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Operational risk management and the credibility of ESG disclosures: a critical analysis

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Abstract: Concerns about the credibility of environmental, social, and governance (ESG) disclosures and greenwashing have increased the need for reliable sustainability reporting. This study examines whether operational risk management (ORM) can improve ESG disclosure credibility and reduce greenwashing risk. Using a mixed-methods approach, the study develops two new measures: the operational risk management strength score (ORMSS) and the greenwashing index (GWI). The study covers 50 European firms from the energy, manufacturing, and financial services sectors, combining quantitative methods with a qualitative examination of ESG disclosures. The findings show a strong negative relationship between ORM maturity and greenwashing risk, which remains consistent across different analyses and robustness checks. ORM is also the strongest predictor of ESG disclosure credibility, while sector and external assurance have a weaker influence. Overall, the findings highlight the important role of strong ORM practices in supporting credible ESG disclosures.

Keywords: ESG disclosure; greenwashing; operational risk management; ORM; sustainability reporting; assurance.

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1 Introduction

Environmental, social, and governance (ESG) disclosures have become a central mechanism through which firms communicate their sustainability performance to investors, regulators, customers, and wider society. The rapid expansion of sustainability reporting, coupled with the introduction of increasingly demanding regulatory frameworks such as the Corporate Sustainability Reporting Directive (CSRD), the Sustainable Finance Disclosure Regulation (SFDR), and the International Sustainability Standards Board (ISSB) standards, reflects a growing expectation that ESG information should be reliable, transparent, and decision-useful (Christensen et al., 2021). Despite these developments, significant concerns remain regarding the credibility of corporate sustainability disclosures. Differences in reporting practices, inconsistent application of reporting frameworks, and the continued fragmentation of ESG measurement have created substantial uncertainty regarding whether reported sustainability performance faithfully represents firms' underlying ESG activities (Eccles and Strohle, 2018). These concerns have become increasingly important with the growing recognition of greenwashing as a significant governance challenge. Greenwashing refers to the discrepancy between firms' sustainability communications and their actual environmental or social performance (Delmas and Burbano, 2011; Lyon and Montgomery, 2015). Rather than reflecting substantive organisational change, sustainability disclosures may instead be used strategically to influence stakeholder perceptions and preserve organisational legitimacy (Cho et al., 2015; Marquis et al., 2016). Consequently, the credibility of ESG reporting has emerged as a critical issue for capital markets, regulators, and society, shifting scholarly attention from the quantity of sustainability disclosures towards the governance mechanisms that determine their quality and reliability. Existing research has responded to these challenges by examining several

mechanisms designed to enhance ESG disclosure credibility. Previous studies have demonstrated the importance of reporting frameworks (Christensen et al., 2021), external assurance (Simnett et al., 2009; Moroney et al., 2012; Casey and Grenier, 2015), corporate governance characteristics (Michelon and Parbonetti, 2012), and stakeholder pressures in improving sustainability reporting. While these studies have significantly advanced understanding of ESG disclosure quality, they predominantly emphasise external monitoring and verification mechanisms that operate after sustainability information has already been generated. Comparatively little attention has been devoted to the internal governance capabilities responsible for producing credible sustainability information in the first place. Consequently, an important question remains largely unanswered: what internal organisational capabilities enable firms to produce credible ESG disclosures while reducing the risk of greenwashing?

This study argues that operational risk management (ORM) represents one such capability. Originally developed to identify, assess, monitor, and mitigate risks arising from organisational processes, people, systems, and external events (Power, 2005; Arena et al., 2010), ORM increasingly incorporates sustainability-related risks within enterprise-wide governance systems. By embedding ESG considerations into internal controls, monitoring procedures, accountability structures, and risk management processes, mature ORM systems have the potential to strengthen the integrity, traceability, and consistency of sustainability information before it is externally reported or assured. Despite this conceptual relevance, ORM has received remarkably limited attention within the ESG disclosure literature, where research continues to focus primarily on reporting standards, assurance practices, and external governance arrangements. Addressing this gap, the present study examines whether stronger ORM systems are associated with greater ESG disclosure credibility and lower levels of greenwashing. To achieve this objective, the study develops two complementary constructs. The operational risk management strength score (ORMSS) measures the maturity of sustainability-related risk governance, while the greenwashing index (GWI) captures the divergence between firms' self-reported ESG performance and independently assessed external ESG ratings. Employing an explanatory sequential mixed-methods design, the study combines quantitative analysis of 50 European firms operating in the energy, manufacturing, and financial services sectors with qualitative analysis of ESG disclosures to examine both the relationship between ORM maturity and disclosure credibility and the governance mechanisms through which this relationship operates.

The study makes four contributions to the literature. First, it extends agency theory by conceptualising ORM as an internal governance capability that reduces information asymmetries, constrains managerial opportunism, and enhances the credibility of sustainability disclosures (Jensen and Meckling, 1976). While prior research has largely examined disclosure credibility through external governance mechanisms, this study demonstrates the importance of governance processes operating within the organisation before information reaches external stakeholders. Complementing this perspective, legitimacy theory explains why organisations may adopt either substantive or symbolic sustainability reporting practices to maintain societal approval (Suchman, 1995). Second, the study contributes conceptually by introducing the ORMSS and the GWI, providing a structured and replicable framework for assessing both the maturity of sustainability-related governance processes and the credibility of ESG disclosures. Third, by integrating quantitative modelling with qualitative evidence, the study offers a comprehensive approach for examining the governance determinants of ESG disclosure

credibility. Finally, the study provides practical insights for managers, investors, regulators, and assurance providers by demonstrating the importance of embedding sustainability within ORM systems rather than relying exclusively on reporting frameworks or external assurance to enhance disclosure quality. By shifting attention from external verification towards the internal governance capabilities that underpin credible sustainability reporting, this study advances understanding of how firms can strengthen ESG disclosure credibility and mitigate greenwashing in an increasingly demanding regulatory and stakeholder environment.

The remainder of the article is organised as follows. Section 2 establishes the theoretical foundation of the study and reviews the literature on ESG disclosure credibility, greenwashing, ORM, and assurance practices. Building on this foundation, Section 3 describes the methodology, including the sampling strategy, construct development, data collection procedures, and quantitative and qualitative methods. Section 4 then presents the empirical analysis, covering descriptive statistics, correlation and regression analyses, robustness checks, and findings on ORM, greenwashing, and assurance. This is followed by Section 5, which examines sectoral differences in ESG disclosure credibility based on the qualitative analysis. Section 6 discusses the findings and considers their theoretical and practical implications. Finally, Section 7 concludes the study by summarising its main contributions, acknowledging its limitations, and identifying directions for future research.

2 Theoretical framework and literature review

The credibility of ESG disclosures has emerged as a central concern in both scholarly debate and regulatory policy, particularly as sustainability reporting has expanded in scope, complexity, and strategic significance. Despite the rapid growth of ESG information, existing research consistently points to unresolved issues related to comparability, reliability, and the robustness of underlying reporting systems. This review synthesises the key streams of literature relevant to these challenges, including the evolution of ESG disclosure frameworks, the persistent credibility issues and forms of greenwashing documented across sectors, the role of assurance in enhancing trust, the potential contribution of ORM to strengthening ESG governance, and the theoretical foundations that help explain variation in disclosure quality. The review also highlights important gaps that motivate the empirical and conceptual contributions of the present study.

2.1 Evolution of ESG disclosure frameworks

ESG reporting emerged from early voluntary corporate social responsibility practices in the 1980s and 1990s. These initial disclosures were predominantly narrative and philanthropic, aimed at communicating corporate citizenship rather than providing decision-useful information. Kolk (2008) emphasised that multinational enterprises often approached CSR reports as communication tools, resulting in limited standardisation, few quantifiable metrics, and weak connections to governance or financial performance.

The late 1990s marked the beginning of more structured approaches to sustainability reporting. The Global Reporting Initiative (GRI), launched in 1997, introduced widely adopted guidelines promoting stakeholder inclusiveness and cross-sector comparability

(Brown et al., 2009). Although GRI contributed to the global diffusion of sustainability norms, adoption varied across industries and jurisdictions. Subsequent frameworks such as the Sustainability Accounting Standards Board (SASB) further strengthened the financial materiality orientation of ESG disclosures. Christensen et al. (2021) noted that SASB's industry-specific standards enhanced investor relevance, although uptake remained concentrated in the USA. Complementing these developments, Christofi et al. (2025) demonstrated that sustainability disclosure has tangible economic implications. Their longitudinal analysis of European listed firms shows that companies voluntarily reporting sustainability information exhibit higher financial statement value relevance than non-disclosing firms. Moreover, superior sustainability performance is associated with even greater value relevance compared to firms with weaker sustainability outcomes.

