Leadership Diversity, Governance Quality, and Responsible Innovation in European Industrial Firms: An Integrative Literature Review

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Abstract: The objective of this paper is to integrate fragmented research on leadership diversity, governance quality, and responsible innovation in European industrial firms and to explain the governance mechanisms through which different dimensions of leadership diversity may shape responsible innovation. Existing research has generated valuable insights into diversity and innovation, diversity and ESG-related disclosure, and governance and responsible innovation, but these streams remain insufficiently integrated and often rely on different conceptualisations, levels of analysis, and outcome measures. Accordingly, the review asks: how do specific dimensions of leadership diversity shape responsible innovation in European industrial firms, and through which governance mechanisms is this relationship enabled or constrained? To answer this question, the paper adopts an integrative review design suited to a fragmented field combining empirical, conceptual, and meta-analytic studies. Drawing on peer-reviewed literature indexed in Scopus and Web of Science, the review applies transparent selection criteria and synthesises the final corpus through a mechanism-based thematic analysis. The review identifies three recurring mechanisms across the literature: cognitive expansion, governance filtering and integration, and legitimacy signalling. It argues that leadership diversity does not influence responsible innovation in a direct or uniform way. Instead, its effects depend on which diversity dimensions are present, how governance structures and processes translate heterogeneous perspectives into accountable strategic decisions, and how strongly the European institutional context links innovation to legitimacy, disclosure, and sustainability expectations. The paper contributes an integrative conceptual framework that positions governance quality as the key translating mechanism between leadership diversity and responsible innovation and highlights implications for future empirical research.

Keywords: Leadership diversity, Governance quality, Responsible innovation, Integrative literature review, ESG, European industrial firms

1. Introduction

Responsible innovation has become an increasingly prominent concept in debates on sustainability, corporate accountability, and the governance of innovation, as scholars have argued that innovation should be evaluated not only in terms of economic performance but also in terms of its broader societal and environmental implications (Stilgoe et al., 2013; Scherer & Voegtlin, 2020). Firms are therefore no longer assessed solely according to their capacity to generate commercially successful innovations, but also according to whether innovation processes and outcomes are aligned with wider social, environmental, and stakeholder expectations (Scherer & Voegtlin, 2020). This shift is particularly salient in Europe, where regulatory developments in non-financial reporting and ESG disclosure have increased pressure on firms to connect innovation with transparency, accountability, and long-term legitimacy (Bigelli et al., 2023; Nicolò et al., 2021). Within this context, leadership diversity has attracted sustained attention in management, corporate governance, and innovation research. A growing body of literature suggests that heterogeneous boards and top management teams may broaden strategic search, enrich problem framing, and expose firms to more diverse knowledge bases and perspectives (Makkonen, 2022; Klarner et al., 2020). At the same time, empirical findings remain inconsistent. While some studies report positive relationships between leadership diversity and innovation, others show that the strength and direction of these effects depend on the type of diversity considered, the way innovation is operationalised, and the specific governance characteristics under examination (Makkonen, 2022; Sierra-Morán et al., 2024). These inconsistencies suggest that leadership diversity should not be treated as a universally beneficial attribute, but rather as a contingent organisational resource whose effects depend on governance arrangements and contextual conditions (Klarner et al., 2020; Zaman et al., 2023). A further challenge is that the relevant literature remains fragmented across several partially overlapping streams. One stream examines the relationship between leadership diversity and innovation outcomes, often focusing on board or top management team characteristics and their association with innovation performance (Makkonen, 2022; Sierra-Morán et al., 2024). A second stream explores how board diversity relates to ESG disclosure and broader sustainability-related governance outcomes, particularly in European firms operating under stronger non-financial reporting expectations (Nicolò et al., 2021; Gavana et al., 2024). A third stream conceptualises responsible innovation primarily as a governance challenge and examines how governance arrangements can support innovation that is socially and environmentally aligned (Scherer & Voegtlin, 2020; Farza & Omri, 2026).

