



Review

Unpacking climate disclosure: A multi-level integrated framework for understanding the corporate sustainability disclosure landscape

Tia Rebecca Driver*, Amr ElAlfy, Amelia Clarke and Jeffrey Wilson

School of Environment, Enterprise and Development (SEED), University of Waterloo, Waterloo, ON, N2L 3G1, Canada

* **Correspondence:** Email: trdriver@uwaterloo.ca.

Abstract: Climate change poses increasingly significant physical and transition risks to firms, financial systems, and national economies, intensifying the demand for transparent, decision-useful climate risk disclosure. However, research entailing corporate climate disclosures remains conceptually fragmented across domains. To address this gap, we conducted an integrative literature review of 140 peer-reviewed articles sourced from Scopus and Web of Science. We identified twelve interconnected themes that collectively map how firms interpret, disclose, and respond to climate-related risks. We organized these findings into a novel conceptual model that identified concept-to-concept connections and presented possible reasons for the persistence of fragmentation. Overall, the findings from this review and model can inform future reviews and serve as a foundation for additional empirical study.

Keywords: integrative literature review; climate change risks; materiality; sustainability reporting; corporate disclosure

JEL Codes: M14, Q56, Q54

1. Introduction

Climate change poses a profound and escalating threat to the long-term viability of business and financial markets (Li et al., 2024) through physical (Chabot & Bertrand, 2023; Wu & Wan, 2023), financial (Campiglio et al., 2023; H. Huang et al., 2022; Matsumura et al., 2024), and possible litigation impacts (Solana, 2020). In response, stakeholders, ranging from investors and regulators to civil society organizations, are demanding greater transparency regarding firms' exposure to and management of climate-related risks (Arian & Sands, 2024). Corporate climate disclosures have thus emerged as a critical mechanism for conveying information on financial and non-financial climate-related issues, enabling firms to demonstrate their resilience strategies while maintaining legitimacy with stakeholder groups (Bingler et al., 2022; Hahn et al., 2015, 2023). Yet, despite considerable development in climate change-related management research (Wohlgezogen et al., 2020), the literature on climate change disclosure remains fragmented (Borghei, 2021; Shui et al., 2023) with a need for clarification regarding the connection with related research topics (Alam & Costa, 2025). This fragmentation can obscure how core concepts interact to shape disclosure practices, thereby suggesting that further integration between research areas is needed. We seek to address this fragmentation by conducting an integrative literature review (Cronin & George, 2023; Toronto & Remington, 2020; Torraco, 2005) that synthesizes six research concepts: climate change disclosure, climate change risks, materiality, financial performance, financial stability, and stakeholders.

The disclosure of corporate climate change risks and climate-related initiatives is a strategic response to internal and external stakeholder interests (De Bernardi et al., 2019; Hahn et al., 2015). Researchers have examined the corporate process for climate change disclosure in detail, including the development of a conceptual model focusing on the antecedents and outcomes of disclosure (Hahn et al., 2023; Shui et al., 2023), while others have identified the key components of disclosure (Aldoseri & Albaz, 2023). However, the choice of information for public disclosure depends on its materiality, judged through the lens of stakeholder decision-making (Font et al., 2016), stakeholder priority (Fiandrino et al., 2022a; Reimsbach et al., 2020), and the possible financial consequences of sharing that information (Arian & Sands, 2024). Although corporate climate disclosures are developed based on stakeholder pressures and critical assessment (Aldoseri & Albaz, 2023; Shui et al., 2023), current disclosures remain superficial (Andersson & Arvidsson, 2023; Arian & Sands, 2024; De Bernardi et al., 2019; Matsumura et al., 2024).