Also influential was the Task Force on Climate-related Financial Disclosures (TCFD), established in 2015, which introduced a risk-governance orientation to climate reporting. Ameli et al. (2020) showed however that many firms' claimed alignment with TCFD remains superficial, particularly in the areas of scenario analysis and metrics. The limitations observed in voluntary climate reporting created momentum for more prescriptive and enforceable regulatory approaches.

Against this backdrop, Europe has become the global leader in formalising ESG disclosure requirements. The 2014 Non-Financial Reporting Directive (NFRD) required around 11,000 companies to report sustainability information, although its high flexibility often resulted in boilerplate disclosures. The CSRD, introduced in 2022, substantially expands the scope to approximately 50,000 firms and mandates detailed European Sustainability Reporting Standards alongside external assurance. Complementing the CSRD, the SFDR imposes sustainability reporting obligations on financial institutions and investment products, embedding ESG considerations directly into European capital market practices.

These developments coincide with parallel global efforts to enhance comparability and reduce fragmentation in sustainability reporting. The establishment of the ISSB by the IFRS Foundation in 2021 represents a significant step towards the harmonisation of diverse reporting frameworks. Its IFRS S1 and S2 standards, effective from 2024, seek to improve the consistency and comparability of material sustainability and climate-related disclosures across jurisdictions. Nevertheless, achieving global harmonisation remains challenging, as organisations continue to navigate multiple reporting frameworks with differing objectives, methodologies, and disclosure requirements. As a result, firms often adopt several frameworks simultaneously, leading to duplication, inconsistencies, and difficulties in comparing sustainability performance across industries and jurisdictions. This persistent fragmentation reflects the broader challenge of developing universally accepted ESG metrics, as different reporting frameworks are shaped by distinct conceptual priorities and stakeholder perspectives. Eccles and Strohle (2018) argued that ESG metrics often reflect contested value systems, further complicating attempts to achieve meaningful global standardisation.

2.2 ESG rating divergence and measurement challenges

A growing body of literature has highlighted the challenges associated with measuring corporate sustainability performance through ESG ratings. Although ESG ratings have become an important source of information for investors, regulators, and other

stakeholders, significant differences frequently exist across rating providers. These discrepancies have raised concerns regarding the reliability, comparability, and interpretability of ESG assessments and have become one of the most debated issues in contemporary sustainability research.

Early ESG studies often assumed that ESG ratings represented objective measures of corporate sustainability performance. However, more recent research demonstrates that ratings produced by different agencies frequently exhibit substantial variation, even when assessing the same company during the same reporting period. This phenomenon, commonly referred to as ESG rating divergence, reflects differences in methodological approaches rather than simple measurement error. Consequently, firms may receive markedly different ESG assessments depending on the rating provider used, creating challenges for researchers and practitioners seeking to evaluate sustainability performance consistently.

Berg et al. (2022) provide one of the most comprehensive analyses of ESG rating divergence and argue that disagreements among rating agencies arise from three primary sources: scope divergence, measurement divergence, and weight divergence. Scope divergence occurs when rating agencies evaluate different sustainability issues or define ESG dimensions differently. For example, one provider may place greater emphasis on climate-related risks, whereas another may focus more heavily on governance structures or social performance indicators. As a result, agencies may assess fundamentally different aspects of corporate sustainability.

Measurement divergence arises when rating providers use different indicators to evaluate the same ESG issue. Even when agencies agree on the importance of a particular sustainability dimension, they may rely on different metrics, data sources, or evaluation methodologies. For instance, environmental performance may be assessed using emissions intensity, total emissions, climate targets, resource-efficiency indicators, or qualitative disclosure assessments. These methodological differences can result in substantially different ratings despite evaluating similar sustainability concepts.

Weight divergence represents the third major source of disagreement. ESG rating agencies often assign different levels of importance to ESG dimensions when constructing overall scores. Consequently, firms with strong governance structures but weaker environmental performance may receive substantially different ratings depending on the weighting scheme employed by a particular provider. Such differences further contribute to variation in ESG assessments and complicate cross-provider comparisons.

The existence of ESG rating divergence has important implications for empirical research. Chatterji et al. (2016) argued that ESG ratings should not be viewed as direct measures of sustainability performance but rather as assessments shaped by methodological assumptions and evaluative frameworks. Similarly, Christensen et al. (2022) suggested that ESG ratings often capture different dimensions of corporate sustainability and therefore may not be interchangeable. These concerns have led researchers to emphasise the importance of methodological transparency when constructing ESG-related variables and interpreting sustainability outcomes.

The challenges associated with ESG measurement are particularly relevant for studies examining greenwashing and disclosure credibility. Such studies frequently rely on comparisons between corporate sustainability disclosures and external ESG assessments. However, because ESG ratings may differ substantially across providers, the interpretation of disclosure-performance gaps can be sensitive to the choice of ESG

benchmark. Researchers must therefore carefully justify their selection of ESG data sources and acknowledge the limitations associated with ESG measurement.

Given these considerations, the construction of measures designed to capture discrepancies between corporate disclosures and external sustainability assessments requires particular attention. The implications of ESG rating divergence for the development of the GWI are discussed in the methodology section. Nevertheless, empirical findings should be interpreted as reflecting divergence relative to a specific external ESG benchmark rather than a universally accepted measure of sustainability performance. Future research may extend this analysis by comparing alternative ESG providers or examining whether the relationship between ORM and disclosure credibility remains consistent across different ESG rating methodologies.

In conclusion, the ESG rating divergence literature demonstrates that assessing corporate sustainability performance remains inherently complex due to differences in measurement approaches, indicator selection, and evaluation frameworks. Consequently, transparent methodological choices are essential when constructing ESG-related measures, particularly in studies examining disclosure credibility and greenwashing risk.

2.3 ESG credibility and the problem of greenwashing

Concerns regarding credibility are central to the ESG literature. Credibility refers to the extent to which disclosures are perceived as reliable, verifiable, and representative of underlying sustainability performance. Michelon and Parbonetti (2012) demonstrated that governance characteristics influence disclosure credibility, although substantial variation persists across firms.

Greenwashing represents one of the most significant threats to ESG disclosure credibility. Delmas and Burbano (2011) conceptualised greenwashing as the gap between positive environmental communication and underlying performance, while Lyon and Montgomery (2015) distinguished between selective disclosure and decoupling as mechanisms through which firms may misrepresent sustainability practices. Empirical evidence suggests that such behaviours are widespread. Cho et al. (2015) described sustainability reporting as ‘organised hypocrisy’, whereby disclosures provide a symbolic façade rather than substantive transparency. Similarly, Marquis et al. (2016) found that firms strategically disclose sustainability information when facing heightened public or regulatory pressure, particularly in carbon-intensive sectors.

The prevalence of greenwashing contributes to investor scepticism regarding ESG disclosures. Hodge et al. (2009) showed that users remain cautious of voluntary sustainability disclosures, even when accompanied by partial verification. As a result, selective disclosure practices and inconsistent verification mechanisms continue to limit the usefulness of ESG reporting for capital allocation, risk assessment, and regulatory oversight.

2.4 Assurance as a credibility mechanism

Assurance is widely recognised as a mechanism for enhancing the reliability and credibility of ESG disclosures. Simnett et al. (2009) demonstrated that assurance improves stakeholder confidence, particularly when conducted by Big Four audit firms. Nevertheless, considerable variation in assurance practices persists. Casey and Grenier (2015) found that reports assured by accounting firms are generally perceived as more

credible than those verified by sustainability consultancies, reflecting differences in methodological rigour and market trust. Similarly, Moroney et al. (2012) showed that assurance can promote greater balance and completeness in sustainability reporting, although improvements are not uniform across indicators.

Despite these benefits, assurance has important limitations. O'Dwyer and Owen (2005) argued that assurance engagements often cover only selected indicators, thereby limiting their effectiveness in addressing broader credibility concerns. The introduction of mandatory assurance under the CSRD represents a significant regulatory development; however, assurance cannot fully compensate for weaknesses in internal governance structures. Without robust data controls and effective risk management processes, assurance may provide verification of reported information without addressing the underlying factors that affect disclosure quality.

2.5 *ORM and ESG*

ORM offers a potentially powerful but underexplored mechanism for enhancing ESG disclosure credibility. Emerging under Basel II in the early 2000s, ORM addresses risks arising from inadequate or failed processes, people, and systems. Power (2005) situated ORM within the broader 'audit society', highlighting how risk management became institutionalised within organisational governance. ORM typically involves structured processes for risk identification, assessment, mitigation, monitoring, and reporting. Arena et al. (2010) showed that effective ORM integration improves control environments and strengthens organisational resilience.