However, these streams only rarely explain how specific dimensions of leadership diversity are translated into responsible innovation outcomes through governance-related mechanisms, particularly in the context of European industrial firms. As a result, the literature still lacks an integrated mechanism-based explanation of when and how leadership diversity contributes not merely to innovation output, but to innovation that is governed responsibly and aligned with broader accountability expectations. To address this gap, the paper asks the following research question: How do specific dimensions of leadership diversity shape responsible innovation in European industrial firms, and through which governance mechanisms is this relationship enabled or constrained? The paper contributes to the literature in three ways. First, it integrates fragmented but related literatures on leadership diversity, governance quality, ESG-related oversight, and responsible innovation. Second, it distinguishes among demographic, experiential, and cognitive diversity rather than treating leadership diversity as a homogeneous construct. Third, it develops an integrative conceptual framework, presented graphically in Figure 1, that positions governance quality as the key mechanism through which leadership diversity is translated into responsible innovation outcomes in the European context.

2. Theoretical Framework

2.1 Core Concepts and Analytical Distinctions

Leadership diversity is best understood as a multidimensional construct encompassing demographic, experiential, and cognitive diversity. Demographic diversity concerns characteristics such as gender, age, and nationality; experiential diversity reflects differences in expertise and experience shaped by career paths, professional backgrounds, and organisational exposure; and cognitive diversity captures variation in the mental models, interpretive frames, and problem-solving approaches through which leaders assess strategic issues (Makkonen, 2022; Wang et al., 2019). Because these dimensions may influence strategic interpretation, information processing, and innovation-related decision making through different pathways, treating them as interchangeable can obscure their distinct effects and help explain why findings across studies are often mixed or contingent (Makkonen, 2022; Sierra-Morán et al., 2024). Recent research further suggests that innovation outcomes depend not only on whether leadership groups are diverse, but also on which board attributes are diverse and how directors participate in strategy and innovation processes. Board characteristics such as independence, outsider representation, and meeting frequency show differentiated relationships with firm innovation, while board involvement in innovation depends on the mobilisation of expertise, the timing of engagement, and the formality of exchanges between directors and organisational members (Sierra-Morán et al., 2024; Klarner et al., 2020). Conceptual precision is therefore essential: treating all forms of diversity as equivalent obscures the mechanisms through which leadership diversity affects governance and innovation and helps explain why findings in this literature often remain mixed, context-dependent, and theoretically fragmented (Makkonen, 2022; Asensio-López et al., 2019; Bezemer et al., 2022). Responsible innovation is treated in this paper as a distinct outcome domain rather than as a synonym for innovation performance. It refers to innovation that is developed and governed in ways that remain attentive to broader social needs, environmental sustainability, stakeholder accountability, and reflexive forms of governance, rather than being assessed solely in terms of novelty, patenting intensity, or commercial success (Scherer & Voegtlin, 2020). This distinction matters because the surrounding literature often relies on adjacent but conceptually non-equivalent constructs, including environmental innovation, ESG disclosure, sustainability governance, and general innovation output. These adjacent streams are analytically relevant because they illuminate how leadership composition and governance arrangements shape environmental orientation, transparency, accountability, and innovation-related strategic choices (Shui et al., 2022; Bigelli et al., 2023; Nicolò et al., 2021; Zampone et al., 2024). However, they do not capture responsible innovation in its entirety and should therefore be treated as related evidence streams rather than direct substitutes for the focal outcome domain (Scherer & Voegtlin, 2020; Shui et al., 2022).

2.2 European Institutional Context and Analytical Boundaries

In this review, European industrial firms are defined as firms headquartered in a European country and operating in manufacturing, engineering, energy, technology, or other production-oriented industrial sectors. The term is used as an analytical category rather than as a uniform legal classification. The review also draws on international and cross-sectoral studies where they provide transferable evidence on the governance mechanisms linking leadership diversity and innovation. Studies that do not focus directly on European industrial firms are treated as supporting evidence and are not used to draw context-specific conclusions about this group of firms.The European setting is not treated in this paper merely as a geographical boundary, but as a theoretically relevant institutional context. European firms operate under comparatively strong sustainability regulation, non-financial

