

Legal Accountability for Climate-Related Financial Risk and Greenwashing: Reconstructing Sustainable Finance Law in Developing Countries through Indonesia's Regulatory Experience

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Abstract

Climate change has become a systemic financial risk, prompting the incorporation of sustainability considerations into financial regulation. However, the rapid expansion of ESG disclosure requirements and sustainable finance has not been matched by equally robust mechanisms of legal accountability, thereby increasing the risks of greenwashing and investor harm. This study analyzes global developments in climate-related financial regulation, evaluates Indonesia's sustainable finance legal framework, and develops a model of legal accountability for greenwashing. Employing normative legal research with comparative-transnational and regulatory governance approaches, the study examines international standards and Indonesia's regulatory framework, particularly policies issued by the Financial Services Authority (OJK) and the Indonesian Sustainable Finance Taxonomy (TKBI). The findings reveal a persistent gap between sustainability disclosure obligations and mechanisms for verification, supervision, and legal accountability. To address this gap, the study develops the Climate Financial Liability Framework, which integrates four interconnected pillars: materiality-based disclosure, independent sustainability assurance, risk-based supervision, and legal liability for greenwashing. The framework reorients sustainable finance governance from disclosure-based regulation toward accountability-based regulation. The study concludes that strengthening Indonesia's sustainable finance regime requires clearer ESG verification standards, more effective climate-risk-based supervision, proportionate liability mechanisms, and closer alignment with international sustainability standards. The proposed framework offers a regulatory model for strengthening market integrity and investor protection in Indonesia and other emerging economies.

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Keywords:

climate-related financial risk; greenwashing; sustainable finance; ESG disclosure; legal liability.

INTRODUCTION

Climate change has evolved from an environmental concern into a significant economic and financial risk. Extreme climate events, including rising temperatures, floods, droughts, wildfires, and supply-chain disruptions, increasingly affect physical assets, economic productivity, and financial stability (Yang et al., 2026). In addition to these physical risks, financial institutions face transition risks arising from policy, technological, and market shifts toward a low-carbon economy. Climate risk is therefore increasingly recognized as a systemic threat to global financial stability (Z. Liu et al., 2024).

The 2015 Paris Agreement accelerated the integration of sustainability into financial governance by positioning the financial sector as a strategic actor in the transition to low-carbon development (Iozzelli & Slingenberg, 2024). Consequently, financial regulation has expanded beyond monetary stability, investor protection, and conventional market risks to encompass ESG disclosure, climate stress testing, green taxonomies, sustainability reporting, and green financing instruments (Manisha & Ramya, 2025). Sustainability information has also become increasingly important to

investors, regulators, shareholders, and the public when assessing environmental impacts and climate-related risks (Kouloukoui et al., 2018). At the same time, the expansion of sustainable finance has heightened the risk of greenwashing, including exaggerated, misleading, or unsupported sustainability claims (Williams, 2024). Such practices can create information asymmetries, distort investment decisions, and undermine market integrity. Recent studies identify a disclosure-performance gap between corporate sustainability claims and actual environmental performance (De Fino et al., 2026), as well as a related phenomenon known as crosswashing, in which firms improve selected ESG indicators without materially changing environmentally harmful core business activities (Cheng & Cheng, 2025; Kathan et al., 2025). These developments demonstrate that sustainability governance concerns not only the quality of disclosure but also the legal accountability attached to sustainability claims.

In Indonesia, sustainable finance has developed alongside national commitments to net-zero emissions (NZE) and the Sustainable Development Goals. The Financial Services Authority (OJK) has introduced regulatory instruments, including the Indonesian Green Taxonomy, which was subsequently developed into the Indonesian Sustainable Finance Taxonomy (TKBI), to classify sustainable economic activities and help prevent greenwashing (Adhariani & Du Toit, 2020). Nevertheless, significant challenges remain regarding ESG disclosure standards, verification of sustainability claims, regulatory certainty, and institutional accountability (Williams, 2024). Three regulatory problems are particularly important. First, ESG disclosure obligations remain fragmented across jurisdictions, ranging from voluntary commitments to mandatory requirements and resulting in divergent reporting and supervisory standards (Hummel & Jobst, 2024; Matuszak et al., 2025). Second, legal accountability for greenwashing remains underdeveloped, particularly with respect to evidentiary standards, the classification of violations, and the legal consequences of misleading sustainability information (Fagerström et al., 2017; Papafloratos & Pantazi, 2025). Third, effective supervision requires a risk-based approach capable of identifying, measuring, and managing climate and sustainability risks rather than relying solely on formal administrative compliance (Kettle et al., 2014; Ozdemir, 2023).

