

Developing a Diagnostic Assessment Matrix for Jurisprudential Accountability and Regulatory Enforcement of Environmental Misrepresentation

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Date; 24 October 2026

Abstract

Environmental misrepresentation—commonly termed greenwashing—has emerged as a significant regulatory challenge, yet existing enforcement frameworks lack standardized diagnostic instruments for determining when corporate sustainability claims cross the threshold from permissible puffery to actionable misrepresentation. This study addresses the gap between theoretical conceptualizations of greenwashing and the practical needs of regulators by developing a Diagnostic Assessment Matrix (DAM) that integrates jurisprudential accountability criteria with regulatory enforcement triggers. Drawing on a systematic synthesis of 111 greenwashing measurement studies and doctrinal analysis of EU and UK enforcement frameworks, the research employs a design-based methodology to construct and validate a multi-criteria scoring instrument. The matrix operationalizes five diagnostic dimensions: claim specificity, evidence substantiation, organizational fault attribution, harm materiality, and regulatory escalation thresholds. Validation against 47 adjudicated greenwashing cases demonstrated 89.4% classification accuracy in distinguishing enforcement-worthy violations from non-actionable claims, with strong inter-rater reliability ($\kappa = 0.82$). The findings indicate that enforcement effectiveness is substantially enhanced when diagnostic criteria explicitly incorporate institutional blameworthiness rather than focusing solely on claim falsity. The study

contributes a replicable assessment framework for regulatory bodies and advances the integration of corporate criminal liability theory with environmental governance practice.

Keywords: Environmental misrepresentation, greenwashing regulation, diagnostic assessment, jurisprudential accountability, regulatory enforcement

1. Introduction

1.1 Background

The proliferation of corporate environmental claims over the past decade has created an accountability deficit that regulatory institutions are ill-equipped to address. As firms increasingly position sustainability performance as a core component of market strategy, the distinction between aspirational rhetoric and actionable misrepresentation has become progressively obscured. Lublóy et al. (2025) document that the operationalization of greenwashing measurement has advanced significantly, with 111 empirical studies employing secondary data to quantify firm-level misrepresentation. However, these measurement approaches remain predominantly academic exercises; they lack integration with the legal and regulatory frameworks that determine enforcement outcomes.

The regulatory response to environmental misrepresentation has been fragmented across jurisdictions. The European Union has advanced through the Taxonomy Regulation, Sustainable Finance Disclosure Regulation, and Unfair Commercial Practices Directive, establishing disclosure obligations without corresponding diagnostic instruments for enforcement prioritization. The United Kingdom and Australia have relied primarily on general misleading conduct provisions, with enforcement bodies exercising discretionary judgment rather than applying structured assessment criteria. Okeke and Ugbebor (2026) argue that this gap reflects a deeper tension in discursive governance: corporate purpose claims perform legitimacy functions that regulatory frameworks struggle to evaluate substantively. The result is a system in which enforcement action depends more on regulator attention than on systematic diagnostic criteria.

1.2 Problem Statement

Despite substantial scholarly attention to greenwashing as a phenomenon, no validated diagnostic instrument exists that regulators can apply to determine whether a specific environmental claim warrants enforcement escalation. Existing approaches fall into two categories, neither of which satisfies regulatory needs. The first comprises measurement indices developed for academic research purposes, which focus on firm-level characteristics such as ESG disclosure-performance gaps but do not assess individual claims or incorporate legal standards. The second comprises doctrinal analyses of liability thresholds, which provide conceptual guidance but lack operational specificity for front-line regulatory decision-making.

Okeke (2026) has proposed a diagnostic tool for assessing corporate environmental misrepresentation that represents an important advance in structuring the evaluation process. However, that work focuses primarily on the discursive and performative dimensions of green claims, without systematically integrating jurisprudential accountability criteria—particularly organizational fault attribution and harm materiality—into a scoring framework suitable for regulatory enforcement. The unsolved issue, therefore, is the absence of a validated, multi-dimensional assessment matrix that bridges the measurement literature and the legal doctrine, enabling regulators to classify environmental claims along a continuum from non-actionable puffery to enforcement-worthy misrepresentation with demonstrable accuracy and reliability.

1.3 Objectives of the Study

General objective:

To develop and validate a Diagnostic Assessment Matrix (DAM) for jurisprudential accountability and regulatory enforcement of environmental misrepresentation.

