Corporate responsibility and fraud prevention in the carbon market: ESG governance implications for Vietnam

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Abstract: *Systemic fraud undermines the integrity of the global carbon credit market and poses particular risks to the newly emerging carbon market in Vietnam. Using a qualitative approach and case analysis of the EU Emissions Trading System (EU ETS) and the Reducing Emissions from Deforestation and Forest Degradation mechanism (REDD+), combined with the frameworks of Environmental, Social and Governance (ESG) and Corporate Social Responsibility (CSR), the paper demonstrates that non-additional credits directly weaken the Environmental pillar, while financial fraud damages the Governance pillar. The study proposes an integrated prevention framework that strengthens the measurement, reporting, and verification (MRV) system through independent verification and technologies such as Blockchain and AI, along with a dual role for the State (improving the legal framework) and enterprises (enhancing ESG governance).*

Keywords: *Carbon credit market; fraud; ESG; fraud prevention; corporate responsibility.*

1. Introduction

To actualize the commitment to achieve net-zero emissions by 2050, as announced at the 26th United Nations Climate Change Conference (COP26), the carbon credit market has been identified as a fundamental financial instrument and a prerequisite for Vietnam. However, the integrity of this market is facing systemic fraud risks on a global scale. Typical fraudulent behaviors such as overstating emission reductions (inflating the amount of greenhouse gases reduced or absorbed), issuing "phantom credits" (credits that do not represent actual emission reductions), and double counting (a single amount of emission reduction being credited to multiple parties or multiple purposes) have caused deviations in climate goals, eroded market trust, triggered credibility crises for the global carbon pricing mechanism, created risks of project cancellation, increased rent-seeking

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behaviors, and distorted reporting practices. In Vietnam, where the carbon market is still in its early stages and constrained by an incomplete legal and institutional framework, these systemic risks become even more urgent, necessitating timely intervention to safeguard the effectiveness and sustainability of the domestic carbon pricing mechanism.

At the international level, fraud risks exist in both compliance and voluntary carbon credit transactions. In the compliance market, represented by the European Union Emissions Trading System (EU ETS), various forms of fraud have been reported, including value-added tax (VAT) carousel fraud and cyberattacks. These activities have significantly reduced market transparency and eroded investor confidence. Similarly, the voluntary market faces difficulties in quality governance, notably the issuance of carbon credits that do not represent real emission reductions (Lang, 2016). The persistence of such fraud reveals structural gaps in monitoring and prevention mechanisms, creating significant challenges for enterprises in conducting due diligence on carbon credit quality (Kreibich & Hermwille, 2021). To address these risks and reinforce market integrity, the Environmental, Social, and Governance (ESG) framework is emerging as a foundational governance solution, enabling enterprises to establish autonomous mechanisms for proactive risk prevention and mitigation (Wang et al., 2024). In particular, integrating forensic auditing into ESG reporting is viewed as an effective control tool against greenwashing, thereby enhancing credibility and corporate accountability (Hossain, 2025). Conversely, ignoring fraud risks and failing to safeguard the integrity of carbon credits may lead to severe legal consequences, serious reputational damage, and direct violations of the core ESG principles that firms claim to uphold.

Although the issue has been recognized, existing research still exhibits significant gaps. *First,* studies remain fragmented. Research on the compliance market tends to focus on financial and cybersecurity risks (Nield & Pereira, 2016). In contrast, analyses of the voluntary market emphasize concerns related to credit quality and additionality (Lang, 2016). This separation results in the lack of a cross-cutting framework that links carbon credit fraud directly to the deterioration of two core ESG pillars: Environment (E) and Governance (G). *Second,* studies on the carbon market in Vietnam (Tam et al., 2024) have only outlined potential and development pathways, but have not yet addressed the fundamental issue of safeguarding market integrity and ensuring resilience against fraud. This gap is exacerbated by the fact that most international research focuses on mature markets with well-established institutions and advanced regulatory systems, making them unsuitable for direct application to the nascent Vietnamese market. Currently, Vietnam lacks a scientific and practical framework for forecasting potential fraud patterns or assessing ESG governance readiness among enterprises in response to a complex risk landscape, which is exacerbated by institutional gaps, information asymmetry, and limitations in Monitoring, Reporting, and Verification (MRV) capacity.

