Carbon Accounting as an Anti-Greenwashing Mechanism for Environmental Accountability and ESG Credibility

Agnes Eyne Banea[1]
[1]Doctoral Student of Accounting, Faculty of Economics and Business, Hasanuddin University, Indonesia;
[1]Sekolah Tinggi Bisnis dan Manajemen Dua Saudara.

Abstract

The rapid expansion of Environmental, Social, and Governance (ESG) reporting has increased corporate transparency regarding sustainability performance. However, concerns regarding the credibility of ESG disclosures remain significant due to the prevalence of greenwashing, where organizations communicate environmental responsibility without corresponding substantive actions. This study aims to examine the role of carbon accounting as an anti-greenwashing mechanism that strengthens environmental accountability and enhances ESG credibility in emerging markets. Using a Systematic Literature Review (SLR) approach, the study synthesizes recent literature on carbon accounting, environmental accountability, sustainability reporting, and greenwashing. The findings indicate that carbon accounting provides measurable, verifiable, and auditable environmental information that reduces information asymmetry, improves disclosure transparency, and strengthens the alignment between sustainability commitments and actual environmental performance. Furthermore, carbon accounting enhances environmental accountability by supporting systematic measurement, monitoring, reporting, and verification of greenhouse gas emissions, thereby limiting opportunities for symbolic ESG disclosure and greenwashing practices. The study proposes an integrated conceptual framework in which institutional pressures encourage the adoption of carbon accounting, leading to improved transparency, stronger environmental accountability, reduced greenwashing, and enhanced ESG credibility. This study contributes to sustainability accounting literature by positioning carbon accounting not merely as a reporting tool but as a governance mechanism that supports substantive accountability, organizational legitimacy, and stakeholder trust.

Keywords: Carbon Accounting; Greenwashing; Environmental Accountability; ESG Credibility; Sustainability Reporting; Sustainability Governance

INTRODUCTION

Environmental, Social, and Governance (ESG) reporting has become an essential component of corporate sustainability strategies and stakeholder communication (Gillan et al., 2021; Velte, 2023). Increasing concerns regarding climate change, environmental degradation, and sustainable development have encouraged organizations to disclose information related to their environmental performance and sustainability commitments (IPCC, 2023; Ahmad et al., 2023). International frameworks such as the Global Reporting Initiative (GRI), Task Force on Climate-related Financial Disclosures (TCFD), and International Sustainability Standards Board (ISSB) have further strengthened the demand for transparent, comparable, and decision-useful sustainability information (IFRS Foundation, 2023). Among various sustainability issues, greenhouse gas (GHG) emissions have emerged as a critical concern because they directly affect climate change mitigation efforts and long-term environmental sustainability.

Despite the rapid growth of ESG reporting, concerns regarding the credibility and reliability of sustainability disclosures continue to increase. Many organizations disclose extensive sustainability information (IFRS Foundation, 2023); however, such disclosures do not always reflect substantive environmental performance. Prior studies suggest that sustainability reporting is often used as a symbolic communication tool to enhance corporate reputation rather than as a genuine accountability mechanism. This phenomenon has contributed to the rise of greenwashing, a practice whereby organizations create an environmentally responsible image through selective disclosure, exaggerated environmental claims, or symbolic sustainability initiatives that are not supported by actual environmental improvements (Delmas & Burbano, 2011; Lyon & Montgomery, 2015). Greenwashing undermines stakeholder trust, creates information asymmetry, and weakens the effectiveness of ESG reporting as a governance and accountability mechanism.

To address this challenge, carbon accounting has gained increasing attention as a mechanism for measuring, monitoring, recording, and reporting greenhouse gas emissions in a transparent and verifiable manner (Ascui & Lovell, 2011; Burritt et al., 2019). Unlike narrative-based sustainability disclosures, carbon accounting relies on measurable and auditable environmental information that enables stakeholders to evaluate whether sustainability commitments are supported by actual environmental performance. Recent regulatory developments, including IFRS S2 Climate-related Disclosures, further emphasize the importance of standardized carbon disclosure and climate-related reporting as part of corporate sustainability governance.

This study is grounded in Institutional Theory, Legitimacy Theory, and Decoupling Theory. Institutional Theory explains that organizational practices are influenced by external pressures arising from regulations, professional norms, and stakeholder expectations, which encourage organizations to adopt structures and practices that are considered socially acceptable and legitimate (DiMaggio & Powell, 1983). In the context of sustainability reporting, these institutional pressures motivate organizations to implement carbon accounting systems and disclose environmental information in response to growing demands for transparency and accountability.