These superficial disclosures pose challenges for investors, regulators, and the broader economy's financial stability. For investors, climate change disclosures are critical tools for assessing a company's potential risks, as climate change risks can affect asset values (Campiglio et al., 2023) and stock prices (Vestrelli et al., 2024). Additionally, the quality of these disclosures can influence a firm's market value and stock liquidity (Cao et al., 2024; Sra et al., 2022), emphasizing the impact of superficial disclosures on capital market outcomes. On the other hand, regulators rely on climate change disclosures when determining the outcomes of their policy decisions or compliance with mandatory regulations (Farkas & Matolay, 2024; Primec & Belak, 2022). When these disclosures are superficial or incomplete, external stakeholders may struggle to accurately assess or value a company, leading to mispricing of assets or ineffective regulations. At a systemic level, superficial assessments of climate change risks may fail to capture a company's vulnerability, thereby increasing its exposure to climate-related economic fluctuations (Andersson & Arvidsson, 2023; Chabot & Bertrand, 2023). These challenges highlight the critical importance of improving the quality and coherence of climate change disclosures.

Given the critical nature of climate change disclosure for companies and the potential repercussions of insufficient disclosure, researchers have explored this topic in greater depth. Some researchers have explored the reasons for disclosure (Aldoseri & Albaz, 2023; Benz-Saliasi, 2020), quality (Andersson & Arvidsson, 2023; Bingler et al., 2022; De Bernardi et al., 2019; Maji & Kalita, 2022), materiality (Arian & Sands, 2024; Ng et al., 2022; Schiemann & Sakhel, 2019), and external pressures (Ma et al., 2023). These works have extended our understanding of corporate climate change disclosure, but the climate change disclosure literature remains fragmented (Borghei, 2021; Shui et al., 2023) and offers limited engagement with other related topics, such as materiality (Fiandrino et al., 2022b).

Literature reviews have applied a systematic analysis of multiple fields and distinct research themes (i.e., governance, policy and impacts, and drivers and strategies) (Alam & Costa, 2025), or a bibliometric analysis to map the fragmented landscape of carbon disclosure research (Borghei, 2021). Although these studies provide valuable insights into key topical areas of climate change disclosure, no comprehensive review has fully integrated the climate change disclosure literature, leading to siloed investigations into the linkages between climate disclosures and other interconnected fields (Borghei, 2021; Wohlgezogen et al., 2020). Such fragmentation is problematic as it limits a comprehensive understanding of carbon disclosure in practice and theory (Alam & Costa, 2025; Shui et al., 2023), and constrains the development of interdisciplinary climate change research (Wohlgezogen et al., 2020). To address these concerns, we conduct an integrative literature review of six research areas related to climate change disclosure. Rather than examining these six areas in isolation, we synthesize and reconcile shared conceptualizations across them to identify underlying relationships and tensions within the literature. In doing so, we develop a unified conceptual model that clarifies how key constructs are interconnected, thereby supporting future interdisciplinary research through the identification of relevant empirical variables (Elsbach & Van Knippenberg, 2020). Moreover, we provide a foundation for identifying gaps and opportunities for future research in the climate disclosure literature by revealing cross-disciplinary linkages that can serve as avenues for deeper investigation (Cronin & George, 2023; Elsbach & Van Knippenberg, 2020).

To guide the integrative review, the following central research question is posed: How have the finance, management, and sustainability literatures conceptualized the intersections among materiality, climate change risk, corporate disclosures, financial performance, financial stability, and stakeholders in the context of climate change disclosure?

To answer this question, we conduct a comprehensive analysis of 140 peer-reviewed articles across relevant disciplines. This review enhances the insights from previous systematic and bibliometric reviews by providing an avenue to synthesize insights from several research fields with diverse perspectives (Cronin & George, 2023; Snyder, 2019). Our findings from this paper contribute to the climate change disclosure literature in two ways. First, the thematic connections between the six research constructs clarify why and how the research concepts are linked, rather than mere keyword associations. These insights are derived by synthesizing related literature to identify core themes and sub-themes with rich descriptions. As such, our findings from this review provide a conceptual map of the climate change disclosure literature that can inform future reviews. Second, the integrative methodology employed extends our understanding of potential review models for exploring the intersections among climate change, corporate disclosure, and related disciplines.

This paper is organized as follows: In the following section, we outline the integrative review methodology and literature coding. In the subsequent section, we present the findings from the literature coding and include the conceptual model derived from the thematic analysis. Finally, the

model and key intersections are discussed, with the final section presenting the conclusion and outlining the limitations and areas for future research.