reporting requirements, and stakeholder expectations, which increase pressure to connect board composition, governance arrangements, and strategic decision making with transparency, accountability, and broader social legitimacy (Directive 2014/95/EU; Bigelli et al., 2023; Nicolò et al., 2021). Recent evidence further suggests that board diversity in European firms is closely linked to ESG disclosure and related governance outcomes, and that these relationships are shaped by contextual governance mechanisms such as board independence, cultural diversity, and sustainability-oriented board committees (Bigelli et al., 2023; Nicolò et al., 2021; Gavana et al., 2024; Zampone et al., 2024). The European context is therefore analytically important not only because it places stronger emphasis on accountability and disclosure, but also because it provides a setting in which diversity, governance quality, and innovation are more likely to be connected through formal institutional channels (Bigelli et al., 2023; Gavana et al., 2024). At the same time, the European context does not resolve the conceptual limitations within the underlying literature. In particular, studies differ in how they define leadership diversity, governance quality, innovation, environmental innovation, ESG disclosure, and responsible innovation. Consequently, evidence generated in a European regulatory and institutional setting cannot automatically be interpreted as direct evidence of responsible innovation. The European context may strengthen the institutional connection between diversity, governance, disclosure, and sustainability, but it does not make these constructs equivalent. The review therefore uses studies on ESG disclosure, eco-innovation, SDG reporting, and sustainability governance as adjacent evidence rather than as direct measures of responsible innovation (Scherer & Voegtlin, 2020; Shui et al., 2022).

2.3 Toward an Integrative Conceptual Framework

Taken together, the preceding conceptual distinctions suggest that leadership diversity, governance quality, and responsible innovation should not be analysed as separate or loosely connected themes, but as mutually interdependent elements of a broader governance process. The literature reviewed in this paper indicates that leadership diversity is most relevant when treated as a multidimensional input, governance quality as the mechanism through which heterogeneous perspectives are filtered and integrated, and responsible innovation as the focal outcome domain shaped by both organisational and institutional conditions (Makkonen, 2022; Klarner et al., 2020; Scherer & Voegtlin, 2020). At the same time, the European context adds an important institutional layer, as disclosure requirements, ESG expectations, and governance traditions influence how diversity is interpreted, how governance mechanisms operate, and how innovation becomes linked to accountability and legitimacy (Bigelli et al., 2023; Nicolò et al., 2021; Gavana et al., 2024). On this basis, the review develops an integrative conceptual framework that organises fragmented findings across the literature and clarifies the mechanisms through which leadership diversity may shape responsible innovation in European industrial firms.

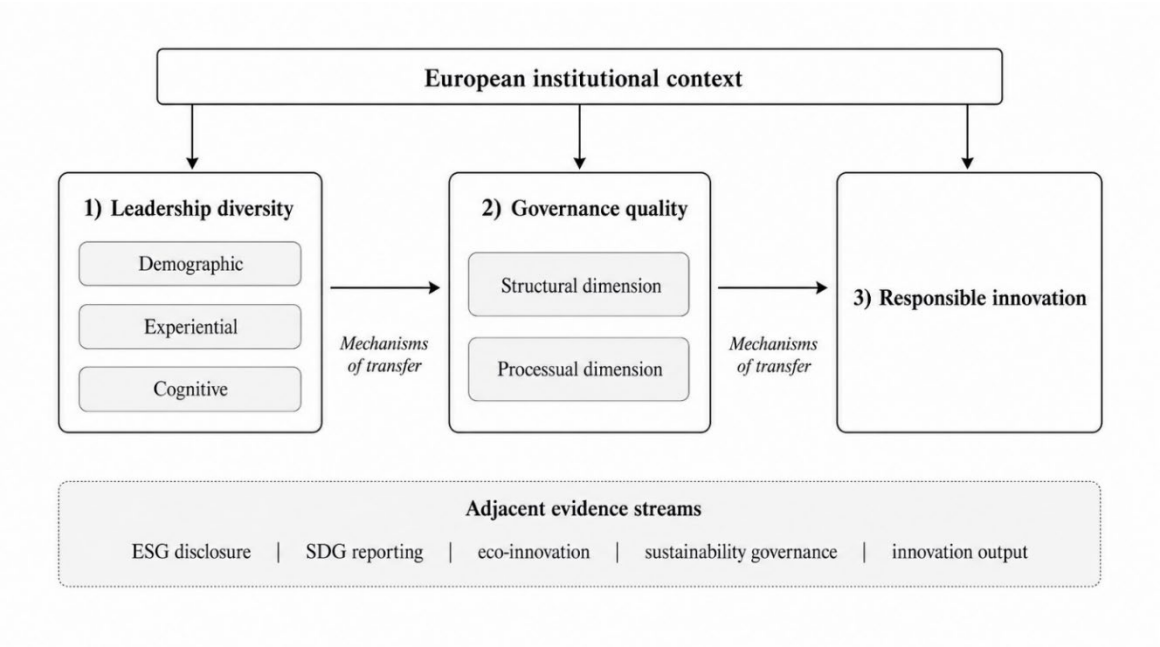


Figure 1: Integrative conceptual framework linking leadership diversity, governance quality, and responsible innovation in European industrial firms. Source: Author's integrative synthesis based on the reviewed literature