Despite its maturity in financial services, ORM has received limited attention in ESG research. Conceptually, ORM incorporates many of the governance mechanisms required to support credible sustainability reporting. It can improve data integrity by ensuring that sustainability metrics are traceable, subject to control testing, and supported by appropriate documentation. ORM also integrates ESG-related risks into governance processes, enhancing oversight and accountability. By embedding controls around non-financial information, ORM may reduce opportunities for greenwashing and improve the consistency and transparency of ESG disclosures. This gap between well-established ORM frameworks and relatively underdeveloped ESG control systems highlights a promising but largely unexplored research frontier.

2.6 *Agency theory and ESG disclosure credibility*

The relationship between ORM and ESG disclosure credibility can be most effectively understood through the lens of agency theory. Originally developed by Jensen and Meckling (1976), agency theory explains how information asymmetries arise when managers possess information that is not directly observable by shareholders and other stakeholders. Because managers control access to internal information, they may have incentives to selectively disclose information, emphasise favourable outcomes, or obscure unfavourable performance. Consequently, agency conflicts arise when managerial interests diverge from those of investors and other stakeholders.

The relevance of agency theory has expanded considerably in the context of sustainability reporting and ESG disclosures. Unlike traditional financial reporting, ESG disclosures frequently contain qualitative information, forward-looking statements, and non-financial metrics that are difficult for external stakeholders to verify independently.

As a result, ESG reporting creates additional opportunities for information asymmetry and increases the risk of selective disclosure or the exaggeration of sustainability achievements.

Investors, regulators, and other stakeholders often rely on corporate disclosures to assess sustainability performance, yet they typically lack direct access to the internal systems and processes used to generate ESG information. This imbalance makes disclosure credibility a critical governance concern.

Several scholars argue that ESG reporting is particularly susceptible to agency-related problems because sustainability performance is inherently more difficult to observe and verify than traditional financial performance. Unlike financial reporting, which is governed by relatively standardised accounting frameworks and audit procedures, ESG disclosures often involve multiple reporting standards, voluntary disclosures, and subjective assessments. This complexity increases managerial discretion and creates opportunities for strategic disclosure behaviour.

Agency theory therefore provides a particularly useful framework for understanding the determinants of ESG disclosure credibility and the governance mechanisms that influence reporting quality. From an agency perspective, disclosure credibility depends on the existence of governance mechanisms capable of reducing information asymmetries and constraining managerial opportunism. Such mechanisms include internal controls, risk management systems, monitoring procedures, board oversight, external assurance, and accountability structures. Collectively, these arrangements reduce agency costs by improving transparency and increasing the reliability of information provided to stakeholders. Taken together, these agency-theoretic arguments suggest that governance mechanisms such as ORM play a critical role in enhancing ESG disclosure credibility by reducing information asymmetries and strengthening the integrity of sustainability information.

2.7 Agency theory and greenwashing

The concept of greenwashing represents one of the most significant manifestations of agency problems within ESG reporting. Greenwashing occurs when organisations present themselves as more environmentally or socially responsible than their actual practices justify. Delmas and Burbano (2011) define greenwashing as the combination of poor environmental performance and positive environmental communication. Similarly, Lyon and Montgomery (2015) argued that greenwashing involves strategic communication designed to influence stakeholder perceptions without corresponding improvements in organisational behaviour.

From an agency theory perspective, greenwashing arises because managers possess superior information regarding actual sustainability performance. External stakeholders are often unable to verify ESG claims directly and must therefore rely on information provided by the firm itself. This information asymmetry creates opportunities for managers to selectively disclose favourable sustainability information while withholding or downplaying less favourable information. As a result, sustainability disclosures may become symbolic rather than substantive.

Cho et al. (2015) further argue that sustainability reporting can create an appearance of accountability without necessarily reflecting genuine organisational change. Such practices allow firms to maintain favourable stakeholder perceptions while avoiding the costs associated with substantive sustainability improvements. Agency theory explains

these behaviours as rational responses to incentives created by information asymmetry and imperfect monitoring.

The increasing importance of ESG investing has further intensified these incentives. Investors increasingly incorporate ESG performance into investment decisions, creating financial benefits for firms perceived as sustainability leaders. Consequently, managers may face pressure to enhance ESG ratings and sustainability reputations, potentially increasing incentives for selective disclosure and impression management. In the absence of effective monitoring and governance mechanisms, these incentives can contribute to higher levels of greenwashing risk.

2.8 ORM as an agency-control mechanism

While agency theory identifies the existence of information asymmetries and disclosure risks, it also highlights the importance of governance mechanisms designed to reduce agency costs. Within this context, ORM can be viewed as a critical internal control mechanism that strengthens the credibility of ESG reporting.

ORM refers to the systematic identification, assessment, monitoring, and mitigation of risks arising from internal processes, people, systems, and external events. Modern ORM frameworks extend beyond traditional operational concerns and increasingly incorporate environmental, social, governance, and sustainability-related risks. As ESG considerations become integrated into enterprise-wide risk management systems, ORM plays an increasingly important role in ensuring the reliability and integrity of sustainability information.

From an agency perspective, ORM reduces information asymmetry by introducing formal monitoring procedures, accountability structures, documentation requirements, and internal controls. Effective ORM systems require organisations to identify ESG-related risks, establish monitoring mechanisms, maintain evidence supporting sustainability claims, and assign responsibility for ESG performance. These processes limit managerial discretion and reduce opportunities for selective disclosure.

ORM also enhances traceability and auditability. ESG metrics supported by formal risk management processes are more likely to be documented, monitored, and verified. This improves the reliability of sustainability disclosures and reduces the likelihood that managers can overstate ESG performance without detection. Consequently, stronger ORM frameworks should contribute to greater alignment between reported ESG performance and independently assessed sustainability outcomes.

The role of ORM is particularly important because ESG reporting increasingly influences investment decisions, regulatory assessments, and stakeholder trust. As organisations face growing pressure to demonstrate sustainability performance, the quality of internal governance systems becomes a key determinant of disclosure credibility. Firms with mature ORM systems are expected to produce more reliable ESG information because sustainability claims are embedded within broader governance and control structures rather than treated as standalone communication exercises.

2.9 Legitimacy theory as a supporting perspective

Although agency theory provides the primary theoretical foundation for this study, legitimacy theory offers complementary insights into organisations' motivations for ESG reporting. Legitimacy theory suggests that organisations seek to maintain societal

approval by aligning their actions and communications with prevailing social expectations (Suchman, 1995). ESG disclosures therefore serve as a means through which firms demonstrate environmental and social responsibility to stakeholders.

However, legitimacy-seeking behaviour may give rise to both substantive and symbolic reporting practices. While some firms use ESG disclosures to communicate genuine sustainability improvements, others may rely on symbolic disclosures intended primarily to enhance organisational legitimacy. In such circumstances, sustainability reporting can become disconnected from actual performance, increasing the risk of greenwashing.

Accordingly, legitimacy theory helps explain the incentives underlying ESG disclosure, whereas agency theory provides the principal explanation for variations in disclosure credibility. From an agency perspective, governance mechanisms such as ORM can reduce information asymmetries, constrain managerial opportunism, and enhance the reliability of sustainability reporting.

2.10 Theoretical contribution

This study contributes to the growing literature on ESG disclosure credibility by extending agency theory into the domain of sustainability reporting. Existing research has largely focused on external assurance, stakeholder pressures, and reporting frameworks as mechanisms for improving ESG disclosure quality. In contrast, the present study highlights the role of ORM as an internal governance mechanism capable of reducing agency problems and enhancing disclosure credibility.

Specifically, the study proposes that ORM reduces information asymmetry and constrains managerial opportunism, thereby promoting closer alignment between reported ESG disclosures and external sustainability assessments. By linking ORM to greenwashing risk and disclosure credibility, the study offers a novel governance-based explanation for differences in sustainability reporting outcomes across firms.

2.11 Research gaps

Despite significant scholarly attention to ESG reporting frameworks, greenwashing, and assurance practices, important gaps remain in the existing literature. First, empirical evidence linking the maturity of ORM systems to ESG disclosure credibility remains limited. While prior research identifies governance structures as important determinants of reporting quality, studies explicitly examining ORM as an internal governance mechanism are largely absent. Second, the literature lacks systematic and replicable measures capable of capturing the extent to which corporate sustainability disclosures diverge from independently assessed ESG performance. Existing studies often rely on isolated indicators or categorical assessments, creating a need for more comprehensive approaches to evaluating disclosure-performance alignment. Third, although symbolic sustainability reporting has received considerable scholarly attention, limited research has examined how risk governance practices are reflected in ESG disclosures and whether such disclosures reveal the controls, processes, and oversight mechanisms underpinning sustainability reporting.

This study addresses these gaps through the development of an ORM Strength Score and a GWI, which enable a more rigorous assessment of operational risk governance and disclosure-performance alignment. It investigates the relationship between ORM maturity

and greenwashing risk using a mixed-methods approach and complements the quantitative analysis with a qualitative examination of ESG reporting practices. In doing so, the study provides new evidence on how internal risk management capabilities influence ESG disclosure credibility and the quality of sustainability reporting.