Despite the rapid growth of sustainable finance research, the existing literature remains dominated by economic, business, and management perspectives, particularly studies of ESG performance, firm value, green investment, and the implementation of sustainable finance (Cao, 2025; Zairis et al., 2024; Ighrarah & Khalifa, 2025; Wang et al., 2025). Studies concerning Indonesia have identified limitations in climate-risk data, inadequate integration of climate risk into banking risk management, and insufficient standardization of sustainability disclosures (Gulati et al., 2025; Sopoćko et al., 2026). Research on OJK supervision has also identified weaknesses in the verification of sustainability claims, supervisory capacity, and administrative sanctions (Agus et al., 2023), while international studies have largely focused on disclosure-performance gaps, ESG evaluation, and emerging forms of sustainability manipulation (Davidescu et al., 2026; Sun et al., 2026).

A significant research gap therefore remains. Existing literature predominantly treats ESG disclosure as an instrument of transparency and corporate governance, while giving insufficient attention to the legal consequences of misleading sustainability information (Raimo et al., 2026). Although financial law recognizes fiduciary duties, disclosure liability, and investor protection (Herlin-Karnell, 2026),

these concepts have not been fully adapted to climate risk and greenwashing, which are still frequently treated as ethical or governance failures rather than as potential legal violations (Bernini & La Rosa, 2025). Moreover, climate-risk management and greenwashing are often examined separately despite their practical interconnection (Lu et al., 2025; Breuer et al., 2024). A further gap concerns the geographical orientation of existing studies. Sustainable finance scholarship largely focuses on developed jurisdictions, whereas emerging economies face distinct challenges, including limited institutional capacity, tensions between development and sustainability objectives, and dependence on natural-resource-based sectors (Ekasingh & Neef, 2007; Estache & Wren-Lewis, 2010). In Indonesia, existing research primarily examines OJK policies, sustainable finance taxonomies, green bonds, and ESG integration within banking (Adhariani & Du Toit, 2020), leaving legal liability, enforcement mechanisms, and the governance of climate-risk oversight insufficiently explored.

To address these gaps, this study shifts the analytical focus from sustainability compliance to legal accountability for sustainability claims. Whereas previous studies have primarily conceptualized ESG disclosure as an instrument of transparency and corporate governance (Alatta Mohamed & Elamin Elboukhari, 2026), this study treats materially misleading ESG disclosure as a potential basis for legal liability.

Accordingly, this study addresses three questions: (1) how climate-related financial risk regulation is evolving globally; (2) how effectively Indonesia's sustainable finance legal framework addresses climate risk and greenwashing; and (3) what model of supervision and legal liability should be developed to prevent greenwashing in the financial sector. The study therefore aims to analyze global regulatory developments, evaluate Indonesia's sustainable finance framework, and formulate a supervisory and legal liability model that is applicable to emerging economies.

The study contributes theoretically by introducing the Climate Financial Liability Framework; methodologically by integrating normative legal analysis, comparative-transnational analysis, and regulatory governance analysis; and practically by providing recommendations for OJK and financial-sector stakeholders regarding ESG verification, risk-based supervision, enforcement mechanisms, and the further development of Indonesia's sustainable finance regulatory framework.

