounds (VOC)?
	6. Does the company report on initiatives to recycle, reduce, reuse, substitute, treat or phase out total waste?
	7. Does the company report on initiatives to reduce, substitute or phase out particulate matter less than 10 μm in diameter (PM10)?
	8. Does the company report on initiatives to recycle, reduce, reuse, substitute, treat or phase out e-waste?
	9. Does the company have a policy for reducing the use of natural resources or to lessen the environmental impact of its supply chain?
Energy and resource efficiency	10. Does the company have a policy to improve its water efficiency?
	11. Does the company have a policy to improve its energy efficiency?
	12. Does the company have a policy to improve its use of sustainable packaging?
	13. Does the company set specific objectives to be achieved on resource efficiency?
	14. Has the company set targets or objectives to be achieved on water efficiency?
	15. Has the company set targets or objectives to be achieved on energy efficiency?

General initiatives	Specific initiatives
	16. Does the company make use of renewable energy?
	17. Does the company report about environmentally friendly or green sites or offices?
	18. Does the company report on at least one product line or service that is designed to have positive effects on the environment, or which is environmentally labelled and marketed?
	19. Does the company provide details on the amount of electricity it produces and purchases?
	20. Does the company report on specific products which are designed for reuse, recycling or the reduction of environmental impacts?
	21. Does the company develop new products that are marketed as reducing noise emissions?
	22. Does the company develop products and services that improve the energy efficiency of buildings?
	23. Does the company report about take-back procedures and recycling programmes to reduce the potential risks of products entering the environment or does the company report about product features or services that will promote responsible and environmentally preferable use?
	24. Is the company aware that climate change can represent commercial risks and/or opportunities?
	25. Does the company report about product features and applications or services that will promote responsible, efficient, cost-effective and environmentally preferable use?
Energy process and supply chain management	26. Does the company use environmental criteria (ISO 14000, energy consumption, etc.) in the selection process of its suppliers or sourcing partners?
	27. Does the company conduct surveys of the environmental performance of its suppliers?
	28. Does the company report or show to be ready to end a partnership with a sourcing partner, if environmental criteria are not met?
Energy environmental team management	29. Does the company have an environmental management team?
	30. Does the company train its employees on environmental issues?
Energy organisational practices	31. Does the company report or provide information on company-generated initiatives to restore the environment?
	32. Does the company report on initiatives to reduce the environmental impact on land owned, leased or managed for production activities or extractive use?
	33. Does the company report on initiatives to reduce, reuse, substitute or phase out toxic chemicals or substances?
Energy technological advancement	34. Does the company develop products or technologies for use in the clean, renewable energy (such as wind, solar, hydrothermal and geothermal and biomass power)?
	35. Does the company develop products or technologies that are used for water treatment, purification or that improve water use efficiency?
	36. Does the company report on its environmental expenditures?
	37. Does the company report on making proactive environmental investments or expenditures to reduce future risks or increase future opportunities?

General initiatives	Specific initiatives
Energy economy market mechanisms	38. Does the company have an internal price on carbon?
	39. Does the company report on its participation in any emissions trading initiative?
Energy collaborations and external relations	40. Does the company report on partnerships or initiatives with specialised NGOs, industry organisations, governmental or supragovernmental organisations, which are focused on improving environmental issues?

Note: Possible total score of an organisation (0 to 40).

A.3 | Assessment Scales for Board Sustainability Committee Initiative

General issues	Specific initiatives
Committee existence and structure	Does the company have a sustainability committee or team? — board level or senior management committee responsible for decision-making on CSR (corporate social responsibility) strategy
Reporting and transparency	Does the company publish a separate CSR/sustainability report or publish a section in its annual report on CSR/sustainability?
	Does the company's extra-financial report consider the global activities of the company?
	Does the company have an external auditor of its CSR/sustainability report?; These include data on external audit of the company's CSR data, or extra financial report is considered; consider an audit in the form of a review done by a university, academic, expert, external panel or a research centre; web-based CSR reports that are externally audited; integrated annual report having external audit statements for its environmental and social data
	The name of the external auditor of the sustainability report. — name of the audit firm or independent person who endorses the extra-financial audit statement — name of the body reviewed such as university, academic, expert, external panel or a research centre (1 if external auditor is a big 4 firm or affiliate, zero if otherwise)
	Does the company's CSR strategy category score communicate the integration of economic, social and environmental dimensions into its day-to-day decision-making processes?
Reporting framework	Is the company's CSR report published in accordance with the GRI (Global Reporting Initiative) guidelines?; in focus on CSR report or data published within the framework or guidelines of GRI principles
	Possible total score of a firm (0 to 7)