Figure 1 summarises the central argument of the review. Leadership diversity is treated as a multidimensional input, governance quality as the mechanism through which heterogeneous perspectives are filtered and integrated, and responsible innovation as the focal outcome domain. The European institutional context shapes how these relationships unfold, while adjacent evidence streams provide supporting insight without being treated as direct substitutes for responsible innovation.

3. Research Design and Review Methodology

3.1 Review Design, Objective and Scope

This paper adopts an integrative literature review design. The review is not presented as a systematic review or meta-analysis; its purpose is to integrate heterogeneous conceptual and empirical evidence and to develop a mechanism-based framework. Integrative reviews are particularly suitable for conceptually fragmented and interdisciplinary fields because they allow the combination of empirical and conceptual studies and support the development of new perspectives, frameworks, and future research agendas (Whittemore & Knafl, 2005; Torraco, 2016; Snyder, 2019). In particular, prior research has tended to examine either leadership diversity and innovation, diversity and ESG-related disclosure, or governance and responsible innovation, while offering only limited explanation of how these domains connect through common mechanisms (Makkonen, 2022; Sierra-Morán et al., 2024; Scherer & Voegtlin, 2020). The objective of the review is therefore not only to summarise prior studies, but to integrate evidence from research on leadership diversity, governance quality, ESG-related oversight, and responsible innovation into a coherent explanatory framework. The review focuses primarily on peer-reviewed journal articles indexed in Scopus and Web of Science and published between 2015 and 2025, while allowing the inclusion of a limited number of earlier foundational studies where these were conceptually necessary.

3.2 Search Strategy and Study Selection

The search strategy was designed to identify both the focal literature and adjacent evidence streams relevant to the research question. In line with recommendations for integrative literature reviews, the search process aimed to ensure transparency while remaining aligned with the explanatory purpose of the review rather than with the logic of statistical aggregation (Torraco, 2016; Snyder, 2019). Searches were conducted in Scopus and Web of Science using combinations of keywords related to leadership diversity, governance quality, responsible innovation, ESG disclosure, sustainability governance, eco-innovation, European firms, and industrial firms. Representative search strings included combinations such as “board diversity” AND “innovation” AND Europe, “corporate governance” AND “responsible innovation”, “gender diversity” AND “ESG disclosure” AND Europe, and “board structure” AND “eco-innovation”. The search strategy was intentionally broad enough to capture both directly relevant studies and adjacent literatures that could illuminate governance-related mechanisms and accountability-oriented innovation outcomes. Studies were included if they were peer-reviewed scholarly publications published in English and addressed at least two of the three focal domains of the review: leadership diversity, governance quality, and innovation or responsible innovation. Eligible studies included empirical articles, conceptual papers, review articles, and meta-analyses, if they offered conceptual clarification, explanatory insight, or evidence relevant to the research question. Studies were excluded if they focused exclusively on public-sector or non-corporate settings without transferability to firm governance, treated diversity solely as a workforce-wide HR issue without leadership or governance relevance, addressed innovation only in a highly technical sense unrelated to governance or sustainability, or consisted only of editorials, teaching cases, or non-scholarly commentary. This inclusion logic reflects the integrative review principle that heterogeneous forms of evidence may be combined when they contribute to a more comprehensive understanding of a conceptually fragmented phenomenon (Whittemore & Knafl, 2005; Torraco, 2016). Study selection followed a staged logic. First, database searches generated an initial pool of records using combinations of diversity-, governance-, innovation-, and Europe-related keywords. Second, duplicate records were removed. Third, titles and abstracts were screened for relevance to the focal constructs and research question. Fourth, full texts were assessed against the inclusion and exclusion criteria. Finally, the retained studies were reviewed for conceptual fit within the overall explanatory scope of the paper. Because the aim was integrative synthesis rather than statistical meta-analysis, study selection prioritised conceptual relevance and explanatory value alongside methodological quality. Particular attention was given to studies that clarified mechanisms, distinguished among diversity dimensions, connected governance to innovation-related outcomes, or provided evidence from European settings. The final review corpus consisted of 25 studies, several of which contributed to more than one line of evidence. Collectively, these studies provided the basis for the mechanism-based thematic synthesis developed in the findings section.