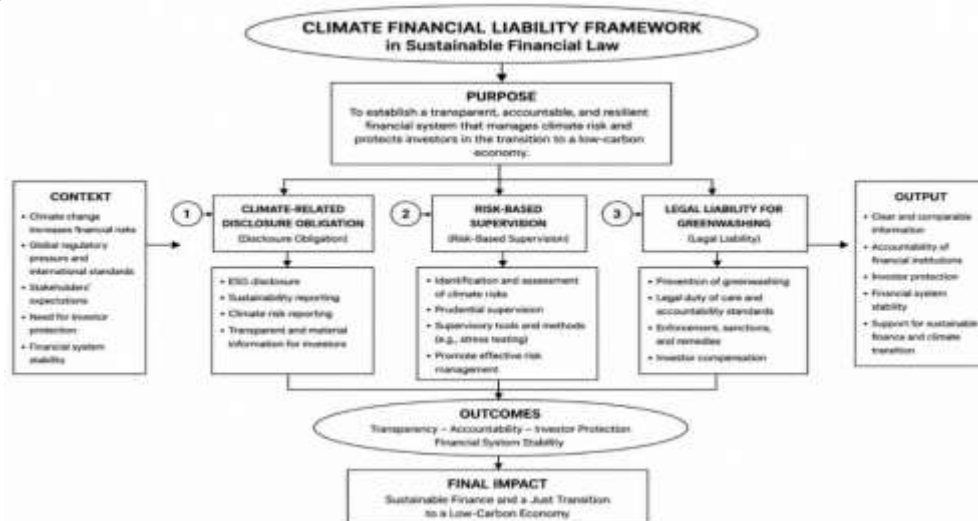


Figure 1 Climate Financial Liability Framework Concept Map.

Against this background, the study addresses three questions: (1) how climate-related financial risk regulation is evolving globally; (2) how effectively Indonesia's sustainable finance legal framework addresses ESG disclosure, climate risk, and greenwashing; and (3) what model of supervision and legal liability should be developed to prevent greenwashing in the financial sector. Accordingly, the study aims to analyze global regulatory developments, evaluate Indonesia's sustainable finance framework, and formulate a supervisory and legal liability model that is applicable to emerging economies.

METHODS

This study employs normative legal research using comparative-transnational and regulatory governance approaches (Alam & Razzaque, 2026; Bandung Law College et al., 2024; Ramraj, 2024). The normative approach examines the legal principles, norms, and doctrines governing sustainable finance, climate-related financial risk, ESG disclosure, sustainability reporting, and legal liability for misleading sustainability information (Cubie & Natoli, 2022; Fabozzi & Markowitz, 2012). The study analyzes international standards developed by the Financial Stability Board (FSB), the Task Force on Climate-related Financial Disclosures (TCFD), the International Sustainability Standards Board (ISSB), and the Network for Greening the Financial System (NGFS), together with relevant European Union frameworks. At the national level, the analysis covers Indonesian laws and regulations, Financial Services Authority (OJK) policies, the Indonesian Sustainable Finance Taxonomy, and regulations governing climate-risk management and sustainability reporting.

The comparative-transnational approach examines climate-risk regulation and greenwashing oversight in the European Union, the United Kingdom, and Australia to identify regulatory patterns, best practices, and enforcement mechanisms relevant to strengthening Indonesia's sustainable finance framework (Rocha & Versiani, 2026; Treglia, 2026). Regulatory governance analysis evaluates the relationships among sustainability disclosure obligations, supervisory capacity, ESG verification mechanisms, and legal accountability in order to assess regulatory effectiveness in promoting transparency, accountability, and market integrity (J. Chen et al., 2026; Yue et al., 2026). The research draws on primary, secondary, and tertiary legal materials. Primary materials include legislation, regulatory policies, and international legal instruments; secondary materials consist of scholarly articles, books, institutional reports, and relevant prior studies; and tertiary materials include legal dictionaries, encyclopedias, and other supporting references. These materials are analyzed qualitatively through prescriptive and conceptual analysis. Prescriptive analysis evaluates the adequacy and effectiveness of existing regulations, while conceptual analysis is used to develop the Climate Financial Liability Framework by integrating disclosure obligations, risk-based supervision, and legal accountability for greenwashing. The framework ultimately provides the basis for regulatory recommendations aimed at strengthening sustainable finance law in Indonesia and other emerging economies.

RESULT AND DISCUSSION

1. Global Developments in Climate Financial Risk Regulation and the Transformation of Sustainable Finance Law

Global financial law has undergone significant transformation as climate change has become an integral component of the international financial stability agenda. Financial regulation, traditionally focused on monetary stability, investor protection, capital adequacy, and market risk, increasingly recognizes climate risk as a systemic and cross-jurisdictional financial concern (Varadi et al., 2026). The Financial Stability Board (FSB) identifies climate-related risks as potential sources of asset devaluation, shifts in risk premiums, market disruption, and long-term economic uncertainty (Monnin, 2026). Consequently, climate change is no longer treated merely as an environmental externality, but as a factor that can affect asset quality, financial resilience, and capital-market integrity.