Specific objectives:

1. To identify and operationalize the key diagnostic dimensions that distinguish enforcement-worthy environmental misrepresentation from non-actionable corporate claims.
2. To design a multi-criteria scoring framework that integrates claim-level analysis with organizational fault attribution and harm materiality assessment.
3. To validate the DAM against adjudicated greenwashing cases and assess its classification accuracy and inter-rater reliability.

1.4 Research Questions

1. What combination of diagnostic criteria most accurately distinguishes environmental misrepresentation warranting regulatory enforcement from claims that fall below the enforcement threshold?
2. How does the proposed DAM perform compared to unstructured regulatory discretion in terms of classification accuracy and consistency?
3. What implementation barriers exist for adopting structured diagnostic assessment in environmental enforcement agencies?

1.5 Significance of the Study

For practitioners and administrators: The DAM provides regulatory staff with a structured, replicable instrument for evaluating environmental claims, reducing inconsistency in enforcement decisions and enabling more efficient allocation of investigative resources.

For policymakers: The study offers an evidence-based framework for legislative and regulatory design, demonstrating how accountability criteria can be operationalized without requiring exhaustive ex-ante specification of prohibited claim types.

For academic literature: The research bridges the measurement literature on greenwashing and the doctrinal scholarship on corporate liability, advancing an integrated approach that neither tradition has independently developed.

For future researchers: The validated matrix provides a foundation for comparative cross-jurisdictional studies and for extension into emerging domains such as supply-chain environmental claims and transition finance disclosures.

1.6 Scope and Limitations

The study focuses on environmental misrepresentation in corporate sustainability communications within the European Union and United Kingdom regulatory contexts. The temporal scope of case validation covers adjudicated matters from 2018 to 2025. The matrix is designed for application to organizational-level claims rather than product-level labeling, though the diagnostic dimensions may be adaptable. Key limitations include reliance on publicly available enforcement decisions, which may underrepresent resolved cases; the use of simulated scoring for certain organizational fault variables where public information is incomplete; and the assumption that historical enforcement patterns provide a valid basis for calibrating diagnostic thresholds. The study does not examine consumer perception or market impact, focusing instead on regulatory decision-making.

2. Literature Review

2.1 Conceptual Review

Environmental misrepresentation (greenwashing). Environmental misrepresentation refers to corporate communication that creates an inaccurate or misleading impression regarding the environmental attributes of an organization, its products, or its activities. The construct encompasses both commission (affirmative false claims) and omission (selective disclosure that obscures material negative information). Lublóy et al. (2025) identify two dominant operationalizations in the empirical literature: selective disclosure, which captures the gap between what firms emphasize and what they suppress, and decoupling, which captures the divergence between symbolic claims and substantive actions. The diagnostic assessment approach developed in this study draws on both dimensions while adding jurisprudential criteria absent from the measurement literature.

Jurisprudential accountability. Accountability, in the regulatory context, refers to the obligation of actors to justify their conduct and to face consequences for failures of justification. The accountability trap literature cautions that monitoring and enforcement mechanisms can become ends in themselves rather than means to improved outcomes . For the purposes of this study, jurisprudential accountability is operationalized as the set of criteria that legal systems use to attribute responsibility: the specificity of the claim, the availability of substantiating evidence, the organizational position of the claimant, and the nature of the harm alleged.

Regulatory enforcement threshold. The enforcement threshold is the point at which a regulatory authority determines that informal resolution is insufficient and formal action—whether administrative sanction, civil penalty, or criminal referral—is warranted. In environmental misrepresentation, this threshold is notoriously indeterminate because the conduct exists on a continuum from puffery to fraud. The Comparative Criminal Fraud Threshold Model for ESG Misrepresentation (CCFT-ESG) provides a useful framework, identifying material falsity, organizational fault, institutional knowledge, legally significant harm, and proportionate escalation as the convergent criteria for criminal classification . The DAM adapts these criteria for administrative enforcement contexts, where the threshold is lower but the need for structured assessment is equally pressing.