2. Research methods

To explore the literature's conceptualization of climate change disclosure and materiality, an integrative literature review was employed since it can synthesize literature within a fragmented field (Cronin & George, 2023) to provide a nuanced understanding of the research through integration and critique (Elsbach & Van Knippenberg, 2020; Torraco, 2005). In doing so, this synthesis enables the development of a conceptual framework (Snyder, 2019) that highlights points of cohesion and thematic bridges between fragments. Therefore, integration must occur to illustrate the shared conceptual, empirical, or theoretical constructs across research areas as the first stage of addressing the fragmentation of the literature related to a phenomenon or communities of practice, in this case, climate change disclosures (Borghei, 2021; Cronin & George, 2023; Shui et al., 2023; Wohlgezogen et al., 2020).

Integrative literature reviews borrow elements from other commonly applied approaches, such as systematic review's data collection process, narrative review's descriptive approach, meta-analysis synthesis, and critical evaluation (Cronin & George, 2023). However, integrative literature applies an inductive approach to data analysis that enables researchers to understand the research topic from the perspective of different communities of practice through developing themes or causal relationships (Snyder, 2019). Due to its inductive nature, integrative literature reviews are suited to develop preliminary conceptualizations (Torraco, 2005) and relationship maps (Torraco, 2016).

More specifically, this review complements but differs from other literature reviews by synthesizing insights from six research areas, each with its own conversations and communities of practice (Cronin & George, 2023). These insights provide greater nuance to the understanding of the relationships among research concepts, as empirical and theoretical literature are synthesized in the analysis, leading to a new framework that would not have been developed by other literature review types (Elsbach & Van Knippenberg, 2020; Toronto & Remington, 2020; Torraco, 2005). For example, meta-analysis studies provide valuable insights from a quantitative perspective, but they primarily focus on the quantitative relationships identified in a limited number of studies and on establishing a definitive solution or answer to the research question (Elsbach & Van Knippenberg, 2020). An integrative review expands on the quantitative focus of a meta-analysis by including other qualitative or theoretical works, which may reinforce the meta-analysis's findings or offer new research directions that would otherwise not have been identified (Elsbach & Van Knippenberg, 2020). Moreover, systematic reviews narrow their focus by examining a specific research question with a highly structured methodological process (Snyder, 2019), whereas an integrative review can adopt a broader scope spanning multiple research questions or areas using an inductive, qualitative approach (Elsbach & Van Knippenberg, 2020; Toronto & Remington, 2020). Thus, integrative reviews can complement systematic reviews' summaries of the literature by providing an alternative conceptualization or mapping (Elsbach & Van Knippenberg, 2020; Snyder, 2019). As for bibliometric reviews, reviewing the literature through co-citation or co-occurrence network mapping would provide insights into the connections among the six research concepts (Borghei, 2021). Yet, the thematic developments from a bibliometric review require further integration to better understand how diverse research areas contain conceptually similar or contradictory findings (Borghei, 2021). Thus, integrative reviews are not superior to, nor do they replace, other review types; instead, they provide innovative conceptualization

of the literature by their unique process of reviewing and synthesizing within fragmented fields (Elsbach & Van Knippenberg, 2020; Cronin & George, 2023; Torraco, 2005).

In summary, this integrative review is not an endpoint whereby the goal is to establish an authoritative, definitive answer to how the six research concepts are interconnected; this review stands as a guide for future research and reviews to further refine the themes identified and build a more theoretical understanding of the complex nature of climate change disclosures (Cronin & George, 2023; Elsbach & Van Knippenberg, 2020). The aim of the integration process is to synthesize information and develop a novel conceptual mapping of the associations between the six research concepts (Cronin & George, 2023; Torraco, 2016). Further, this review was conducted in accordance with the procedures outlined by Cronin and George (2023) and Torraco (2005; 2016). It begins with a systematic literature data collection based on the process utilized by Fiandrino et al. (2022b). This is then followed by a thematic analysis to summarize and synthesize the identified sources, informed by Braun and Clarke (2006) and Skjott Linneberg and Korsgaard (2019).