This transformation accelerated following the Paris Agreement, as sustainability shifted from a largely voluntary component of corporate social responsibility to an integral element of financial governance (Richardson, 2024; De Arriba-Sellier, 2025). A major development was the establishment of the Task Force on Climate-related Financial Disclosures (TCFD), whose framework emphasizes governance, strategy, risk management, and metrics and targets. The framework is intended to promote consistent, comparable, and decision-useful climate disclosures and to reduce the risk of mispricing in financial markets (Scholten et al., 2020). Climate disclosure has subsequently moved from voluntary practice toward regulatory obligation. Many FSB jurisdictions have introduced regulations, guidelines, or roadmaps for climate-risk disclosure, while some have adopted International Sustainability Standards Board (ISSB) standards (Benjamin, 2025). Nevertheless, implementation remains uneven. The Basel Committee on Banking Supervision, for example, adopted a voluntary climate-risk disclosure framework in 2025, reflecting cross-jurisdictional differences in data quality, institutional capacity, and climate-risk measurement methodologies (Kim & Yang, 2026; Penikas & Vasilyeva, 2024). This divergence illustrates the tension between regulatory flexibility and legal certainty. Voluntary approaches can accommodate evolving methodologies (L. Liu et al., 2024), but they may also generate inconsistent information and increase the risk of sustainability-related manipulation (Saleh, 2026). This concern is particularly relevant to greenwashing, which has expanded alongside growing demand for sustainable investments and green financial products (Dempere et al., 2024). Studies have identified a disclosure-performance gap between corporate sustainability narratives and actual environmental performance (De Fino et al., 2026; Frostenson, 2023).

A related phenomenon is crosswashing, whereby companies improve ESG scores through limited sustainability initiatives while retaining core business activities that generate substantial environmental impacts (Zervoudi et al., 2025). Such practices demonstrate that sustainability governance extends beyond the accuracy of disclosure to encompass the integrity of corporate conduct and market incentives. Where sustainability information materially influences investment decisions, misleading claims should therefore give rise to legal consequences comparable to those associated with violations of conventional capital-market disclosure obligations (Morgandi, 2024). These developments indicate a broader transition from disclosure-based regulation to accountability-based regulation. Regulators increasingly require

not only sustainability disclosure but also mechanisms for verification, assurance, and supervision (Simnett et al., 2026). The European Union illustrates this trend by emphasizing measurable, comparable, and verifiable ESG information as a means of reducing greenwashing risk (Rimmel et al., 2025). Sustainability regulation is therefore evolving from formal reporting requirements toward substantive accountability for the credibility of disclosed information.

Nevertheless, a significant legal gap remains. Although sustainability disclosure and supervisory standards have developed rapidly, legal liability for misleading sustainability information remains fragmented. Jurisdictions variously rely on investor and consumer protection, administrative sanctions, or market-based mechanisms (Joo et al., 2026). This creates an imbalance between transparency and accountability because disclosure obligations are not always accompanied by clear rules governing responsibility and legal consequences when sustainability claims fail to reflect actual conditions (Spanò et al., 2025). The findings therefore indicate that the central challenge of sustainable finance governance is no longer merely the availability of disclosure rules, but the development of an effective legal accountability mechanism that links climate risk, sustainability disclosure, and investor protection. Sustainable finance law should consequently move beyond stronger reporting standards toward a climate financial liability framework capable of establishing clear accountability and proportionate legal consequences for greenwashing and other sustainability-related misrepresentations.

2. Effectiveness of the Sustainable Finance Legal Framework in Indonesia

The development of sustainable finance in Indonesia reflects the growing global recognition of climate change as a systemic financial risk. As a developing country with high climate vulnerability and substantial financing needs, Indonesia faces the dual challenge of sustaining economic growth while transitioning toward a low-carbon economy. The financial sector therefore plays a strategic role in aligning development finance with environmental and social objectives (Wayan Budiasa, 2020; Berensmann, 2024). Indonesia has progressively integrated sustainability considerations into financial regulation through various Financial Services Authority (OJK) policies, reflecting a shift from a conventional focus on market stability toward a governance framework that also incorporates environmental and social risks (Mahardika & Bayu, 2022; Saputra & Dhianty, 2022). A major development is the Indonesian Sustainable Finance Taxonomy (TKBI), which evolved from the Indonesian Green Taxonomy and provides a common classification framework for sustainable economic activities. From a legal perspective, the taxonomy functions not only as a technical guideline but also as a normative reference for distinguishing among green, transitional, and unsustainable activities (Rynska, 2025).