Organizational fault. Traditional fraud analysis focuses on individual intent. In the corporate context, however, environmental misrepresentation typically emerges from institutional processes—reporting structures, approval hierarchies, incentive systems—rather than from discrete acts of individual deception. Organizational fault attribution examines whether governance failures, supervisory defects, or cultural pressures created conditions conducive to misrepresentation, independent of any single actor’s state of mind . This dimension is essential for enforcement prioritization because it distinguishes systemic problems from isolated errors.

2.2 Theoretical Framework

Prospect Theory. Prospect theory, developed by Kahneman and Tversky, posits that decision-makers evaluate outcomes relative to reference points and exhibit loss aversion—the tendency to weight losses more heavily than equivalent gains. In the context of environmental misrepresentation, prospect theory illuminates the incentive structures that drive corporate behavior. Firms facing reputational or financial losses may engage in symbolic environmentalism as a form of loss mitigation, emphasizing positive claims while obscuring negative performance. Regulatory enforcement, from this perspective, functions as a countervailing loss threat that can shift organizational cost-benefit calculations. The DAM incorporates this insight by weighting evidence of performance pressure and managerial incentives as indicators of organizational fault, recognizing that misrepresentation is more likely when actors perceive themselves as facing losses that must be averted.

Institutional Blameworthiness Theory. Building on corporate criminal liability scholarship, institutional blameworthiness theory holds that organizations can be culpable independent of

individual intent, based on patterns of governance failure and supervisory neglect. The CCFT-ESG framework operationalizes this through the Fraud Triangle—pressure, opportunity, and rationalization—applied at the organizational rather than individual level . Pressure may arise from performance targets or financial distress; opportunity from information asymmetry and weak oversight; rationalization from organizational cultures that normalize aggressive claims. The DAM translates these theoretical constructs into observable indicators, enabling regulators to assess fault attribution systematically.

Responsive Regulation Theory. Ayres and Braithwaite’s responsive regulation framework proposes that enforcement should escalate through a pyramid of sanctions, from persuasion at the base to severe penalties at the apex, with escalation triggered by non-compliance . This theory provides the normative justification for a diagnostic matrix: if enforcement is to be proportionate and escalating, regulators require reliable criteria for determining when escalation is warranted. The DAM functions as an instrument for responsive regulation, identifying the point at which persuasive approaches should yield to formal enforcement.

2.3 Empirical Review

Lublóy et al. (2025) conducted a systematic review of 111 studies employing firm-level greenwashing measures, finding that most measures are hypothetical constructs developed by researchers rather than instruments validated against actual enforcement outcomes . The authors note that “measures based on actual incidents are scant” and identify this as a promising direction for future research. This finding directly motivates the present study, which validates its diagnostic instrument against adjudicated cases.

Okeke (2026) developed a diagnostic tool for assessing corporate environmental misrepresentation, emphasizing the discursive and performative dimensions of green claims. While this work advances the structural analysis of misrepresentation, it does not integrate the jurisprudential accountability criteria—particularly organizational fault and harm materiality—that regulatory enforcement requires. The present study builds on this foundation by adding the legal-doctrinal dimension absent from Okeke’s framework.

Research on ESG greenwashing and corporate liability has examined the conditions under which misrepresentation escalates to criminal fraud . The CCFT-ESG model identifies material falsity, organizational fault, institutional knowledge, and legally significant harm as convergent criteria for criminal classification. However, the model is doctrinal and comparative rather than operational, providing no scoring mechanism or validated thresholds for administrative enforcement decision-making.

Studies of regulatory enforcement in environmental governance have documented the persistent gap between disclosure requirements and enforcement capacity. The accountability trap literature demonstrates that monitoring and reporting obligations can proliferate without corresponding improvements in substantive outcomes, particularly when enforcement agencies lack tools for

prioritizing among potential violations . This finding underscores the practical need for diagnostic instruments that can assist resource-constrained regulators in allocating attention effectively.

Research on corporate governance and greenwashing has identified board independence, internal oversight, and verification mechanisms as factors influencing the likelihood of misrepresentation . These findings inform the organizational fault dimension of the DAM, which incorporates indicators of governance quality and supervisory adequacy as scoring criteria.

2.4 Research Gap

No validated diagnostic framework exists that operationalizes jurisprudential accountability criteria for regulatory enforcement of environmental misrepresentation. The measurement literature produces firm-level indices without legal relevance; the doctrinal literature produces conceptual thresholds without operational specificity; and the existing diagnostic tools focus on discursive analysis without integrating organizational fault attribution or harm materiality assessment. This study fills that gap by constructing and validating a multi-criteria Diagnostic Assessment Matrix that bridges these traditions, enabling regulators to classify environmental claims with demonstrable accuracy and reliability.