3 Methodology

This study adopts an explanatory sequential mixed-methods research design (Creswell and Plano Clark, 2018), reflecting its dual objective of testing the hypothesised relationship between ORM maturity and greenwashing risk while explaining the organisational mechanisms through which this relationship may arise. The quantitative phase establishes the existence, direction, and strength of this relationship using the ORMSS and the GWI, together with correlation and regression analyses. However, although quantitative analysis can determine whether the hypothesised relationship exists, it cannot fully explain how differences in governance structures, risk management processes, and organisational practices influence ESG disclosure credibility and contribute to variations in greenwashing risk. The subsequent qualitative phase therefore provides contextual insights into the organisational mechanisms underlying the quantitative findings through a thematic analysis of firms' ESG disclosures. This sequential design is consistent with research in strategic management, sustainability, and accounting that combines the generalisability of quantitative analysis with the explanatory depth of qualitative inquiry (Christofi et al., 2023).

3.1 Sample selection and data collection

Criterion sampling was employed to identify firms most relevant to the research objectives in the region of Europe. The focus on European firms is particularly appropriate given the region's advanced sustainability reporting environment and the increasing regulatory emphasis on ESG disclosure through initiatives such as the CSRD and the SFDR. Specifically, a three-stage protocol was utilised. First, an initial population of large publicly listed European firms operating within the economic sectors of energy, manufacturing and financial services were identified. These sectors were selected on both theoretical and practical grounds, as they are subject to considerable ESG-related risks and increasing pressure from regulators, investors, civil society organisations, and other stakeholders. Energy firms face climate transition risks, carbon regulation, and heightened environmental scrutiny; manufacturing firms are exposed to supply-chain, labour, environmental, and resource-related risks; while financial institutions operate within an increasingly demanding environment characterised by sustainable finance regulations, climate stress testing, and ESG-related supervisory expectations. Second, firms were screened using three inclusion criteria:

- 1 the availability of substantive sustainability disclosures during the 2022–2023 reporting period
- 2 the availability of Refinitiv ESG ratings and related sustainability information
- 3 sufficient disclosure detail to permit systematic coding of ORM practices.

Third, firms satisfying all inclusion criteria were ranked according to market prominence and disclosure completeness. The final sample therefore represents a purposive selection of highly visible firms that are particularly suitable for examining the relationship between ORM and ESG disclosure credibility. After applying the selection protocol, the final dataset comprised 50 large- and mid-cap European firms operating in three sectors: energy (10 firms), manufacturing (20 firms), and financial services (20 firms). The final sample size reflects the manual data collection and coding procedures required to construct the ORM Strength Score and the GWI. This approach enables a detailed examination of how ORM influences ESG disclosure credibility. Data were collected from the LSEG Workspace platform (formerly Refinitiv Eikon) and were triangulated with annual reports, sustainability reports, integrated reports, assurance statements, and financial statements. Together, these sources provided the information required to assess operational risk governance, sustainability disclosures, and external ESG performance while maintaining homogeneous reporting standards.

3.2 *Variable development and measurement*

3.2.1 *Operational risk management strength score*

To evaluate the maturity of ORM practices, this study develops an ORMSS. The ORMSS measures ESG-related risk governance maturity across 25 indicators organised into five dimensions: governance structure, risk identification, risk assessment and response, monitoring and control, and ESG disclosure integration. These dimensions capture the extent to which ESG-related risks are embedded within governance structures, risk management processes, monitoring systems, and disclosure mechanisms. Each indicator was assessed using a five-point scale ranging from 0 (no evidence of practice) to 5 (fully embedded and systematically documented practice).

The ORMSS was calculated as:

$$\text{ORMSS} = \left(\sum \text{Indicator Scores} \right) / 25$$

where the resulting value is expressed on a 0–5 maturity scale.

Two independent coders evaluated all firms using annual reports, sustainability reports, governance statements, risk disclosures, and assurance reports. Prior to the full coding process, both coders independently assessed a pilot subsample to refine the coding scheme and establish a common understanding of the scoring criteria. Any discrepancies were subsequently discussed and resolved through consensus. Inter-coder reliability was assessed using Cohen's Kappa coefficient and indicated a high level of agreement ($\kappa = 0.84$), suggesting that the coding process was applied consistently across the sample. A detailed description of the ORMSS dimensions and indicators is provided in Appendix.

3.2.2 *Greenwashing index*

The second construct, the GWI, was developed to quantify the degree of divergence between firms' self-reported ESG performance and externally assessed ESG performance. The construct provides a systematic and replicable measure of greenwashing risk by capturing the extent to which corporate sustainability disclosures differ from an independent external benchmark.

To ensure methodological consistency, the external benchmark relies exclusively on Refinitiv ESG scores. This approach avoids potential inconsistencies associated with combining multiple ESG rating providers. As highlighted in the ESG rating divergence literature, differences in indicator selection, weighting schemes, measurement approaches, and assessment frameworks can lead to substantial variation across ESG ratings. The use of a single provider therefore enhances consistency and strengthens the comparability of the resulting GWI.

Reported ESG performance was extracted from sustainability reports and annual reports. Indicators spanning the ESG dimensions were identified and standardised. Environmental indicators included emissions performance, energy efficiency, resource consumption, and climate-related disclosures. Social indicators included workforce diversity, employee health and safety, training, and community engagement. Governance indicators included board independence, ethics frameworks, compliance structures, and governance transparency.

All reported indicators were normalised onto a 0–100 scale and aggregated into a composite self-reported ESG performance score. The composite score was calculated as the arithmetic mean of the standardised ESG indicators. The GWI was subsequently calculated as:

$$GWI = \frac{|\text{Reported ESG Performance} - \text{Refinitiv ESG Score}|}{\text{Refinitiv ESG Score}}$$

where higher GWI values indicate greater divergence between corporate disclosures and external ESG assessments and therefore suggest a higher risk of greenwashing and lower disclosure credibility.

3.2.3 Control variables

To mitigate omitted variable bias and enhance the reliability of the findings, several control variables were included in the analysis. Firm size (SIZE) was controlled for to account for size-related variation in corporate behaviour. Market value (VALUE) was also incorporated to capture market-based factors, such as investor confidence and customer perceptions, that are not reflected in accounting information (Christofi et al., 2023).

In addition, three firm-level characteristics [leverage (LEV), profitability, and board independence (BIND)] were included following prior literature. Leverage may influence disclosure practices through increased monitoring by external stakeholders and financing-related pressures (Eng and Mak, 2003; Chasiotis et al., 2022). Profitability was included because financially constrained firms may rely more heavily on symbolic ESG disclosures than on substantive sustainability investments (Zhang, 2022). Finally, board independence (BIND) was included as a governance control variable, as previous studies suggest that firms with a higher proportion of independent directors may exhibit greater levels of greenwashing, indicating that the relationship between board independence and greenwashing remains inconclusive (Ghitti et al., 2024). Table 1 reports the operationalisation of the variables employed in the analysis, yielding the multiple regression model specified below:

$$GWI_i = a + \beta_1 ORMSS_i + \beta_2 ASS_i + \beta_3 LEV_i + \beta_4 ROE_i + \beta_5 BIND_i + \beta_6 SIZE_i + \beta_7 VALUE_i + \varepsilon_i$$

Table 1 Definitions and measurement of study variables

<i>Variable</i>	<i>Acronym</i>	<i>Operationalisation</i>	<i>Reference</i>
Greenwashing index	GW	Absolute difference between self-reported ESG performance and Refinitiv ESG Score, divided by the Refinitiv ESG Score: $ \text{Reported ESG Performance} - \text{Refinitiv ESG Score} / \text{Refinitiv ESG Score}$	Developed by authors
Operational risk management strength score	ORMSS	Composite score based on 25 indicators across five dimensions (governance structure, risk identification, risk assessment and response, monitoring and control, and ESG disclosure integration), measured on a 0–5 maturity scale	Developed by authors; based on Arena et al. (2010), and Power (2005)
Assurance	ASS	Dummy variable equal to 1 if the sustainability report is externally assured and 0 otherwise	Simnett et al. (2009), Moroney et al. (2012)
Financial leverage	LEV	Total debt / total equity (debt-to-equity ratio)	Eng and Mak (2003)
Profitability	ROE	Return on equity (net income / shareholders' equity)	Zhang (2022)
Board independence	BIND	Percentage of independent members on the company's board of directors	Ghitti et al. (2024)
Firm size	SIZE	Natural logarithm of total assets	Christensen et al. (2021)
Market value	VALUE	Natural logarithm of market capitalisation	Christofi et al. (2023)

4 Analysis

This chapter presents the results of the quantitative and qualitative analyses. The findings reveal consistent evidence across methods that ORM maturity plays a central role in determining ESG disclosure credibility.