Legitimacy Theory suggests that organizations continuously seek societal approval by aligning their actions and disclosures with prevailing social values and expectations (Suchman, 1995). Consequently, sustainability reporting and carbon disclosure are often used as mechanisms to maintain organizational legitimacy. However, legitimacy may become vulnerable when environmental disclosures are not supported by actual environmental performance, creating concerns regarding the credibility of ESG reporting.

To further explain this phenomenon, Decoupling Theory argues that organizations may formally adopt policies, standards, and sustainability commitments while failing to implement them effectively in operational practices (Meyer & Rowan, 1977). This separation between formal commitments and actual practices is commonly referred to as organizational decoupling and may result in symbolic compliance rather than substantive accountability. Bromley and Powell (2012) further emphasize that decoupling occurs when organizations maintain formal structures to satisfy external expectations while operational activities remain largely unchanged. In this regard, greenwashing can be viewed as a manifestation of organizational decoupling, where sustainability claims and ESG disclosures are not fully aligned with actual environmental performance.

By integrating these three theoretical perspectives, this study explains how carbon

accounting can function as a governance mechanism that responds to institutional pressures, strengthens organizational legitimacy, reduces decoupling between sustainability commitments and environmental practices, and ultimately enhances environmental accountability and ESG credibility.

Although previous studies have extensively examined ESG disclosure, carbon reporting, sustainability assurance, and greenwashing, limited research has explored carbon accounting as an integrated anti-greenwashing mechanism capable of strengthening environmental accountability and enhancing ESG credibility. Existing studies primarily focus on disclosure quality, determinants of carbon reporting, or the relationship between ESG performance and firm value, while the governance role of carbon accounting remains underexplored, particularly in emerging market contexts.

The novelty of this study lies in the development of an integrated conceptual perspective that positions carbon accounting as a strategic governance mechanism linking institutional pressures, environmental accountability, greenwashing prevention, and ESG credibility. By extending Legitimacy Theory and Decoupling Theory, this study explains how measurable and verifiable carbon information can reduce symbolic ESG disclosure and encourage substantive environmental accountability. Therefore, the objective of this study is to examine the role of carbon accounting as an anti-greenwashing mechanism that strengthens environmental accountability and enhances the credibility of ESG reporting in emerging markets.

RESEARCH METHODOLOGY

This study employs a Systematic Literature Review (SLR) approach to examine the role of carbon accounting as an anti-greenwashing mechanism that strengthens environmental accountability and enhances ESG credibility. The SLR method was selected because it enables a comprehensive and systematic synthesis of existing knowledge, facilitates the identification of research gaps, and supports the development of a robust conceptual framework based on accumulated evidence from prior studies (Snyder, 2019).

Relevant literature was collected from internationally recognized academic databases, including Scopus, Web of Science, ScienceDirect, and Emerald Insight. These databases were selected because they provide high-quality peer-reviewed publications in the fields of sustainability accounting, environmental management, corporate governance, and ESG reporting. The literature search was conducted using combinations of the keywords “carbon accounting,” “carbon disclosure,” “environmental accountability,” “greenwashing,” “ESG credibility,” “sustainability reporting,” and “climate disclosure.” Boolean operators (AND, OR) were used to improve search accuracy and coverage.

The study included peer-reviewed journal articles published in English between 2020 and 2025 that specifically addressed carbon accounting, environmental accountability, ESG reporting, sustainability governance, and greenwashing. Editorials, conference abstracts, book reviews, and publications unrelated to the research objectives were excluded from the review process.

Data analysis was conducted using thematic analysis. The review process consisted of four stages: literature identification, screening and eligibility assessment, thematic coding and categorization, and synthesis of findings. Through this process, key themes and conceptual relationships were identified to explain how carbon accounting contributes to transparency, environmental accountability, greenwashing reduction, and ESG credibility. The findings were subsequently integrated

into a conceptual framework that positions carbon accounting as a strategic governance mechanism capable of transforming symbolic ESG disclosure into substantive sustainability accountability.

RESULTS AND DISCUSSION

1. Carbon Accounting as a Governance Mechanism

The literature review indicates that carbon accounting has evolved beyond its traditional role as a compliance and reporting tool into a strategic governance mechanism (Ascui & Lovell, 2011; Burritt et al., 2019). Organizations increasingly use carbon accounting systems to measure, monitor, and report greenhouse gas emissions as part of broader sustainability management practices. By transforming environmental impacts into measurable and verifiable information, carbon accounting improves transparency and supports evidence-based decision making (Tang & Demeritt, 2018). This development reflects growing institutional pressures from regulators, investors, and stakeholders who demand higher levels of environmental accountability and climate-related disclosure (DiMaggio & Powell, 1983; IFRS Foundation, 2023).