3.3 Review Corpus, Analytical Procedure and Limitations

The retained literature covered five overlapping streams: (1) leadership diversity and innovation; (2) top management team diversity and innovation output; (3) board structure and innovation governance; (4) diversity and ESG disclosure or sustainability governance; and (5) responsible innovation and corporate governance. This composition reflects the integrative logic of the review, as no single stream is sufficient on its own to explain how dimensions of leadership diversity may shape responsible innovation through governance-related mechanisms. The final corpus was analysed through a mechanism-based thematic synthesis. Coding focused on four analytical questions: which dimension of diversity is examined, at which level of analysis the study operates, what outcome is assessed, and which governance mechanism or contextual condition helps explain the relationship. Through iterative comparison across studies, three recurring analytical themes emerged: cognitive expansion, governance filtering and integration, and legitimacy signalling. These themes structure the findings section because they provide a more explanatory synthesis than a descriptive catalogue of articles. The review has several limitations. First, it is restricted to Scopus- and Web of Science-indexed publications and to English-language scholarship, which may have excluded relevant regional or non-indexed contributions. Second, it synthesises a conceptually heterogeneous body of literature in which diversity, governance, and innovation are defined and operationalised differently across studies. Third, the inclusion of adjacent evidence streams such as ESG disclosure, SDG disclosure, and eco-innovation broadens the explanatory base but also requires careful conceptual discipline. Finally, while the European focus increases contextual specificity, it also limits the direct generalisability of the review beyond the region.

Table 1: Review design and selection criteria

Review element	**Specification**
Review type	Integrative literature review
Objective	To explain how different dimensions of leadership diversity relate to responsible innovation through governance quality mechanisms
Databases	Scopus; Web of Science
Time frame	Primarily 2015–2025, with limited earlier foundational studies where conceptually necessary
Language	English
Core search domains	Leadership diversity; governance quality; responsible innovation; ESG disclosure; eco-innovation; innovation output
Inclusion logic	Peer-reviewed studies with conceptual or empirical relevance to at least two focal domains
Exclusion logic	Non-scholarly outputs; non-corporate settings without transferability; studies lacking leadership or governance relevance

Review element	Specification
Selection stages	Identification; duplicate removal; title/abstract screening; full-text assessment; final conceptual fit
Synthesis strategy	Mechanism-based thematic synthesis

Source: Author's own elaboration based on Whittemore and Knafl (2005), Torraco (2016), and Snyder (2019).