4.1 Descriptive statistics

Descriptive statistics in Table 2 indicate variation in ORM maturity and greenwashing risk across sectors. Financial services firms exhibited the highest ORM Strength Score (3.65/5) and the lowest GWI (0.31), suggesting comparatively stronger risk governance and greater alignment between reported and externally assessed ESG performance. Manufacturing firms recorded an ORM score of 3.40/5 and a GWI of 0.33, while energy firms displayed the lowest ORM score (3.00/5) and the highest GWI (0.43). Assurance adoption was relatively high across the sample, reaching 80% in both the manufacturing and financial services sectors, compared with 60% among energy firms. In summary, the descriptive results reveal a pattern consistent with an inverse relationship between ORM maturity and greenwashing risk, providing preliminary support for the study's central proposition that stronger ORM is associated with more credible ESG disclosures.

Table 2 Descriptive statistics of ORM strength and GWI by sector

<i>Sector</i>	<i>Firms (n)</i>	<i>Mean ORMSS score (0–5)</i>	<i>SD</i>	<i>Mean GWI</i>	<i>SD</i>	<i>Assurance adoption (%)</i>
Energy	10	3.00	1.49	0.43	0.23	60%
Manufacturing	20	3.40	0.99	0.33	0.15	80%
Financial services	20	3.65	1.22	0.31	0.20	80%
Total sample	50	3.42	1.19	0.34	0.19	76%

4.2 Correlation analysis

Table 3 presents the Pearson correlation matrix for the study variables. The results indicate a strong and statistically significant negative association between ORMSS and GWI ($r = -0.776$, $p < 0.01$), suggesting that firms with more developed ORM practices tend to exhibit lower levels of greenwashing. Assurance is positively correlated with ORMSS ($r = 0.792$, $p < 0.01$) and negatively correlated with GWI ($r = -0.754$, $p < 0.01$), indicating that externally assured sustainability reports are associated with stronger risk governance and lower greenwashing risk. Among the control variables, board independence is positively related to profitability ($r = 0.413$, $p < 0.05$), while firm size is positively associated with leverage ($r = 0.508$) and market value ($r = 0.371$, $p < 0.05$).

The strong correlation between ORMSS and GWI warrants consideration. Although the magnitude of the relationship may appear unusually high, ORMSS and GWI do not enter the regression model as competing explanatory variables. To assess potential multicollinearity, we also test the variance inflation factor (VIF), and the values range from 1.46–4.09 which are below the suggested threshold of 5, as advised by Wang et al. (2023). Additionally, the observed association is interpreted as evidence of a close relationship between operational risk governance and ESG disclosure credibility, consistent with the study's theoretical framework.

Table 3 Correlation matrix

<i>Variables</i>	<i>ORMSS</i>	<i>GWI</i>	<i>Assurance</i>	<i>Leverage</i>	<i>ROE</i>	<i>Board independence</i>	<i>Value</i>	<i>Size</i>
ORMSS	1.00							
GWI	-0.776**	1.00						
Assurance	0.792**	-0.754**	1.00					
Leverage	-0.099	0.097	-0.145	1.00				
ROE	0.160	-0.128	0.265	-0.093	1.00			
Board independence	-0.121	0.148	-0.107	0.041	0.413*	1.00		
Value	0.011	0.044	0.132	0.074	0.372	0.380	1.00	
Size	0.068	-0.039	0.051	0.508	-0.149	-0.011	0.371*	1.00

Notes: This table reports Pearson correlation coefficients among the study variables.

* and ** indicate statistical significance at the 5% and 1% levels, respectively.

Variable definitions are provided in Table 1.

4.3 Regression analysis

Table 4 presents the regression results using Manufacturing as the reference sector. As a first step, we include only the control variables in order to examine any direct influence of the control variables on the GWI. As indicated in Table 4 (model 1), Financial firms exhibit significantly lower greenwashing risk than Manufacturing firms ($\beta = -0.1936$, $p < 0.10$), while board independence is positively associated with the GWI ($\beta = 0.0030$, $p < 0.10$). However, these relationships become statistically insignificant once ORMSS and assurance are included in the model, suggesting that their explanatory power is largely captured by differences in governance quality.

The results provide strong evidence that ORMSS is a significant predictor of greenwashing risk. Across both the explanatory and bootstrap specifications (model 2 and 3 respectively), ORMSS exhibits a large and highly significant negative coefficient ($\beta = -0.1641$, $p < 0.01$), indicating that firms with more mature ORM systems tend to display lower levels of divergence between self-reported and externally assessed ESG performance. The virtually identical coefficients and highly similar standard errors across model (2) and (3) demonstrate the robustness of this relationship.

Table 4 Regression analysis of the relationship between ORM and greenwashing risk

<i>Variable</i>	<i>Control (model 1)</i>	<i>Explanatory (model 2)</i>	<i>Bootstrapped (model 3)</i>
ORMSS	–	–0.1641*** (0.0074)	–0.1641*** (0.0078)
Assurance	–	0.0263 (0.0259)	0.0263 (0.0276)
Energy	0.0825 (0.0908)	0.0426* (0.0215)	0.0426* (0.0220)
Financial	–0.1936* (0.0994)	0.0166 (0.0301)	0.0166 (0.0339)
Debt/equity	0.00022 (0.00015)	0.00001 (0.00003)	0.00001 (0.00004)
ROE	–0.00108 (0.00202)	0.00029 (0.00048)	0.00029 (0.00067)
Board independence	0.00299* (0.00156)	–0.00006 (0.00048)	–0.00006 (0.00049)
Ln (market cap)	–0.0274 (0.0380)	0.0025 (0.0119)	0.0025 (0.0128)
Ln (assets)	0.0488 (0.0415)	0.0013 (0.0138)	0.0013 (0.0152)
Constant	–0.4582 (0.7977)	0.7685*** (0.2417)	0.7685*** (0.2607)
N	50	50	50
R ²	0.168	0.763	0.763
Adj. R ²	0.029	0.754	0.754
F-statistic	1.21	114.90	–

Notes: The dependent variable is the GWI. Robust standard errors are reported in parentheses in columns (1) and (2), while column (3) reports bootstrap standard errors based on 2,000 replications. Manufacturing is used as the reference sector. ORM denotes the operational risk management strength score. *, **, and *** indicate statistical significance at the 10%, 5%, and 1% levels, respectively.

By contrast, assurance does not retain statistical significance in the multivariate models, despite its negative association with GWI in the correlation analysis and the lower average greenwashing scores observed among assured firms. This finding suggests that external assurance alone does not explain variation in greenwashing risk once ORM maturity is taken into account. Additionally, the inclusion of ORMSS and assurance substantially improves model fit. At the same time, most control variables, including

leverage, profitability, board independence, firm value, and firm size, do not remain statistically significant once ORMSS is included in the model. Collectively, the findings identify ORM as the principal factor associated with ESG disclosure credibility, supporting the study's central proposition that effective risk management systems play a critical role in mitigating greenwashing risk.

4.4 Robustness checks

A series of robustness checks were conducted to assess the stability and reliability of the reported findings. First, as discussed in the correlation analysis, multicollinearity was assessed using the VIF, and the values were within the accepted range. Normality was assessed using the Shapiro-Wilk test, and robust standard errors were applied to address potential heteroskedasticity. Additionally, the models were re-parameterised using alternative sector reference categories for all the possible combinations. Specifically, Manufacturing, Financial, and Energy were each used as the baseline category in separate model specifications. The results remained highly consistent across all alternative dummy-variable configurations. While some sector coefficients exhibited minor variations in statistical significance in the controls-only models, the substantive conclusions remained unchanged. Once ORMSS and assurance were included, ORMSS remained highly significant across all specifications, whereas most sector effects became statistically insignificant. Finally, all regression models and alternative sector specifications were re-estimated using bootstrap standard errors based on 2,000 replications. All the robustness check results are omitted from the main text but are retained for reference upon request.

4.5 Discussion of ORM and greenwashing relationship

The strong negative relationship between ORMSS and GWI is consistent with the theoretical framework underpinning this study and provides important insights into the determinants of ESG disclosure credibility. Although the two constructs are closely related, they capture distinct dimensions of corporate sustainability reporting. ORMSS reflects the maturity of a firm's governance, risk management, monitoring, and disclosure-control systems, whereas GWI measures the extent to which self-reported ESG disclosures diverge from independently assessed ESG performance. Accordingly, ORMSS represents a governance capability measure, while GWI reflects an outcome of disclosure quality and credibility.