From an institutional perspective, the adoption of carbon accounting is driven by coercive pressures arising from environmental regulations, normative pressures originating from sustainability standards, and mimetic pressures resulting from industry best practices. Consequently, carbon accounting functions not only as a reporting mechanism but also as an organizational control system that supports sustainability governance and strengthens corporate legitimacy.

2. Carbon Accounting and Environmental Accountability

Environmental accountability requires organizations to disclose and justify the environmental consequences of their activities to stakeholders (Bebbington et al., 2021). The review demonstrates that carbon accounting strengthens environmental accountability by providing objective and quantifiable information regarding greenhouse gas emissions (Schaltegger & Burritt, 2018). Unlike narrative-based sustainability disclosures, carbon accounting generates measurable indicators that enable stakeholders to assess whether environmental commitments are supported by actual performance.

The availability of reliable carbon information reduces ambiguity in environmental reporting and enhances organizational transparency. As a result, stakeholders are better equipped to evaluate environmental risks, sustainability strategies, and corporate responses to climate-related challenges. Carbon accounting therefore, serves as a critical mechanism for improving the quality and credibility of environmental disclosures.

3. Carbon Accounting as an Anti-Greenwashing Mechanism

Greenwashing remains one of the most significant challenges facing ESG reporting (Delmas & Burbano, 2011; Lyon & Montgomery, 2015). Organizations often communicate sustainability commitments extensively while failing to implement corresponding environmental improvements. This condition creates a gap between sustainability rhetoric and operational reality, consistent with the assumptions of Decoupling Theory (Meyer & Rowan, 1977; Bromley & Powell, 2012).

The findings suggest that carbon accounting can reduce greenwashing by providing measurable, verifiable, and auditable environmental information. Because carbon emissions data are subject to monitoring, reporting, and verification processes, opportunities for selective disclosure and misleading environmental claims become more limited. Consequently, carbon accounting reduces information

asymmetry and promotes greater alignment between sustainability commitments and actual environmental performance.

In this context, carbon accounting functions as an anti-decoupling mechanism that narrows the gap between symbolic ESG disclosure and substantive environmental accountability. Organizations are encouraged to demonstrate environmental performance through measurable outcomes rather than relying solely on sustainability narratives.

4. Carbon Accounting and ESG Credibility

The credibility of ESG reporting depends on the extent to which disclosed information accurately reflects organizational sustainability performance (Velte, 2023; Khan et al., 2021). Stakeholders increasingly demand reliable environmental information to support investment, regulatory, and managerial decisions. The review indicates that carbon accounting contributes significantly to ESG credibility by improving disclosure quality, transparency, and accountability.

Organizations that implement robust carbon accounting systems are more likely to provide consistent and verifiable environmental information, thereby enhancing stakeholder confidence and organizational legitimacy (Suchman, 1995; Velte, 2023). In contrast, weak carbon disclosure practices increase the risk of greenwashing and reduce trust in sustainability reporting. Therefore, carbon accounting plays a strategic role in strengthening the credibility and usefulness of ESG information.

5. Proposed Integrated Framework and Implications

Based on the synthesis of the literature, this study proposes an integrated framework in which institutional pressures encourage the adoption of carbon accounting systems. Carbon accounting subsequently generates transparency and verification mechanisms that strengthen environmental accountability, reduce greenwashing practices, and ultimately enhance ESG credibility.