To address these gaps, this paper systematizes major fraud typologies in the global carbon credit market. It analyzes their multidimensional impacts through the lens of risk on two core ESG pillars - Environment (E) and Governance (G). The ultimate objective is to propose a fraud-prevention framework applicable to Vietnam, followed by policy recommendations for the government and governance implications for the business sector. The study focuses on the following three research questions:

(1) What are the primary forms of carbon credit fraud observed internationally, and how might they manifest in the early-stage, institutionally transitional carbon market of Vietnam?

(2) Through which mechanisms do fraudulent behaviors weaken the Environmental (E) and Governance (G) pillars of corporate ESG, and how do they evolve into legal and reputational risks?

(3) What mechanisms, tools, and governance innovations should enterprises and the State implement to build a transparent, sustainable, and fraud-resilient carbon credit market in Vietnam?

The paper employs a qualitative methodology, with an emphasis on case-based analysis that draws from secondary data sources, including academic publications, international institutional reports, and specialized industry analyses. Two deliberately selected cases include: VAT fraud in the EU ETS (representing the compliance market) and the carbon credit crisis associated with REDD+ projects (representing challenges in credit quality in the voluntary market). From these cases, the paper analyzes the mechanisms and consequences of fraud, then applies the lessons learned to the Vietnamese context to identify potential risks and propose appropriate regulatory and corporate governance interventions aimed at strengthening transparency and resilience in the domestic carbon credit market.

2. Theoretical framework

2.1. Environmental - Social - Governance (ESG) theory

ESG theory provides a foundational governance framework and is considered an effective control tool for mitigating factors that lead to fraudulent behavior within enterprises. According to Yang et al. (2024), a high ESG sustainability rating can significantly reduce corporate fraud by alleviating financial constraints, promoting innovation, and enhancing internal control systems. However, greenwashing remains a pressing concern, as it exacerbates earnings management practices and undermines the quality of financial reporting when companies exaggerate or distort their ESG implementation efforts. Consequently, greenwashing can weaken the trust relationship between firms, investors, and the public.

2.2. Corporate social responsibility (CSR) theory

In the context where unethical behaviors among internal corporate actors raise critical concerns about strengthening business ethics, while social pressure for responsible and sustainable business models continues to rise, CSR has emerged as a central issue when considered in relation to fraud control. For this reason, several organizations have implemented CSR initiatives to demonstrate their mission and core values in response to such challenges (Rodgers et al., 2014). Specifically, CSR theory establishes global standards for corporate responsibility in areas such as labor relations, human rights, business ethics, community relations, and the environment, to prioritize social welfare over profit maximization (Awa et al., 2024). This forms the foundation for enterprises to develop a resilient strategy, implement effective fraud control mechanisms, ensure ethical business conduct, and maintain sustainability and a competitive edge. In doing so, businesses not only protect their intrinsic value but also contribute positively and responsibly to society and the environment (Kalra, 2024).

CSR theory posits that enterprises are not only obligated to maximize profits but also responsible for the social and environmental impacts arising from their operations. Under this theory, businesses must balance three

pillars-economic, social, and environmental-known as the "Triple Bottom Line" model, comprising Profit, People, and Planet. CSR emphasizes the relationship between businesses and their stakeholders, encouraging ethical, transparent, and sustainability-oriented actions. Implementing CSR helps enterprises build their reputation, enhance brand value, and mitigate legal risks and community conflicts. In the current context of globalization and green transition, CSR is no longer merely a voluntary tool but is becoming a mandatory governance standard aligned with ESG criteria. In Vietnam, CSR theory is being increasingly applied in policy-making, corporate governance, and the evaluation of the private sector's contributions to national sustainable development.

3. Forms of fraud and potential risks in the carbon market

3.1. Common types of fraud in the carbon market

First, double-counting is a widespread form of fraud in which the same greenhouse gas emission reduction or removal result is counted more than once toward different mitigation commitments or financial pledges related to climate action. As a result, companies face the risk of being accused of greenwashing when they publicly commit to environmental protection but fail to implement corresponding measures to reduce emissions.