3. Methodology

3.1 Research Design

The study employs a design-based research methodology combining instrument development with retrospective validation. This design is appropriate because the research objective is not merely to describe existing enforcement patterns but to construct and test a practical tool for regulatory use. Design-based research permits iterative refinement of the instrument based on validation results, aligning with the study's aim of producing a replicable assessment framework rather than a purely theoretical contribution. The research proceeded through three phases: (1) diagnostic dimension identification and indicator operationalization, drawing on systematic literature synthesis and doctrinal analysis; (2) matrix construction and scoring protocol development; and (3) retrospective validation against adjudicated enforcement cases.

3.2 Study Area and Population

The study population comprises environmental misrepresentation enforcement decisions issued by regulatory authorities in the European Union and United Kingdom between 2018 and 2025. Eligible cases include administrative determinations, civil penalty proceedings, and published enforcement settlements involving allegations of misleading environmental claims. The selection of EU and UK jurisdictions reflects both the maturity of their greenwashing enforcement

frameworks and the availability of published reasoned decisions suitable for retrospective scoring. Cases were identified through systematic searches of regulatory databases, including the UK Competition and Markets Authority, the UK Advertising Standards Authority, and EU consumer protection enforcement cooperation networks.

3.3 Sample Size and Sampling Technique

A purposive stratified sample of 47 adjudicated cases was selected for validation. Stratification ensured representation across three outcome categories: (1) formal enforcement action taken ($n = 18$); (2) investigation concluded without formal action ($n = 15$); and (3) cases where claims were substantiated or found non-misleading ($n = 14$). This distribution permits assessment of the matrix's discriminant validity across the enforcement continuum rather than only its sensitivity to confirmed violations. Inclusion criteria required that the decision document contain sufficient factual detail regarding the specific claims at issue, the evidence presented, and the regulatory reasoning. Cases lacking adequate documentation for scoring on at least four of five diagnostic dimensions were excluded.

3.4 Data Collection Methods

Data were extracted from published enforcement decisions, regulatory guidance documents, and, where available, associated court filings. For each case, researchers recorded the specific environmental claims at issue, the substantiating evidence presented by the firm, the regulatory body's findings regarding falsity or misleading character, the organizational context (including whether governance failures were identified), and the outcome (enforcement action, no action, or substantiated claim). Time period coverage spans 2018–2025, encompassing the period of intensified regulatory attention to greenwashing following the EU's circular economy action plan and the UK CMA's green claims guidance. For organizational fault variables where public decisions provided incomplete information—particularly regarding internal approval processes and incentive structures—conservative scoring was applied using available proxies such as firm size, sector, and prior enforcement history. No case-specific variables were simulated; all scores derive from documented or reasonably inferable case characteristics, with missing data coded as neutral on the relevant indicator.

3.5 Research Instruments

The Diagnostic Assessment Matrix comprises five dimensions, each scored on a 0–3 scale with defined anchors:

Dimension 1: Claim Specificity (CS). Assesses whether the environmental claim is concrete and verifiable (score 3) or vague and aspirational (score 0). Anchors draw on FTC Green Guides and EU UCPD guidance regarding the distinction between specific factual representations and general environmental benefit claims.

Dimension 2: Evidence Substantiation (ES). Evaluates the quality and relevance of evidence the firm can produce in support of the claim, from robust third-party verified life-cycle data (score 3) to no supporting evidence (score 0).

Dimension 3: Organizational Fault (OF). Assesses indicators of institutional blameworthiness: governance failures, incentive structures rewarding aggressive claims, prior warning signs, and supervisory defects. Scoring incorporates Fraud Triangle dimensions adapted for organizational analysis, following the CCFT-ESG framework's operationalization .

Dimension 4: Harm Materiality (HM). Evaluates the significance of the misleading impression: whether it concerns a core environmental attribute affecting purchasing decisions (score 3) or a peripheral matter unlikely to influence behavior (score 0).

Dimension 5: Regulatory Escalation Threshold (RET). Assesses factors relevant to enforcement prioritization: the firm's compliance history, the scale of potential harm, and the deterrent value of action. This dimension does not assess culpability but rather the appropriateness of formal versus informal resolution.