The TKBI strengthens regulatory certainty by providing regulators, investors, financial institutions, and businesses with common sustainability criteria, thereby reducing inconsistent ESG assessments and the potential for greenwashing. However, its effectiveness depends on implementation, verification, and regulatory oversight (Schütze & Sandbaek, 2025). OJK policies have also encouraged financial institutions to develop sustainable finance action plans, integrate environmental risks into risk-management processes, and issue sustainability reports, demonstrating the growing incorporation of sustainability into financial governance (Endarto, 2024; Kartiko et al., 2024; Yuspin et al., 2024). Despite this progress, the study identifies four

major regulatory challenges. First, the existing framework remains strongly compliance- and disclosure-oriented. Current instruments primarily emphasize reporting, information disclosure, and sustainability action plans. Although these obligations enhance transparency, administrative compliance does not necessarily ensure substantive sustainability performance (Cam & Klovienė, 2026; Poll, 2023). The disclosure-based regulatory paradigm assumes that transparency promotes market discipline; however, disclosure without adequate verification may instead facilitate misleading sustainability claims (Alatta Mohamed & Elamin Elboukhari, 2026). Second, the integration of climate risk into financial supervision remains limited. Climate risks are long-term, multidimensional, and difficult to capture through conventional financial indicators (Caravaggio et al., 2025; Varadi et al., 2026). Unlike traditional risks measured through indicators such as capital adequacy, liquidity, and asset quality, climate-risk assessment depends on evolving methodologies and assumptions. This increases supervisory complexity and requires stronger data, analytical methodologies, and institutional capacity.

Third, an imbalance persists between ESG disclosure requirements and verification capacity. Although regulations have increased the volume of sustainability information, existing verification mechanisms remain insufficient to ensure its accuracy and reliability (G. Chen & Zou, 2025; Chopra et al., 2024; Gazzola et al., 2026). Sustainability reports frequently rely on internally generated corporate data without robust independent verification. Where ESG information influences investment decisions, its reliability should approach the standard expected of financial information; otherwise, companies retain substantial scope to make claims that are difficult to verify objectively. Fourth, enforcement and legal liability for greenwashing remain underdeveloped. Indonesia's current framework primarily emphasizes preventive, compliance-oriented, and guidance-based mechanisms. However, as sustainable finance markets become more complex, stronger enforcement mechanisms are required. Existing regulations have not yet clearly established the legal characterization of greenwashing violations, standards of proof, causation requirements, or applicable sanctions for misleading sustainability information (J. Nieto & Papathanassiou, 2026; Sneideriene & Legenzova, 2025). This creates a gap between regulatory objectives and effective legal accountability. Overall, Indonesia's sustainable finance framework remains in a transitional phase. A relatively strong normative foundation has been established through OJK policies, sustainability reporting requirements, and the TKBI, but implementation, verification, supervision, and enforcement remain comparatively weak. The principal challenge is therefore no longer the absence of regulation, but the capacity of the legal system to convert transparency into accountability. Future reform should move beyond requiring ESG disclosure toward establishing clear verification, supervisory, and liability mechanisms for inaccurate or misleading sustainability information.

3. Greenwashing, Legal Liability, and Weaknesses in Law Enforcement Mechanisms

The expansion of sustainable finance requires sustainability information that is both accurate and accountable, as investors and regulators increasingly rely on ESG disclosures in financial decision-making (Ganc et al., 2026). However, this development has also intensified the risk of greenwashing, whereby companies present misleading or unsupported sustainability claims to enhance their

environmental reputation (Poiriazi et al., 2025). Such practices should no longer be viewed merely as ethical concerns because misleading sustainability information may distort investment decisions, harm investors, and undermine market integrity (Williams, 2024; Dempere et al., 2024). This study identifies significant weaknesses in Indonesia's legal framework for addressing greenwashing. Existing regulations emphasize sustainability reporting but provide limited clarity regarding the definition of greenwashing, potentially liable parties, standards of proof, verification mechanisms, and applicable sanctions. Sustainability information is also more difficult to verify than conventional financial information because it frequently relies on projections, assumptions, and non-standardized indicators (Jebe, 2019; Bernini & La Rosa, 2025). Consequently, formal compliance with disclosure obligations does not necessarily ensure substantive accountability.