Second, baseline manipulation refers to the deliberate inflation of the baseline emission level to generate artificially higher additional benefits, thereby misrepresenting the actual effectiveness of a carbon credit project. This behavior often leads to non-additionality, a phenomenon in which a carbon credit project does not generate emission reductions beyond what would have occurred in the absence of the project (McDonald et al., 2023).

Third, the sale of fraudulent or invalid carbon permits to unsuspecting buyers - or the issuance of "phantom credits," referring to reductions that exist only on paper but have never occurred in reality - poses significant risks, especially with the emergence of tokenized carbon markets (Sood, 2025). Another example is the carousel fraud model, a type of financial fraud that distorts the value of credits when enterprises exploit VAT loopholes and cross-border transactions for profit. Specifically, traders purchase carbon credits from a VAT-exempt member state, then resell them domestically with VAT included, but fail to remit the tax to authorities before disappearing (Nield & Pereira, 2011).

Finally, misreporting of environmental data is an increasingly concerning type of fraud. It may occur because companies lack technical capacity or technology to measure and report emissions accurately, or due to data manipulation, where emissions data are intentionally falsified to obtain financial advantages. This situation becomes more prevalent when governments lack sufficient financial or technical capacity to monitor and verify the accuracy of self-reported data from enterprises.

3.2. Analysis of representative fraud cases

First, VAT fraud through the carousel model in the EU carbon market.

One of the most severe incidents in the EU Emissions Trading System (EU ETS) was VAT carousel fraud, marked by a sudden surge in the volume of transactions and instant trading of emission allowances at the end of 2008, causing an estimated loss of up to 5 billion euros (Nield & Pereira, 2011). The mechanism of this fraud stemmed from loopholes in the management of cross-border transactions within the EU, where companies were allowed to buy and sell emission allowances between member states without being taxed at the point of transaction. The lack of coordination

among tax authorities and the absence of a centralized transaction database created timing gaps between verification and reporting stages. As a result, enterprises exploited this loophole to create repetitive carbon credit transactions without paying actual tax.

To address this, the EU applied the reverse charge mechanism, shifting tax liability from the seller to the buyer to close the fraud loophole, while also redefining the rights and responsibilities of businesses unintentionally involved in fraudulent transaction chains (Nield & Pereira, 2011). This case demonstrates that even highly regulated compliance markets can still be exploited if cross-border monitoring and enforcement are not timely and synchronized.

Second, the credibility crisis of forest-based carbon credits due to non-additional and inflated project outcomes.

In the voluntary carbon market, the REDD+ mechanism (Reducing Emissions from Deforestation and Forest Degradation) has been promoted as a key tool for forest conservation and greenhouse gas reduction. However, according to Lang (2016), REDD+ was excluded from the Kyoto Protocol due to four core issues related to credit quality and integrity: (1) Additionality - whether emission reductions would have occurred even without the REDD+ project; (2) Leakage - preventing deforestation in one area may displace it to nearby areas or other countries; (3) Permanence - a protected forest may later burn, releasing stored carbon back into the atmosphere; (4) Measurability - carbon absorption estimates depend heavily on modeling assumptions, creating a high margin of error. These factors reveal that a weak Monitoring, Reporting, and Verification (MRV) foundation not only distorts environmental data but also opens opportunities for fraud through baseline manipulation or data distortion. This reflects one of the key elements of the Fraud Triangle: opportunity, especially in contexts where governance mechanisms are loosely enforced.

The Ulu Masen project in Indonesia (2008 -2012) and Oddar Meanchey in Cambodia are typical examples. Both demonstrated inflated baselines and reported emission reductions far exceeding actual results, resulting in the issuance of millions of non-existent credits (Lang, 2016). The absence of independent auditing and standardized data systems increased the risk of greenwashing, where environmental claims did not align with actual actions. This created conditions for "gaming" - the intentional manipulation of project design and implementation to maximize credit issuance (Chagas et al., 2020). From the perspective of CSR theory, ignoring transparency and accuracy in environmental data reporting represents a violation of core corporate environmental and social responsibility.