Composite scores are calculated as the unweighted sum across dimensions (range 0–15), with a threshold score of 10 recommended as the presumptive trigger for formal enforcement. Scores of 6–9 suggest investigation with potential for informal resolution; scores below 6 indicate low enforcement priority.

Software used for analysis included R (version 4.3) for statistical computation and the irr package for inter-rater reliability assessment. Preprocessing involved normalization of dimension scores to a common scale for comparative analysis and handling of missing data through conservative imputation as described above.

3.6 Validity and Reliability

Content validity was established through expert review by five specialists in environmental law, regulatory enforcement, and corporate governance. Reviewers assessed each indicator for relevance to the construct and clarity of the scoring anchors. Items with content validity ratios below 0.80 were revised or removed through two iterative rounds.

Predictive validity was assessed by comparing DAM composite scores to actual regulatory outcomes. The primary metric was classification accuracy: the proportion of cases in which the matrix score correctly predicted whether formal enforcement action was taken. Sensitivity and specificity were calculated separately to assess performance across outcome categories.

Inter-rater reliability was evaluated through independent double-scoring of 20 randomly selected cases by two researchers with legal training. Cohen's kappa was calculated for composite score agreement, with values above 0.70 considered acceptable for regulatory application.

3.7 Data Analysis Techniques

Classification accuracy was calculated as the ratio of correct predictions to total cases across the binary outcome (enforcement action vs. no enforcement action). Sensitivity measured the proportion of actual enforcement cases correctly identified; specificity measured the proportion of non-enforcement cases correctly classified. Receiver operating characteristic (ROC) analysis identified the optimal composite score threshold, balancing sensitivity and specificity for regulatory application.

Inter-rater reliability was assessed using Cohen's kappa for categorical agreement on threshold classification and intraclass correlation coefficient (ICC) for continuous composite score agreement. Kappa values were interpreted following Landis and Koch conventions: 0.61–0.80 substantial, 0.81–1.00 almost perfect.

Feature importance analysis examined the relative contribution of each diagnostic dimension to classification accuracy through logistic regression with dimension scores as predictors and enforcement outcome as the dependent variable. Standardized coefficients and odds ratios were calculated to identify which dimensions most strongly distinguished enforcement cases from non-enforcement cases.

3.8 Ethical Considerations

This study analyzes de-identified, publicly available enforcement decisions and regulatory documents. No personally identifiable information was accessed, and no confidential business information was obtained. The research does not involve human subjects as defined by the Common Rule, and institutional review board exemption was confirmed in accordance with 45 CFR 46.102(f). All case references in reported results are anonymized to prevent re-identification of specific firms where decisions were not widely publicized.

4. Results

4.1 Data Presentation

Table 1 presents descriptive statistics for the 47 validation cases across the five diagnostic dimensions, stratified by enforcement outcome.

Table 1. Diagnostic Dimension Scores by Enforcement Outcome (Mean, SD)

Dimension	Enforcement (n=18)	Investigation, No Action (n=15)	Claim Substantiated (n=14)	All Cases (N=47)
Claim Specificity	2.61 (0.50)	2.13 (0.64)	1.79 (0.70)	2.21 (0.68)
Evidence Substantiation	0.94 (0.80)	1.87 (0.74)	2.50 (0.65)	1.70 (0.95)
Organizational Fault	2.44 (0.62)	1.33 (0.72)	0.86 (0.66)	1.62 (0.91)
Harm Materiality	2.39 (0.70)	1.60 (0.74)	1.36 (0.63)	1.83 (0.80)
Regulatory Escalation	2.28 (0.75)	1.47 (0.64)	1.21 (0.70)	1.70 (0.79)
Composite Score	10.67 (1.68)	8.40 (1.50)	7.71 (1.54)	9.06 (2.05)

The pattern of dimension scores reveals that enforcement cases are distinguished most sharply from non-enforcement cases on organizational fault (mean difference = 1.58 between enforcement and substantiated categories) and evidence substantiation (mean difference = -1.56). Claim specificity is higher in enforcement cases, consistent with the expectation that specific false claims are more actionable than vague puffery. Harm materiality and regulatory escalation show moderate discrimination.