4. Findings and Thematic Synthesis

4.1 Cognitive Expansion: When Diversity Broadens Strategic Search

A recurring pattern across the reviewed literature is that leadership diversity contributes to innovation most consistently when it expands the knowledge base, interpretive range, and strategic search capacity of the leadership group. Meta-analytic evidence indicates that board diversity is positively associated with firm innovation, but that this relationship is driven more strongly by cognitive diversity, captured through expertise and experience, than by demographic diversity alone (Makkonen, 2022). Related evidence on culturally diverse teams similarly shows that deep-level diversity is more positively associated with creativity and innovation than surface-level diversity, suggesting that differences in perspectives, mental models, and problem-solving approaches are especially relevant for innovative outcomes (Wang et al., 2019). These findings help explain why the diversity–innovation relationship remains uneven across studies. Research that relies mainly on demographic proxies such as gender or nationality often captures surface-level variation, whereas studies focusing on expertise-, experience-, or cognition-related forms of diversity are methodologically closer to the informational and interpretive mechanisms through which leadership groups shape innovation. Meta-analytic and review evidence further suggests that findings also vary depending on how innovation is operationalised, for example as inputs, outputs, novelty, or efficiency (Makkonen, 2022; Sierra-Morán et al., 2024). International evidence on board gender diversity supports this interpretation by showing positive associations with patents, novel patents, and innovative efficiency, while also linking gender-diverse boards to more innovative corporate cultures and more diverse inventor bases (Griffin et al., 2021). Evidence also suggests that minority representation in leadership may be associated with changes in corporate governance and product development, although such effects depend on the organisational position of minority leaders and the institutional conditions in which they operate (Cook & Glass, 2015). Similarly, research on female director participation indicates that board diversity can be associated with corporate innovation, while also suggesting that the relationship should be interpreted in relation to the specific form of diversity and the organisational processes through which board members contribute to innovation (Vafaei et al., 2021). A second important distinction concerns the level of analysis in the reviewed studies. Research on top management teams suggests that diversity shapes strategic innovation orientation and influences firms' choices to focus on particular innovation fields, implying a relatively direct effect on innovation trajectories (Talke et al., 2011). By contrast, research on boards points to a more indirect role through oversight, advising, and expertise-based strategic engagement rather than operational execution. A third insight is that diversity generates both informational potential and coordination challenges. Heterogeneous groups may identify blind spots, challenge dominant assumptions, and introduce non-routine alternatives, but they may also experience slower consensus formation or weaker integration when task conditions and interaction processes are not supportive (Wang et al., 2019). The most defensible synthesis is therefore not that diversity directly improves innovation, but that it expands the cognitive potential for innovation, while the realisation of that potential depends on whether heterogeneous perspectives can be effectively integrated into strategic deliberation and coherent strategic choices (Wang et al., 2019; Klarner et al., 2020).

4.2 Governance Filtering and Integration: When Diversity Becomes Actionable

The most important synthesis emerging from the review is that governance quality functions as the central translation mechanism between leadership diversity and responsible innovation. Diversity does not become

strategically useful simply by being present at the top of the firm; rather, its value depends on whether governance structures and processes can filter, organise, and integrate heterogeneous perspectives into accountable decisions and coherent strategic action (Klarner et al., 2020; Bezemer et al., 2022; Scherer & Voegtlin, 2020). Evidence from the board–innovation literature suggests that this process depends not only on formal board composition but also on how deliberation is organised, how expertise is mobilised, and how boards connect monitoring with strategic guidance. Meta-analytic findings indicate that board characteristics such as meeting frequency, outsider representation, and board independence are differentially associated with innovation, while process-oriented research shows that directors contribute to innovation through staged, expertise-based review rather than through direct operational execution (Sierra-Morán et al., 2024; Klarner et al., 2020). Governance quality therefore refers not only to structural arrangements, but also to the organisational capacity to create space for specialised knowledge, challenge assumptions constructively, and translate diverse inputs into decisions with strategic and ethical relevance (Klarner et al., 2020; Bezemer et al., 2022). This theme also helps explain why direct-effect models of diversity and innovation are often analytically unsatisfactory. When diversity is examined only as an independent variable predicting innovation output, the analysis overlooks the internal organisational processes through which diverse inputs are prioritised, interpreted, and translated into action. Review work on governance and innovation has repeatedly noted the absence of consensus in this field and the need to move beyond simple input–output approaches toward more processual and context-sensitive explanations (Asensio-López et al., 2019; Bezemer et al., 2022). For responsible innovation, this point is especially important: innovation that is expected to align with stakeholder interests, environmental sustainability, and long-term legitimacy requires governance arrangements capable of evaluating competing priorities and embedding social and environmental concerns into innovation-related decision making (Scherer & Voegtlin, 2020). The literature therefore supports a view of governance as an active integrative layer through which diversity becomes strategically actionable and potentially responsibility-enhancing, rather than as a passive institutional background or a mere control variable (Scherer & Voegtlin, 2020; Klarner et al., 2020; Asensio-López et al., 2019).