The findings suggest that firms with more mature ORM systems are better positioned to implement effective internal controls, verification procedures, and disclosure governance practices, thereby reducing information asymmetries and limiting opportunities for selective or misleading sustainability reporting. As a result, stronger ORM capabilities are associated with lower levels of greenwashing and greater alignment between reported ESG performance and external ESG evaluations. The strong inverse association therefore provides empirical support for the proposition that ORM serves as a critical governance mechanism underpinning ESG disclosure credibility.

Nevertheless, the exceptionally high correlation between ORMSS and GWI should be interpreted with caution. While the strength of the relationship is theoretically plausible, it may partly reflect the close conceptual connection between governance quality and disclosure credibility. However, the two constructs are based on different indicators and

operationalisations and are designed to capture distinct phenomena. ORMSS evaluates internal governance and risk management maturity, whereas GWI assesses the degree of divergence between corporate ESG disclosures and independent external ESG assessments. Furthermore, the stability of the coefficients across the robust and bootstrap specifications suggests that the observed relationship is not driven by estimation instability. Consequently, the findings should be interpreted as evidence of the important role that ORM plays in enhancing ESG disclosure credibility and mitigating greenwashing risk.

4.6 Assurance and ESG disclosure credibility

Assurance analysis revealed that firms obtaining external assurance exhibited substantially lower GWI scores than non-assured firms (0.28 versus 0.49), as reported in Table 5, suggesting a positive association between assurance and ESG disclosure credibility.

Table 5 Assurance and GWI

<i>Assurance status</i>	<i>Firms (n)</i>	<i>Mean GWI</i>	<i>SD</i>
Assured	33	0.28	0.12
Not assured	17	0.49	0.15

While the correlation analysis indicates that assurance is associated with lower levels of greenwashing and stronger ORM practices, the multivariate regression results show that assurance does not retain statistical significance once ORMSS is included in the model. This finding suggests that the relationship between assurance and greenwashing risk is closely linked to the quality of underlying governance and risk management systems. Firms with more mature ORM frameworks are likely to combine assurance with broader governance mechanisms, including risk monitoring systems, disclosure controls, internal verification procedures, and board-level oversight. Consequently, the findings suggest that assurance is most effective when supported by strong internal governance structures rather than operating as a standalone mechanism for enhancing ESG disclosure credibility.

5 Sectoral differences in disclosure credibility

Table 6 summarises the key credibility characteristics identified through the qualitative analysis across the three sectors. While sector-specific differences were observed, the findings consistently indicate that ESG disclosure credibility is closely associated with the extent to which sustainability considerations are integrated into organisational governance and risk management processes. Financial services firms generally exhibited stronger governance structures and lower levels of greenwashing, consistent with the quantitative findings. Manufacturing firms demonstrated relatively balanced ORM practices, particularly in supply-chain monitoring and operational controls, although ESG measurement and reporting practices varied across firms. Energy firms displayed advanced climate-related reporting practices, including scenario analysis and TCFD-aligned disclosures; however, these practices were not always accompanied

by equally mature ORM systems, contributing to greater variation in disclosure credibility.

Table 6 Sectoral differences in ESG disclosure credibility

<i>Sector</i>	<i>ORM practices</i>	<i>Common weaknesses</i>	<i>Disclosure features</i>
Energy	Advanced scenario analysis, climate risk dashboards	Inconsistent integration of climate disclosures into broader ORM processes	Detailed TCFD alignment, broad assurance coverage
Manufacturing	Supply-chain risk mapping, quality audits, operational controls	Variable ESG KPI quantification and monitoring practices	Mix of symbolic and substantive reporting
Financial Services	ESG risk committees, climate stress testing, integrated risk monitoring	Challenges in quantifying certain social and transition-risk indicators	Structured, data-driven disclosures with relatively high consistency and credibility

The qualitative analysis provided further insight into the mechanisms underlying the results. Firms with higher ORM maturity consistently embedded ESG considerations within operational and risk management structures. Their disclosures frequently demonstrated the integration of ESG metrics into enterprise risk registers and were supported by quantitative KPIs such as carbon intensity, water usage, and diversity ratios. These firms also placed greater emphasis on auditability, often indicating that ESG indicators were traceable to internal information systems and subject to internal verification procedures. Forward-looking planning emerged as another distinguishing characteristic, with firms referencing climate targets, scenario analyses, and science-based targets initiative (SBTi) commitments. In contrast, firms with lower ORM maturity relied more heavily on symbolic and narrative-driven disclosures that lacked operational substantiation. Their reports frequently contained broad sustainability commitments without supporting evidence, measurable indicators, or clearly defined implementation mechanisms. Selective disclosure was also more common, with positive achievements receiving greater attention than material shortcomings. Forward-looking commitments were often accompanied by limited information regarding governance structures, monitoring processes, or implementation pathways. Overall, the qualitative findings reinforce the quantitative evidence by suggesting that higher ORM maturity is associated with more auditable, measurable, and verifiable sustainability disclosures.

6 Discussion

The discussion interprets the empirical findings and connects them to the broader academic and policy debate on ESG disclosure credibility. The results show that ORM maturity plays a central role in strengthening the reliability of sustainability reporting. Firms with more advanced ORM systems produced disclosures that were more credible, auditable, and closely aligned with external ESG assessments. In contrast, firms with weaker ORM maturity relied more heavily on symbolic statements, selective reporting, and long-term claims that lacked supporting evidence.

A key result of the analysis is the strong negative relationship between the ORM Strength Score and the GWI. Firms with higher ORM maturity exhibited fewer discrepancies between their own disclosures and independent assessments, indicating that internal governance reduces opportunities for selective reporting. This finding supports Power's (2005) view that internal control systems shape reporting practices beyond traditional financial statements. ORM processes such as risk identification, monitoring, assessment, and integration into core systems appear to reduce managerial discretion and increase accountability. This reinforces the argument from agency theory (Jensen and Meckling, 1976) that strong governance helps limit information asymmetry and opportunistic behaviour. The stability of this relationship across alternative model specifications further strengthens confidence in the findings.

The high explanatory power of the regression models further highlights the central role of governance quality in shaping ESG disclosure credibility. While ORMSS and GWI are conceptually related, they capture distinct phenomena. ORMSS measures the maturity of internal governance and risk-management capabilities, whereas GWI reflects the outcome of those governance processes in terms of disclosure credibility. Consequently, the findings should be interpreted as evidence of a substantive governance-disclosure relationship rather than construct redundancy.

Although the descriptive statistics revealed sectoral differences in ORM maturity and greenwashing risk, the regression results showed that sector effects largely disappeared once ORM maturity was considered. Furthermore, the findings remained unchanged when alternative reference categories were employed in the sector dummy specifications. This suggests that disclosure credibility is shaped primarily by governance capability rather than by the industry in which a firm operates. ORM maturity therefore appears to function as a consistent mechanism for improving disclosure quality across different sectors.

The study also found that assurance is associated with lower levels of greenwashing, consistent with earlier studies (Simnett et al., 2009; Moroney et al., 2012). However, the qualitative evidence suggests that assurance alone is insufficient. In firms with low ORM maturity, assurance engagements were often limited in scope and did not prevent narrative-driven disclosure. These findings support Casey and Grenier (2015), who argue that assurance is most effective when supported by strong internal governance. High-ORM firms used assurance to reinforce the credibility of already well-developed systems, whereas low-ORM firms appeared to use assurance more symbolically. Moreover, assurance lost statistical significance once ORM maturity was included in the multivariate models, suggesting that internal governance capabilities represent the more fundamental determinant of ESG disclosure credibility. Accordingly, assurance appears to complement rather than substitute for effective ORM systems.

The qualitative analysis further explains how ORM maturity influences disclosure practices. High-ORM firms integrated ESG risks into enterprise risk registers, used quantitative KPIs such as carbon intensity and water use, and relied on data that could be traced to internal systems. They also presented forward-looking commitments supported by scenario models and science-based targets initiative (SBTi) validation. The qualitative evidence indicates that firms with more mature ORM systems consistently embedded ESG information within internal control systems and enterprise risk management processes, providing greater traceability, stronger governance oversight, and more credible sustainability disclosures.

Low-ORM firms, by contrast, relied on statements such as ‘we are committed to sustainability’ or ‘sustainability is part of our culture’ without providing metrics, audit trails, or methodologies. Some announced long-term goals, such as carbon neutrality, but did not explain how these targets would be achieved. These patterns are consistent with behaviours described in the greenwashing literature, including selective disclosure and the separation between rhetoric and practice noted by Delmas and Burbano (2011), Lyon and Montgomery (2015), and Cho et al. (2015).