2.1. Research concepts

Given the diverse nature of the climate change disclosure literature, we identified six key research concepts to guide the selection of relevant literature and to serve as a foundation for the subsequent conceptual model. In doing so, this review aligns with the requirements of ensuring comprehensive coverage of the literature (Cronin & George, 2023) and establishing a conceptual structure for the review (Torraco, 2016). The research concepts included: climate change disclosure, climate change risks, materiality, financial performance, financial stability, and stakeholders.

These six concepts were selected because they capture important dimensions of climate change disclosure, as evidenced by their inclusion in prior reviews (e.g., Alam & Costa, 2025; Allam, 2023; Borghei, 2021; Fiandrino et al., 2022b; Shui et al., 2023) or models demonstrating the theoretical or conceptual linkages between these dimensions (e.g., Chabot & Bertrand, 2023; Ma et al., 2023). The literature also indicates interest in further examining their integration. For example, Fiandrino et al. (2022b) highlighted a need for models that reflect the interdependencies between financial considerations, materiality perspectives, stakeholder expectations, and sustainability impacts. As such, developing an integrative model that incorporates these topics will enhance our understanding of their interconnections. Furthermore, the work of Shui et al. (2023) noted that additional climate-related topics could be examined alongside one another in future systematic reviews (Shui et al., 2023), which echoes the call from Borghei (2021) to understand the conceptual similarities between research areas.

Considering those calls, the six concepts were selected for the following reasons. The financial performance, climate change risks, and climate change disclosure constructs were selected because of their prevalence in climate change and sustainability disclosure literature reviews (Atz et al., 2023; Ma et al., 2023; Shui et al., 2023). The financial stability construct was added because it captures the importance of the impacts that climate change has on the stability of financial institutions and the possible implications for companies (Battiston et al., 2021; Chabot & Bertrand, 2023). The materiality was included within the list since there has been a reference to it as an essential part of the climate change disclosure process (Jørgensen et al., 2022; O'Dwyer & Unerman, 2020). Finally, the stakeholders were included as the sixth concept due to the integral role they have in public disclosures (Arian & Sands, 2024; Ngu & Amran, 2018) and their frequent references in the literature during the

review process. Investigating the linkages among these six concepts provides a more integrated understanding of climate disclosure and helps overcome the fragmentation of research.

2.2. Search protocol

2.2.1. Information sources

For the data collection, academic peer-reviewed articles were obtained from Scopus and Web of Science (WoS) since these databases provide considerable coverage of literature related to climate change, finance, and business management while being utilized by other integrative reviews (Fiandrino et al., 2022b; Ketonen-Oksi & Vigren, 2024). Furthermore, the literature searches for both databases were completed in May 2024.

2.2.2. Keywords

Our goal of this integrative review was to synthesize the insights from the six constructs. As such, it was important to ensure that a sufficiently broad search strategy was used to gather literature across all six areas, without excluding sources prior to screening, and to be mindful of the discourse within each community of practice. To achieve this, broad keywords related to (1) climate change, (2) materiality, and (3) financial performance were applied to gather articles that contained relevant information, with the full list of keywords provided in Table 1. Each keyword set was applied to searches in Scopus and WoS, yielding 510 entries; 48 duplicates were removed using Covidence, a systematic literature review application used for screening.

Table 1. Keywords organized by category.

Category	Keywords
Climate Change	Climate change
	Climate change risks
	Climate change risk*
	Climate change risks disclosure
	Climate change disclosure
	Climate change risks reporting
	Climate change reporting
Materiality	Materiality
	Double materiality
Financial	financial performance
	financial stability
	financial disclosure
	financial reporting

For the Scopus search, a single search string was used, as all keywords could be entered in the advanced search using the title, abstract keywords function, and the AND and OR operators. For the Scopus search, an additional DOCTYPE function was used to limit results to academic articles. The complete Scopus search string is presented below with the total number of articles found in parentheses.

Scopus search string (7): (TITLE-ABS-KEY (“climate change risks” OR “climate change”) OR TITLE-ABS-KEY (“climate change risks disclosure” OR “climate change disclosure”) OR TITLE-ABS-KEY (“climate change risks reporting” OR “climate change reporting”) AND TITLE-ABS-KEY (“materiality” OR “double materiality”) AND TITLE-ABS-KEY (“financial performance” OR “financial stability” OR “financial disclosure” OR “financial reporting”)) AND PUBYEAR > 1999 AND PUBYEAR < 2024 AND (LIMIT-TO (DOCTYPE, “ar”)) AND (LIMIT-TO (LANGUAGE, “English”).