4.3 Legitimacy Signalling and Adjacent Sustainability Outcomes

A third major theme in the reviewed literature links leadership diversity to ESG disclosure, eco-innovation, and broader sustainability-oriented governance outcomes. This stream is particularly visible in European and comparative studies, where non-financial reporting obligations and governance expectations make board composition more salient as a signal of accountability and credibility (Directive 2014/95/EU; Bigelli et al., 2023; Nicolò et al., 2021). Recent evidence suggests that demographic and structural diversity can enhance the visibility and legitimacy of governance, especially when combined with enabling structures such as board independence, cultural diversity, CSR or sustainability committees, and stronger disclosure regimes (Bigelli et al., 2023; Gavana et al., 2024; Zampone et al., 2024). Related work on CSR and corporate social performance also indicates that women's representation on boards is often positively associated with CSR ratings, corporate social performance, and reputational outcomes, suggesting that diversity may matter not only for internal deliberation but also for how firms are evaluated by external stakeholders (Bear et al., 2010; Harjoto et al., 2015; Byron & Post, 2016). This stream must nevertheless be interpreted with conceptual caution. ESG disclosure, sustainability performance, SDG reporting, and eco-innovation are not equivalent to responsible innovation, even though they provide important adjacent evidence about how governance arrangements and leadership composition shape transparency, accountability, environmental orientation, and external trust (Scherer & Voegtlin, 2020; Shui et al., 2022; Zampone et al., 2024). Studies on eco- and green innovation similarly show that the effects of board gender diversity are often mediated or moderated by governance- and context-related conditions, such as CSR strategy, disclosure quality, or industry-level institutional pressures, which reinforces the broader argument that diversity matters through organisational and institutional pathways rather than through simple direct effects (Issa & Bensalem, 2022). Country-level institutional conditions also appear to shape the relationship between board gender diversity, environmental innovation, and carbon-related outcomes, indicating that the consequences of leadership diversity cannot be separated from the institutional environment in which firms operate (Konadu et al., 2022). The European context is analytically valuable because these legitimacy effects may be particularly salient in settings where board composition is more visible and more tightly linked to formal accountability expectations.

4.4 Fragmentation in the Evidence Base

Despite the recurring patterns identified in the previous sections, the evidence base remains fragmented along several important dimensions. First, studies vary substantially in how they define and operationalise diversity, often collapsing conceptually distinct forms of leadership heterogeneity into broad demographic indicators,

even though recent meta-analytic work suggests that demographic and cognitive or experience-based diversity do not produce equivalent innovation-related effects (Makkonen, 2022; Wang et al., 2019). Second, innovation outcomes are measured inconsistently across the literature, ranging from patents, novelty, and innovation efficiency to eco-innovation, ESG disclosure, and broader sustainability-oriented outcomes, which limits direct comparability across studies and contributes to the persistence of mixed findings (Makkonen, 2022; Sierra-Morán et al., 2024). Third, the level of analysis also varies considerably, as research on boards, top management teams, and broader leadership arrangements often draws on different assumptions about how diversity influences innovation, making conceptual transfer across these levels problematic unless the underlying mechanisms are carefully specified (Talke et al., 2011; Klarner et al., 2020). Methodologically, the field also remains limited by the prevalence of broad input–output models and governance proxies that do not fully capture how strategic deliberation, accountability allocation, and the integration of heterogeneous perspectives actually unfold. Review work on governance and innovation has noted the absence of consensus in this area, while more recent board–strategy scholarship shows that the literature is still dominated by archival approaches and pays insufficient attention to processual, contextual, and multilevel dynamics (Asensio-López et al., 2019; Bezemer et al., 2022). This weakens causal interpretation and means that many conclusions in the literature are stronger as suggestive patterns than as definitive explanations (Makkonen, 2022; Sierra-Morán et al., 2024). The most robust conclusion of the review is therefore not that diversity directly produces responsible innovation, but that certain dimensions of leadership diversity become more consequential when governance quality enables their productive integration and when institutional conditions reinforce the link between governance, accountability, and innovation-related responsibility (Klarner et al., 2020; Scherer & Voegtlin, 2020).