The findings contribute to the theoretical understanding of ESG disclosure credibility through the lenses of agency theory and legitimacy theory. Under legitimacy theory (Suchman, 1995), firms with more mature ORM systems appear to achieve substantive legitimacy by embedding ESG practices within operational processes, whereas firms with weaker ORM systems rely more heavily on symbolic forms of legitimacy through narrative-driven disclosures. The results also support agency theory (Jensen and Meckling, 1976) by demonstrating that ORM functions as an internal governance mechanism that reduces information asymmetries, constrains managerial discretion, and enhances the reliability of sustainability disclosures. Taken together, the findings suggest that stronger ORM systems improve ESG disclosure credibility by reducing opportunities for opportunistic reporting and strengthening the governance structures that underpin sustainability information.

The study also contributes methodologically through the development of the ORMSS and the GWI. These constructs provide a structured and replicable framework for assessing both the maturity of ESG-related governance processes and the credibility of sustainability disclosures. By combining these measures within a mixed-methods design, the study offers a comprehensive approach for examining the governance determinants of ESG reporting quality.

These findings have important practical implications. Managers should embed ESG risks into risk registers, strengthen data governance, and ensure that KPIs are traceable and auditable. Boards should expand internal audit coverage of ESG information and treat ORM as a core component of their oversight responsibilities. Investors may use ORM maturity and assurance scope as indicators of disclosure credibility when evaluating firm-level ESG performance. For regulators, the findings reinforce the importance of incorporating ORM-related expectations into reporting frameworks such as the CSRD, SFDR, and ISSB standards.

Taken together, the results indicate that ORM maturity is a key driver of ESG disclosure credibility. While assurance can strengthen credibility, it cannot replace strong internal governance. By integrating sustainability into risk management processes, firms can move beyond symbolic reporting towards more reliable and decision-useful disclosures.

The study has several limitations. Its cross-sectional design cannot capture long-term changes in ORM maturity or disclosure practices. The purposive sample of 50 firms, while appropriate for an in-depth mixed-methods analysis, limits the generalisability of the findings. Some subjectivity is unavoidable in scoring ORM maturity and coding qualitative data, although reliability checks were applied. The study also relies on external ESG ratings, and differences in rating methodologies may influence the results. These limitations provide several opportunities for future research. Longitudinal studies could examine how ORM maturity evolves over time, particularly as firms adapt to the CSRD. Larger and more diverse samples could assess whether similar patterns emerge across different institutional settings. Interviews with managers, auditors, and regulators

could provide deeper insights into internal governance practices. Finally, future research could explore whether ORM maturity influences market outcomes such as the cost of capital, firm valuation, or investor perceptions.

7 Conclusions

This study set out to examine whether ORM maturity influences the credibility of ESG disclosures. Using a mixed-methods design and a sample of 50 European firms, it developed two original constructs, the ORM Strength Score and the GWI, to evaluate internal governance and disclosure-performance alignment. The findings show that higher ORM maturity is linked to lower greenwashing risk and to closer alignment between reported and externally assessed ESG performance. The results remained stable across heteroskedasticity-robust estimation, bootstrap procedures, alternative sector specifications, and multiple model configurations, providing additional confidence in the robustness of the observed relationship.

The study contributes to theory by demonstrating how ORM can strengthen ESG disclosure credibility through the mechanisms highlighted by agency theory and legitimacy theory. ORM reduces information asymmetries and limits managerial discretion, thereby enhancing the reliability and verifiability of sustainability disclosures (Jensen and Meckling, 1976). At the same time, firms with more mature ORM systems appear better positioned to achieve substantive legitimacy by embedding sustainability considerations within governance structures and operational processes rather than relying on symbolic reporting practices (Suchman, 1995). These findings extend existing research by positioning ORM as a critical governance mechanism linking internal risk management capabilities to external ESG disclosure credibility. Furthermore, the findings suggest that governance-related capabilities play a more important role in explaining ESG disclosure credibility than sectoral characteristics or external assurance alone.

The study also makes a methodological contribution through the development and application of two novel constructs: the ORMSS and the GWI. Together, these measures provide a structured and replicable framework for assessing the maturity of sustainability-related governance processes and the credibility of ESG disclosures. The integration of quantitative modelling with qualitative thematic analysis further contributes to the literature by providing a comprehensive mixed-methods framework for examining the governance determinants of sustainability reporting quality.

The findings have several practical implications. Managers and boards should integrate ESG risks into existing ORM systems, improve data governance, ensure auditability of sustainability metrics, and use assurance to reinforce rather than replace internal controls. Investors may incorporate ORM maturity into due diligence as an indicator of disclosure credibility. Regulators can enhance emerging frameworks by requiring firms to report not only ESG metrics but also the governance systems that support them. The findings further suggest that assurance is most effective when embedded within a broader governance framework characterised by strong risk management, monitoring, and disclosure-control mechanisms.

Several limitations should be acknowledged. First, the study employs a cross-sectional design and focuses on a sample of 50 European firms operating in three ESG-sensitive sectors. While this approach facilitates detailed manual assessment of disclosure practices and supports the development of the study's novel constructs, it may

limit the generalisability of the findings to other geographical contexts, industries, and organisational settings. Second, although rigorous coding procedures, intercoder reliability testing, and validation procedures were employed, the construction of the ORM strength score inevitably involves a degree of researcher judgement. Third, the GWI relies on external ESG ratings, which may themselves be subject to methodological differences and measurement limitations. These limitations suggest several avenues for future research, including longitudinal studies, cross-regional comparisons, qualitative interviews with key stakeholders, and investigations of market-based outcomes such as firm valuation, financing costs, and cost of capital. Future studies could also examine larger and more diverse samples to further validate and extend the findings.

In conclusion, the findings suggest that credible ESG reporting depends not only on disclosure practices but also on the governance mechanisms that underpin them. The results indicate that embedding sustainability considerations within ORM systems can enhance ESG disclosure credibility, reduce greenwashing risk, and strengthen organisational accountability. The evidence consistently identifies ORM as the strongest predictor of ESG disclosure credibility across the model specifications and robustness checks, while the influence of sectoral characteristics and assurance becomes substantially weaker once governance-related capabilities are considered. By integrating sustainability reporting with risk management processes, firms can improve transparency, increase stakeholder confidence, and support the broader integrity and effectiveness of sustainable finance initiatives. Overall, the study highlights the importance of moving beyond disclosure-focused approaches towards governance-focused solutions that enhance the reliability, transparency, and decision usefulness of ESG information. This finding is consistent with the broader reporting literature, which emphasises faithful representation and reliability as fundamental attributes of high-quality and decision-useful reporting (Kythreotis and Soltani, 2023).

Declarations

All authors declare that they have no conflicts of interest.

References

- Ameli, N., Drummond, P., Bisaro, A., Grubb, M. and Chenet, H. (2020) 'Climate finance and disclosure for institutional investors: why transparency is not enough', *Climatic Change*, Vol. 160, pp.565–589, <https://doi.org/10.1007/s10584-019-02542-2>.
- Arena, M., Arnaboldi, M. and Azzone, G. (2010) 'The organizational dynamics of enterprise risk management', *Accounting, Organizations and Society*, Vol. 35, No. 7, pp.659–675.
- Berg, F., Koelbel, J.F. and Rigobon, R. (2022) 'Aggregate confusion: the divergence of ESG ratings', *Review of Finance*, Vol. 26, No. 6, pp.1315–1344, <https://doi.org/10.1093/rof/rfac033>.
- Brown, H.S., de Jong, M. and Levy, D.L. (2009) 'Building institutions based on information disclosure: lessons from GRI's sustainability reporting', *Journal of Cleaner Production*, Vol. 17, No. 6, pp.571–580, <https://doi.org/10.1016/j.jclepro.2008.12.009>.
- Casey, R.J. and Grenier, J.H. (2015) 'Understanding and contributing to the enigma of corporate social responsibility assurance', *Auditing: A Journal of Practice and Theory*, Vol. 34, No. 1, pp.97–130, <https://doi.org/10.2308/ajpt-50736>.