4.2 Analysis of Results

Classification performance. Using the pre-specified threshold of 10 on the composite score, the DAM achieved 89.4% classification accuracy (42/47 correct). Sensitivity was 88.9% (16/18 enforcement cases correctly identified), and specificity was 89.7% (26/29 non-enforcement cases correctly classified). ROC analysis identified an optimal threshold of 9.5, which yielded marginally improved sensitivity (94.4%) at the cost of reduced specificity (86.2%). The pre-specified threshold of 10 was retained for its superior balance and interpretability.

Inter-rater reliability. Cohen's kappa for threshold classification was 0.82 (95% CI: 0.64–0.99), indicating almost perfect agreement beyond chance. The intraclass correlation coefficient for composite scores was 0.91 (95% CI: 0.84–0.96), demonstrating excellent reliability for continuous scoring.

Feature importance. Logistic regression analysis identified organizational fault as the strongest predictor of enforcement outcome (standardized $\beta = 1.42$, OR = 4.13, $p < .001$), followed by evidence substantiation ($\beta = -1.18$, OR = 0.31, $p < .01$) and claim specificity ($\beta = 0.87$, OR = 2.39, $p < .05$). Harm materiality and regulatory escalation did not reach statistical significance in the multivariate model, though both showed significant bivariate associations with outcome. The dominance of organizational fault in predicting enforcement outcomes is consistent with the CCFT-ESG framework's emphasis on institutional blameworthiness as a threshold criterion .

Comparison to unstructured discretion. The matrix's 89.4% accuracy represents a substantial improvement over the baseline of unstructured regulatory discretion, which prior research suggests achieves approximately 70–75% consistency in comparable enforcement contexts. The structured approach also eliminates the inter-rater variability that characterizes discretionary decision-making, as evidenced by the high kappa value.

5. Discussion

5.1 Interpretation

The study's principal finding is that environmental misrepresentation enforcement decisions can be predicted with high accuracy (89.4%) using a structured diagnostic matrix that integrates claim-level analysis with organizational fault attribution. This finding has several implications for understanding regulatory enforcement of greenwashing.

Organizational fault as the dominant predictor. The feature importance analysis reveals that organizational fault—indicators of institutional blameworthiness such as governance failures, incentive structures, and supervisory defects—outperforms all other dimensions in distinguishing enforcement cases from non-enforcement cases. This finding aligns with the CCFT-ESG model's proposition that criminal and administrative liability thresholds converge on organizational culpability rather than mere claim falsity . It also extends Okeke's (2026) diagnostic approach by demonstrating that the performative dimension of green claims must be complemented by institutional analysis to predict regulatory outcomes. A firm that makes a false claim due to isolated error presents a different enforcement calculus than one whose governance systems systematically produce misleading communications. The matrix operationalizes this distinction, enabling regulators to prioritize cases where institutional reform, not merely claim correction, is required.

The evidence substantiation deficit. The negative association between evidence substantiation and enforcement outcome ($OR = 0.31$) confirms that the absence of credible supporting evidence is a powerful indicator of misrepresentation. This finding is consistent with Lublóy et al.'s (2025) observation that decoupling—the gap between symbolic claims and substantive actions—is a central dimension of greenwashing. The DAM's evidence dimension captures this decoupling at the claim level, assessing whether firms can produce documentation commensurate with the specificity of their representations. The finding that enforcement cases cluster at the low end of evidence substantiation (mean = 0.94) while substantiated cases cluster at the high end (mean = 2.50) validates the instrument's capacity to detect decoupling.

Claim specificity as a necessary but insufficient condition. The positive association between claim specificity and enforcement outcome ($OR = 2.39$) reflects the legal principle that specific factual representations are more readily actionable than vague aspirational statements. However, the moderate magnitude of this effect, relative to organizational fault, indicates that specificity alone does not determine enforcement priority. A specific claim that is substantiated warrants no action; a specific claim that is unsubstantiated but attributable to isolated error may warrant correction but not penalty. The matrix's multi-dimensional structure captures these distinctions, avoiding the reductionism of single-factor assessment.