5. Discussion

The review supports a conditional and mechanism-based interpretation of leadership diversity, but its main contribution lies in clarifying where the evidence is robust and where it remains inconclusive. Three points of convergence appear relatively strong across the literature. First, diversity is most consistently associated with innovation-related outcomes when it captures cognitive, experiential, or task-related differences rather than demographic heterogeneity alone. Second, governance quality is not a peripheral condition but a central mechanism through which heterogeneous perspectives are translated into accountable strategic decisions. Third, legitimacy and disclosure effects appear particularly salient in European settings, where board composition is more visible and more tightly linked to formal accountability expectations (Makkonen, 2022; Sierra-Morán et al., 2024; Klarner et al., 2020; Bigelli et al., 2023; Nicolò et al., 2021). At the same time, the review reveals several points of tension that help explain why the literature has remained fragmented. One recurring problem is proxy slippage: demographic diversity is often used as a stand-in for broader heterogeneity even when the underlying mechanism is more plausibly cognitive or experiential. A second problem is outcome slippage: many studies move too easily between innovation output, eco-innovation, ESG disclosure, and responsible innovation without clarifying the conceptual boundaries among these constructs. A third point of tension concerns the level of analysis, as board diversity and top management team diversity are frequently discussed under the same broad heading despite relying on partly distinct mechanisms. These slippages weaken comparison across studies and make some inconsistencies in the evidence base more apparent than real (Makkonen, 2022; Wang et al., 2019; Sierra-Morán et al., 2024; Talke et al., 2011; Klarner et al., 2020). The theoretical contribution of this review lies not in claiming that diversity improves responsible innovation in a uniform or universal way, but in re-specifying the relationship among the three focal domains. Leadership diversity is best understood as a differentiated antecedent condition rather than a homogeneous attribute. Governance quality is the main organisational process through which heterogeneous perspectives become strategically useful, ethically relevant, and organisationally actionable. Responsible innovation is treated as the focal outcome domain, while ESG disclosure, eco-innovation, SDG reporting, and sustainability governance are positioned as adjacent but conceptually non-equivalent evidence streams. This formulation moves beyond a simple diversity–performance model by integrating previously separate literatures and by showing that the European context is not merely a boundary condition, but an institutional environment that shapes how diversity, governance, and accountability become linked (Scherer & Voegtlin, 2020; Bigelli et al., 2023; Nicolò et al., 2021; Gavana et al., 2024; Zampone et al., 2024).

6. Conclusion and Implications

This integrative literature review indicates that leadership diversity may shape responsible innovation in a conditional rather than uniform way. Its influence depends on which dimensions of diversity are present, how governance structures and processes translate heterogeneous perspectives into accountable decision making,

and how strongly the institutional environment embeds innovation within broader accountability, disclosure, and sustainability expectations. The review identifies three recurring mechanisms across the literature: cognitive expansion, governance filtering and integration, and legitimacy signalling. Together, these mechanisms provide an analytical basis for integrating previously fragmented research streams on diversity, governance, innovation, and sustainability-related outcomes. On this basis, the article develops an integrative conceptual framework that positions governance quality as the central link between leadership diversity and responsible innovation in European industrial firms, while also distinguishing responsible innovation from adjacent but non-equivalent domains such as ESG disclosure, eco-innovation, and SDG-related reporting. The review also has several implications for future empirical work. If the field is to move beyond broad generalisations, future studies should distinguish more carefully among demographic, experiential, and cognitive diversity instead of collapsing them into a single measure, avoid conflating adjacent outcome domains, and examine governance quality through process-sensitive designs rather than through structural proxies alone. Comparative European research would be especially valuable because it can test whether disclosure-intensive and accountability-rich institutional settings strengthen, weaken, or redirect the relationship between leadership diversity and responsible innovation.

Ethics and AI Disclosure

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Paper title: Leadership Diversity, Governance Quality, and Responsible Innovation in European Industrial Firms: An Integrative Literature Review

Ethics Statement

This article is based exclusively on an integrative review of published scholarly literature and does not involve human participants, human biological material, animals, or primary personal data collection. For that reason, formal institutional ethics committee approval was not required for the study design under standard research ethics procedures applicable to literature-based reviews. The review was conducted with attention to transparency in search, selection, and synthesis, and with the intention to represent prior scholarship accurately and without selective distortion.

AI Use Disclosure

Generative artificial intelligence was used only as a language-support and editing aid during manuscript development. Its use was limited to improving phrasing, readability, and structural coherence under the direct supervision of the authors. All substantive intellectual tasks, including formulation of the research question, literature search design, source selection, interpretation of the literature, argument development, and final verification of the manuscript, remained the responsibility of the authors. The authors reviewed and revised all AI-assisted outputs and take full responsibility for the accuracy, originality, and integrity of the final text.
No AI-generated content was used without human verification.

Signature

Date: 26.6.2026

Signature: Eva Klink

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