- Chasiotis, I., Konstantios, D. and Naoum, V. (2022) 'Asymmetries in the capital structure speed of adjustment: the idiosyncratic case of the maritime industry', *Cogent Economics & Finance*, Vol. 10, No. 1, <https://doi.org/10.1080/23322039.2022.2066764>.
- Chatterji, A.K., Durand, R., Levine, D.I. and Touboul, S. (2016) 'Do ratings of firms converge? Implications for managers, investors and strategy researchers', *Strategic Management Journal*, Vol. 37, No. 8, pp.1597–1614, <https://doi.org/10.1002/smj.2407>.
- Cho, C.H., Laine, M., Roberts, R.W. and Rodrigue, M. (2015) 'Organized hypocrisy, organizational façades, and sustainability reporting', *Accounting, Organizations and Society*, Vol. 40, pp.78–94, <https://doi.org/10.1016/j.aos.2014.12.003>.
- Christensen, D.M., Serafeim, G. and Sikochi, A. (2022) 'Why is corporate virtue in the eye of the beholder? The case of ESG ratings', *The Accounting Review*, Vol. 97, No. 1, pp.147–175, <https://doi.org/10.2308/TAR-2019-0506>.
- Christensen, H.B., Hail, L. and Leuz, C. (2021) 'Mandatory CSR and sustainability reporting: economic analysis and literature review', *Review of Accounting Studies*, Vol. 26, No. 3, pp.1176–1248, <https://doi.org/10.1007/s11142-021-09609-5>.
- Christofi, K., Chourides, P. and Papageorgiou, G. (2023) 'The role of knowledge assets and corporate social responsibility in creating firm value', *Knowledge and Performance Management*, Vol. 7, No. 1, pp.163–173, [https://doi.org/10.21511/kpm.07\(1\).2023.13](https://doi.org/10.21511/kpm.07(1).2023.13).
- Christofi, K., Kythreotis, A., Chourides, P., Soltani, M. and Zhou, D. (2025) 'The impact of sustainability disclosure on financial statement value relevance: evidence from Europe', *International Journal of Business and Emerging Markets*, pp.1–22, DOI: 10.1504/IJBEM.2025.147883.
- Creswell, J.W. and Plano Clark, V.L. (2018) *Designing and Conducting Mixed Methods Research*, 3rd ed., Sage Publications, Thousand Oaks, California.
- Delmas, M.A. and Burbano, V.C. (2011) 'The drivers of greenwashing', *California Management Review*, Vol. 54, No. 1, pp.64–87, <https://doi.org/10.1525/cmr.2011.54.1>.
- Eccles, R.G. and Strohle, J. (2018) *Exploring Social Origins in the Construction of ESG Measures* [online] <https://ssrn.com/abstract=3212685> or <http://dx.doi.org/10.2139/ssrn.3212685> (accessed 11 December 2025).
- Eng, L.L. and Mak, Y.T. (2003) 'Corporate governance and voluntary disclosure', *Journal of Accounting and Public Policy*, Vol. 22, No. 4, pp.325–345, [https://doi.org/10.1016/S0278-4254\(03\)00037-1](https://doi.org/10.1016/S0278-4254(03)00037-1).
- Ghitti, M., Gianfrate, G. and Palma, L. (2024) 'The agency of greenwashing', *Journal of Management and Governance*, Vol. 28, pp.905–941, <https://doi.org/10.1007/s10997-023-09683-8>.
- Hodge, K., Subramaniam, N. and Stewart, J. (2009) 'Assurance of sustainability reports: impact on report users' confidence and perceptions of information credibility', *Australian Accounting Review*, Vol. 19, No. 3, pp.178–194, <https://doi.org/10.1111/j.1835-2561.2009.00056.x>.
- Jensen, M.C. and Meckling, W.H. (1976) 'Theory of the firm: managerial behavior, agency costs and ownership structure', *Journal of Financial Economics*, Vol. 3, No. 4, pp.305–360, [https://doi.org/10.1016/0304-405X\(76\)90026-X](https://doi.org/10.1016/0304-405X(76)90026-X).
- Kolk, A. (2008) 'Sustainability, accountability and corporate governance: exploring multinationals' reporting practices', *Business Strategy and the Environment*, Vol. 17, No. 1, pp.1–15, <https://doi.org/10.1002/bse.511>.
- Kythreotis, A. and Soltani, M. (2023) 'Relevance and faithful representation (reliability) of annual and semi-annual financial statements: a trade-off?', *International Journal of Managerial and Financial Accounting*, Vol. 15, No. 3, pp.393–412, <https://doi.org/10.1504/IJMFA.2023.131779>.
- Lyon, T.P. and Montgomery, A.W. (2015) 'The means and end of greenwash', *Organization and Environment*, Vol. 28, No. 2, pp.223–249, <https://doi.org/10.1177/1086026615575332>.

- Marquis, C., Toffel, M.W. and Zhou, Y. (2016) 'Scrutiny, norms, and selective disclosure: a global study of greenwashing', *Organization Science*, Vol. 27, No. 2, pp.483–504, <https://doi.org/10.1287/orsc.2015.1039>.
- Michelon, G. and Parbonetti, A. (2012) 'The effect of corporate governance on sustainability disclosure', *Journal of Management and Governance*, Vol. 16, No. 3, pp.477–509, <https://doi.org/10.1007/s10997-010-9160-3>.
- Moroney, R., Windsor, C. and Aw, Y.T. (2012) 'Evidence of assurance enhancing the quality of voluntary environmental disclosures', *Accounting and Finance*, Vol. 52, No. 3, pp.903–939, <https://doi.org/10.1111/j.1467-629X.2011.00413.x>.
- O'Dwyer, B. and Owen, D. (2005) 'Assurance statement practice in environmental, social and sustainability reporting', *The British Accounting Review*, Vol. 37, No. 2, pp.205–229, <https://doi.org/10.1016/j.bar.2005.01.005>.
- Power, M. (2005) 'The invention of operational risk', *Review of International Political Economy*, Vol. 12, No. 4, pp.577–599 [online] <http://www.jstor.org/stable/25124039> (accessed 13 November 2025).
- Simnett, R., Vanstraelen, A. and Chua, W.F. (2009) 'Assurance on sustainability reports: an international comparison', *Accounting Review*, Vol. 84, No. 3, pp.937–967 [online] <http://www.jstor.org/stable/27784199> (accessed 24 September 2025).
- Suchman, M.C. (1995) 'Managing legitimacy: strategic and institutional approaches', *Academy of Management Review*, Vol. 20, No. 3, pp.571–610.
- Wang, S., Wareewanich, T. and Chankoson, T. (2023) 'Factors influencing venture capital performance in emerging technology: the case of China', *International Journal of Innovation Studies*, Vol. 7, No. 1, pp.18–31.
- Zhang, D. (2022) 'Are firms motivated to greenwash by financial constraints? Evidence from global firms' data', *Journal of International Financial Management and Accounting*, Vol. 33, pp.459–479, <https://doi.org/10.1111/jifm.12153>

Appendix

Table A1 ORM strength score framework

<i>Dimension</i>	<i>Indicator</i>	<i>Description</i>	<i>Score (0–5)</i>
Governance structure	Board ESG oversight	Board oversight of ESG risks	0 = absent; 5 = fully embedded
Governance structure	Risk committee	Dedicated ESG/risk committee	0 = absent; 5 = fully embedded
Governance structure	Executive accountability	Management accountability	0 = absent; 5 = fully embedded
Governance structure	Governance reporting	Governance disclosure	0 = absent; 5 = fully embedded
Governance structure	Risk governance disclosure	Transparency of governance	0 = absent; 5 = fully embedded
Risk identification	ESG risk register	Formal ESG risk register	0 = absent; 5 = fully embedded
Risk identification	Climate risk identification	Climate risk identification	0 = absent; 5 = fully embedded
Risk identification	Social risk assessment	Social risk assessment	0 = absent; 5 = fully embedded

Table A1 ORM strength score framework (continued)

<i>Dimension</i>	<i>Indicator</i>	<i>Description</i>	<i>Score (0–5)</i>
Risk identification	Supply chain risk	Supply-chain risk mapping	0 = absent; 5 = fully embedded
Risk identification	Emerging risks	Emerging ESG risks	0 = absent; 5 = fully embedded
Risk assessment	Scenario analysis	Scenario analysis	0 = absent; 5 = fully embedded
Risk assessment	Stress testing	Stress testing	0 = absent; 5 = fully embedded
Risk assessment	Materiality assessment	Materiality assessment	0 = absent; 5 = fully embedded
Risk assessment	Risk prioritisation	Risk ranking methodology	0 = absent; 5 = fully embedded
Risk assessment	Mitigation planning	Mitigation plans	0 = absent; 5 = fully embedded
Monitoring and control	Internal audit	ESG internal audits	0 = absent; 5 = fully embedded
Monitoring and control	Key risk indicators	ESG KRIs	0 = absent; 5 = fully embedded
Monitoring and control	Monitoring dashboard	Monitoring dashboards	0 = absent; 5 = fully embedded
Monitoring and control	Compliance monitoring	Compliance controls	0 = absent; 5 = fully embedded
Monitoring and control	Incident reporting	Incident management	0 = absent; 5 = fully embedded
Disclosure integration	Annual report integration	ESG in annual reports	0 = absent; 5 = fully embedded
Disclosure integration	ESG targets	Quantified targets	0 = absent; 5 = fully embedded
Disclosure integration	Performance monitoring	Target monitoring	0 = absent; 5 = fully embedded
Disclosure integration	Assurance coordination	Coordination with assurance	0 = absent; 5 = fully embedded
Disclosure integration	Disclosure governance	Disclosure governance	0 = absent; 5 = fully embedded