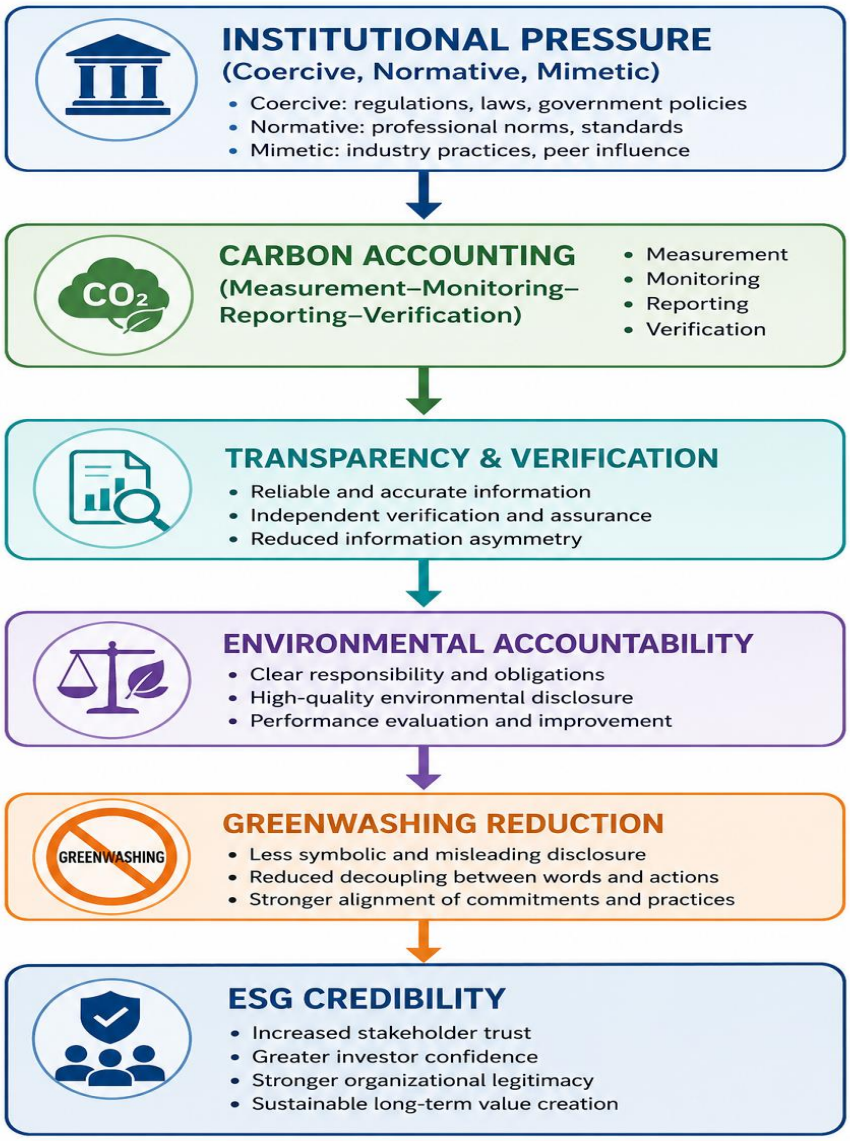


Figure 1. Integrated Framework of Carbon Accounting as an Anti-Greenwashing Mechanism for Strengthening Environmental Accountability and ESG Credibility in Emerging Markets.

Source: Developed by the author based on the synthesis of literature (2025)

CONCLUSION

This study examined the role of carbon accounting as an anti-greenwashing mechanism that strengthens environmental accountability and enhances ESG credibility. The findings indicate that carbon accounting extends beyond its traditional function as a reporting tool and serves as a strategic governance mechanism that improves transparency, accountability, and disclosure quality. By providing measurable, verifiable, and auditable environmental information, carbon accounting reduces information asymmetry, limits opportunities for symbolic sustainability disclosure, and supports greater alignment between sustainability

commitments and actual environmental performance.

Furthermore, carbon accounting strengthens environmental accountability through systematic measurement, monitoring, reporting, and verification of greenhouse gas emissions, thereby reducing the risk of greenwashing and increasing stakeholder confidence in ESG disclosures. The proposed framework demonstrates that institutional pressures encourage the adoption of carbon accounting, which subsequently enhances transparency, promotes environmental accountability, reduces greenwashing practices, and ultimately improves ESG credibility. Therefore, organizations seeking to enhance the reliability of sustainability reporting should integrate carbon accounting into their governance and sustainability strategies. Future studies are encouraged to empirically test the proposed framework across different industries and emerging market contexts to further validate the relationships among carbon accounting, environmental accountability, greenwashing reduction, and ESG credibility.

RECOMMENDATION

Organizations should strengthen the integration of carbon accounting into their sustainability governance systems to ensure that environmental disclosures are supported by measurable and verifiable performance outcomes. The implementation of comprehensive carbon measurement, monitoring, reporting, and verification practices can improve environmental accountability, reduce greenwashing risks, and enhance the credibility of ESG reporting. Regulators and standard-setting bodies are also encouraged to develop more consistent carbon disclosure requirements and assurance mechanisms to improve the comparability and reliability of sustainability information across industries.

For future research, empirical studies are recommended to test the proposed conceptual framework in different industrial sectors and emerging market contexts. Further investigation may also explore the moderating role of sustainability assurance, corporate governance, and regulatory quality in strengthening the relationship between carbon accounting, environmental accountability, greenwashing reduction, and ESG credibility.

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