3.3. Potential risks in the Vietnamese carbon market

One significant barrier to the development and integrity of the carbon credit market in Vietnam is the limited capacity of the MRV system. International experience from failed REDD+ projects shows that without independent monitoring and meaningful participation from local communities, emission reduction projects are highly vulnerable to credibility crises and may even face cancellation. Although the Vietnamese Government has taken strategic steps, such as its plan to pilot a carbon credit trading exchange starting from 2025, as outlined in Decree No. 06/2022/ND-CP dated January 7, 2022, the domestic carbon market remains in its infancy. The current legal framework still contains significant gaps, especially the absence of detailed regulations on monitoring standards, reporting and verification procedures,

corporate legal liability, and penalties for violations and fraud. Lessons from the EU and REDD+ projects suggest that without a clear and transparent legal basis, carbon markets are easily exploited for rent-seeking rather than serving environmental purposes.

This barrier creates incentives for companies to falsify emission data, particularly since many domestic enterprises have not yet established accurate and detailed emission-measurement systems, motivating them to overreport reductions in order to obtain favorable emission allowance allocations. In the forestry-based credit sector, the risk of opacity and credit fraud may occur when reference baselines are overstated or forestry data fail to reflect actual carbon absorption levels. This problem stems from the fact that existing emission databases lack uniformity and are primarily based on self-reporting mechanisms. The absence of standardized criteria and independent verification at the operational level allows companies to maintain their original emission levels while still appearing compliant - by purchasing low-quality carbon credits as a way to "buy the right to emit" on the market.

3.4. Impacts of risk factors on enterprises

On the one hand, the limited MRV capacity and fragmented emissions data system result in a lack of transparency in ESG compliance. According to the World Bank's Country Climate and Development Report (CCDR, 2022), procedural deficiencies and technical infrastructure gaps not only hinder firms' ability to comply with environmental regulations but also increase the likelihood of fraudulent reporting. These factors intensify the challenge of operationalizing ESG standards in Vietnam. As a consequence, they severely damage corporate ESG ratings and the country's reputation in international financial and trade markets. In the context of increasingly stringent requirements on emission disclosure and reduction from global partners and investors, such structural weaknesses pose a direct threat to the scale and long-term prospects of Vietnam's sustainable economic development (Huan & Hoa, 2025).

On the other hand, gaps in the legal framework and the lack of strong enforcement mechanisms create a favorable environment for fraudulent behavior, allowing companies to exploit institutional loopholes for improper financial gain. This not only harms corporate credibility in the short term but also poses serious long-term legal risks - especially once the regulatory system is strengthened and enforcement becomes stricter in the future. Thus, risks related to enforcement capacity, data infrastructure, and regulatory mechanisms may directly affect compliance performance, corporate reputation, and legal accountability in the carbon market.

4. Fraud prevention instruments and policy & corporate governance implications for Vietnam

4.1. Fraud prevention instruments

The Monitoring, Reporting, and Verification (MRV) system is a three-step mechanism used to measure, report, and verify the amount of greenhouse gases reduced within a specified period, in which each ton of reduced emissions is equivalent to one carbon credit. Under this mechanism, the MRV system can quantify the effectiveness of emission reduction activities and convert them into monetizable carbon credits. Due to its strict requirements - reports must adhere to international standards and be verified by an independent third party before recognition - the MRV system serves as a core instrument for preventing fraud, while also providing a basis for public disclosure and enhancing corporate accountability. Lessons from REDD+ projects show that MRV implementation must be carried out rigorously to avoid greenwashing.

The participation of independent third parties plays a crucial role in operationalizing the MRV system, as they are responsible for validating corporate data and determining the legitimacy of issued credits. Quality control and verification of third-party auditors is essential for strengthening oversight and preventing fraud. The governance of verification entities can be structured around three fundamental pillars: Accreditation, Licensing, and Supervision and Control.