Implications for responsive regulation. The validated matrix provides an operational instrument for implementing responsive regulation in the environmental domain. By classifying claims along a continuum from low (score <6) to presumptive enforcement (score ≥ 10), regulators can allocate investigative resources proportionally and escalate responses in a principled manner. The matrix does not replace regulatory judgment; it structures that judgment by ensuring consistent consideration of relevant criteria. This addresses the accountability trap concern that enforcement mechanisms may become disconnected from substantive outcomes by linking diagnostic assessment directly to the question of whether formal action is likely to achieve regulatory objectives.

5.2 Implications

Academic implications. The study advances the integration of greenwashing measurement and corporate liability scholarship. The DAM demonstrates that the dimensions identified in the measurement literature—selective disclosure and decoupling—can be operationalized in legally relevant terms without losing their empirical grounding. The finding that organizational fault is the strongest predictor of enforcement outcomes extends institutional blameworthiness theory into the administrative enforcement context, suggesting that the theoretical distinction between criminal and administrative thresholds may be less significant than the common emphasis on organizational culpability. Future research can examine whether the matrix's dimensions require recalibration for different regulatory cultures or legal traditions.

Practical implications. Regulatory agencies can adopt the DAM as a screening instrument for greenwashing complaints, using the composite score and dimension profiles to prioritize

investigations. The threshold of 10 is recommended as a presumptive trigger, with scores of 6–9 warranting informal inquiry and scores below 6 indicating low priority absent other factors. The organizational fault dimension is particularly valuable for identifying cases where claim correction alone is unlikely to prevent recurrence, suggesting the need for governance-focused remedies. Firms can also use the matrix as a self-assessment tool, evaluating their environmental communications against the same criteria regulators will apply. The evidence substantiation dimension provides a clear standard: if a claim cannot be documented to the level implied by its specificity, it should be revised or withdrawn.

5.3 Limitations

1. **Sample size and generalizability.** The validation sample of 47 cases, while sufficient for initial psychometric assessment, is modest relative to the full population of enforcement decisions. The matrix's performance in jurisdictions beyond the EU and UK remains untested.
2. **Incomplete organizational fault data.** Public enforcement decisions do not consistently disclose internal governance details. Conservative scoring was applied where information was incomplete, but this may underestimate organizational fault in cases where regulators had access to non-public evidence.
3. **Assumption of historical stability.** The calibration of thresholds assumes that enforcement patterns from 2018–2025 will remain relevant. Changes in regulatory priorities, legislative frameworks, or market conditions could alter the relationship between diagnostic scores and appropriate enforcement responses.
4. **Exclusion of consumer perception.** The matrix assesses claims from a regulatory perspective, not from the perspective of consumer interpretation. A claim that scores low on harm materiality under the matrix might nonetheless influence purchasing behavior if consumers interpret it differently than regulators expect.

5.4 Future Research Directions

1. **Extension to additional jurisdictions.** Validation in civil law systems (e.g., Germany, France) and in emerging regulatory contexts (e.g., Southeast Asia) would assess the matrix's cross-cultural applicability and identify dimensions requiring adaptation.
2. **Longitudinal study of enforcement outcomes.** Tracking cases over time would permit assessment of whether DAM-based prioritization improves substantive environmental outcomes, addressing the accountability trap concern.
3. **Integration with machine learning classification.** The diagnostic dimensions could inform automated screening of corporate disclosures, enabling regulators to process larger volumes of potential violations than manual review permits.

4. **Extension to supply-chain and transition finance claims.** The matrix's applicability to indirect claims—where the misrepresentation concerns supply-chain practices or future transition commitments—requires separate validation, as these contexts present distinct evidentiary challenges.

6. Conclusion

This study developed and validated a Diagnostic Assessment Matrix for jurisprudential accountability and regulatory enforcement of environmental misrepresentation, achieving 89.4% classification accuracy and substantial inter-rater reliability ($\kappa = 0.82$) in distinguishing enforcement-worthy claims from non-actionable corporate communications. The matrix's principal contribution is the operationalization of organizational fault attribution as a central diagnostic criterion, demonstrating that institutional blameworthiness predicts enforcement outcomes more strongly than claim falsity alone. For regulators, the DAM offers a structured, replicable instrument for responsive enforcement that reduces discretion while preserving proportionality. The framework is adaptable to different regulatory contexts and can be refined as enforcement experience accumulates. As environmental claims continue to proliferate and regulatory attention intensifies, the need for evidence-based diagnostic tools will only grow; this matrix represents a step toward enforcement that is both more effective and more accountable.

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