Legal accountability is further constrained by limited independent verification and the predominance of administrative sanctions. Existing mechanisms do not adequately address individual responsibility or provide sufficiently strong consequences for materially misleading ESG information. This creates an imbalance between expanding disclosure obligations and limited enforcement capacity (Linares Membrilla, 2026). The central challenge is therefore not the absence of sustainability disclosure, but the lack of a coherent legal framework connecting disclosure, verification, supervision, and liability. Accordingly, sustainable finance law must move from transparency toward accountability. Transparency without effective verification and legal consequences risks creating only an appearance of sustainability (Nagina, 2025). This finding provides the conceptual foundation for the Climate Financial Liability Framework developed in this study.

4. Reconstruction of the Climate Financial Liability Framework as a Governance and Oversight Model for Greenwashing

This study proposes the Climate Financial Liability Framework as a reconstruction of sustainable finance law that integrates climate-risk management, sustainability governance, supervision, and legal accountability. Unlike conventional approaches that treat disclosure as the endpoint of regulation, this framework treats disclosure as the starting point for verification, supervision, and accountability (Gulati et al., 2025). Climate and sustainability information should therefore be treated as material information capable of influencing investment and financing decisions, so that materially misleading information may constitute a basis for legal liability (Cassola et al., 2025). The framework consists of four interconnected pillars: (1) materiality-based disclosure, requiring relevant, comparable, and reliable climate information; (2) independent sustainability assurance, ensuring the credibility and verifiability of ESG claims; (3) risk-based supervision, enabling regulators to assess substantive climate risks rather than merely formal administrative compliance; and (4) a legal liability regime that establishes clear responsibility and proportionate consequences for greenwashing.

Legal liability should incorporate appropriate administrative and civil mechanisms. Regulators should be empowered to impose sanctions, require corrective disclosures, restrict activities, or revoke sustainability labels in response to misleading claims. Investors who reasonably rely on materially misleading sustainability information should also have access to legal remedies where the necessary elements of liability are established (Morrow & Cullen, 2019; Talouni &

Rabczun, 2022). The framework also requires harmonization with international sustainability standards to reduce regulatory inconsistency and opportunities for arbitrage across jurisdictions (Paun et al., 2025; Friedrich & Thiemann, 2021). In Indonesia, alignment with evolving ISSB, TCFD, and FSB standards can strengthen the credibility of sustainable finance governance while remaining responsive to domestic institutional capacity.

Ultimately, the Climate Financial Liability Framework shifts sustainable finance law from disclosure-based regulation to accountability-based regulation. Its principal contribution lies in integrating disclosure, independent verification, risk-based supervision, and legal liability within a unified governance model. This framework is particularly relevant to Indonesia and other emerging economies seeking to balance sustainable investment, economic development, and market integrity.

CONCLUSION

This study demonstrates that sustainable finance law is evolving from a conventional focus on financial stability toward the governance of climate-related financial risks. Although global and Indonesian regulations have strengthened ESG disclosure, sustainability reporting, and climate-risk management, mechanisms of legal accountability have not developed at the same pace. In Indonesia, OJK policies and the Indonesian Sustainable Finance Taxonomy provide an important normative foundation, but weaknesses remain in ESG verification, climate-risk supervision, enforcement, and liability for misleading sustainability information. Greenwashing therefore represents not merely an ethical or disclosure problem, but a legal accountability issue affecting investors and market integrity. Existing regulations remain insufficiently clear regarding the definition of greenwashing, standards of proof, responsible parties, and legal consequences. To address this gap, the study proposes the Climate Financial Liability Framework, which integrates four elements: materiality-based disclosure, independent sustainability assurance, risk-based supervision, and legal liability. The framework shifts sustainable finance governance from disclosure-based regulation toward accountability-based regulation, ensuring that sustainability information is not only disclosed but also verifiable and subject to legal accountability. Accordingly, Indonesia should strengthen ESG disclosure standards, independent verification, climate-risk-based OJK supervision, and proportionate liability mechanisms for greenwashing, while aligning domestic regulation with relevant international standards. Future empirical research should evaluate the implementation and enforcement effectiveness of this framework within the financial sector.

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