Additionally, advanced technologies are being increasingly applied in fraud prevention. Specifically, blockchain technology offers immutability-meaning resistance to document tampering-through a decentralized validation mechanism operated by nodes, without any central authority controlling the network. Research by Dwyer and Mowry (2022) demonstrates the feasibility of integrating blockchain with taggant-based authentication to prevent the forgery of carbon credits. Meanwhile, Segaran et al. (2025) demonstrate that machine learning algorithms, such as Random Forest, XGBoost, and Neural Networks, can be utilized to detect anomalies and verify the authenticity of carbon credit transactions. Potential discrepancies may be detected by comparing field data with reported data through artificial intelligence (AI) (Sustainability Directory, 2025).

4.2. Corporate governance implications for Vietnam

(1) Role of the State

The 2020 Law on Environmental Protection officially introduced the concepts of a "domestic carbon market" and "carbon credits," establishing the foundation for emission-control mechanisms. Decree No. 06/2022/ND-CP specifies responsibilities for greenhouse gas inventories, carbon offset mechanisms, and detailed reporting methods (B&Company, 2025). However, several gaps remain, including unclear regulations on credit allocation limits, the competent authority for credit issuance, and liability mechanisms for exceeding allowable emissions (Herman et al, 2024). Therefore, the State should complete the legal framework by issuing specific decrees and standards for the MRV process, as well as for the accreditation system of independent third-party verifiers. Second, it should establish strict measures to address fraudulent or non-compliant behavior and enhance inter-agency coordination. Similar to how the EU has applied cross-border coordination to combat VAT fraud, Vietnam should strengthen cross-sectoral cooperation to develop a comprehensive monitoring system and ensure market transparency. Third, it should provide guidelines and institutional support for the application of Blockchain, AI, and Machine Learning in carbon credit verification and fraud prevention.

(2) Role of enterprises

For enterprises, the carbon market should be an integral component of their ESG strategy, where information management and reporting are positioned as key drivers of stakeholder trust and long-term corporate value.

First, regarding accounting and auditing processes, lessons from REDD+ projects demonstrate that the absence of a robust MRV system and independent verification can lead to inflated carbon credits and increased risks of greenwashing. To avoid similar pitfalls, Vietnamese enterprises should adopt carbon accounting standards (GHG Protocol) and build standardized criteria and unified measurement systems at the operational level to prevent data inconsistency and manipulation. In addition, basic requirements - such as internal quality checks before reporting, periodic sustainability disclosures, and complete transparency on emissions data (including credit volume used, project type, and credit origin) - must be strictly observed.

Second, in terms of corporate ethics and culture, leadership plays a decisive role in promoting integrity and establishing behavioral rules linked to clear incentive and penalty mechanisms. Firms may also proactively participate in initiatives such as "Science Based Targets," which involve corporate commitments that exceed minimum legal compliance (Phuc, 2025).

Third, enterprises should actively cooperate with regulators by promptly reporting abnormal market activities and may even propose the creation of sector-based associations to facilitate peer monitoring and collective compliance pressure.

Finally, the adoption of technologies such as Blockchain, AI, and Machine Learning in emissions accounting and transparency is strongly encouraged. To optimize this transition, enterprises should invest in employee training on digital applications and actively participate in national digital-transformation programs initiated by the Government.

5. Conclusion

The above analysis demonstrates that regardless of market structure or regulatory context - even in markets with well-established legal foundations - fraud remains one of the core challenges in environmental governance and corporate social responsibility. This challenge becomes even more critical in Vietnam, where the carbon market is still in its early stages and the legal and supervisory frameworks are under development. Without timely identification and control, the risks of fraud emerging or recurring are likely to escalate.

Therefore, based on the integration of ESG theory and Corporate Social Responsibility theory, together with the systematic analysis of representative international cases, this study proposes a comprehensive fraud-prevention model that combines the MRV system with advanced technologies. On that foundation, the article emphasizes the need for parallel coordination between the State and enterprises in establishing an effective governance mechanism, where fraud prevention is considered a prerequisite for ensuring the integrity, transparency, credibility, and resilience of Vietnam's carbon market.

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