The WoS search used the same keywords, but the TI (title), AB (abstract), and AK (author keywords) fields were used. Additionally, seven search strings were used to ensure appropriate capture of relevant articles. Additional search functions were not employed, as WoS filters were used instead. As such, the results for each search string were filtered to include only journal articles published from 1999 to 2024. Below is a list of all seven WoS search strings, along with the total number of articles for each in parentheses.

WoS search string 1 (39): TI= (“climate change risks disclosure” OR “climate change disclosure”) OR AB= (“climate change risks disclosure” OR “climate change disclosure”) OR AK= (“climate change risks disclosure” OR “climate change disclosure”)

WoS search string 2 (5): TI=(“climate change” OR “climate change risk*”) AND TI=(“materiality” OR “double materiality”)

WoS search string 3 (86): (TI=(“climate change” OR “climate change risk*”) AND TI=(“materiality” OR “double materiality”)) OR (AB= (“climate change” OR “climate change risk*”) AND AB= (“materiality” OR “double materiality”)) OR (AK=(“climate change” OR “climate change risk*”) AND AK=(“materiality” OR “double materiality”))

WoS search string 4 (21): TI=(“climate change” OR “climate change risk*”) AND (TI= (“financial performance” OR “financial stability”) OR TI=(“financial disclosure” OR “financial reporting”))

WoS search string 5 (268): (TI=(“climate change” OR “climate change risk*”) AND (TI= (“financial performance” OR “financial stability”) OR TI=(“financial disclosure” OR “financial reporting”))) OR (AB= (“climate change” OR “climate change risk*”) AND (AB= (“financial performance” OR “financial stability”) OR AB=(“financial disclosure” OR “financial reporting”))) OR (AK= (“climate change” OR “climate change risk*”) AND (AK= (“financial performance” OR “financial stability”) OR AK=(“financial disclosure” OR “financial reporting”)))

WoS search string 6 (2): TI= (“materiality” OR “double materiality”) AND (TI= (“financial performance” OR “financial stability”) OR TI=(“financial disclosure” OR “financial reporting”))

WoS search string 7 (82): (TI= (“materiality” OR “double materiality”) AND (TI= (“financial performance” OR “financial stability”) OR TI=(“financial disclosure” OR “financial reporting”))) OR (AB= (“materiality” OR “double materiality”) AND (AB= (“financial performance” OR “financial stability”) OR AB=(“financial disclosure” OR “financial reporting”))) OR (AK= (“materiality” OR “double materiality”) AND (AK= (“financial performance” OR “financial stability”) OR AK=(“financial disclosure” OR “financial reporting”)))

2.2.3. Inclusion and exclusion criteria

The inclusion and exclusion criteria were developed in accordance with the project’s research question and are outlined in Table 2. To ensure the most recent and relevant articles were included, a time range from 2000 to 2024 was used to capture the influence of key events in the literature (Allam,

2023; Fiandrino et al., 2022b). Additionally, the articles were limited to English to facilitate cross-source comparison (Fiandrino et al., 2022b).

The acceptable literature would include research on sustainability reporting and disclosure, including Environmental, Social, and Governance (ESG) and climate change risk disclosures. Articles discussing the implications of sustainability disclosures on financial stability or financial performance would also be included. Regarding climate change risks, studies that examine the disclosure of transition risks, physical risks, or both would be retained.

However, articles focusing on the practical application of Corporate Social Responsibility (CSR) or ESG practices within firms were not included, as we focused on disclosure rather than corporate practices. Furthermore, literature on greenhouse gas (GHG) emissions reduction practices or measurements were not be included, except for studies that link these topics to financial performance.

2.2.4. Screening

It is essential to ensure objectivity, transparency, and inclusiveness within integrative reviews (Tsotsou et al., 2022). Therefore, we applied the principles of Relevance, Appropriateness, Transparency, and Soundness (RATS) review protocol from Clark (2003), presented in Table 3. We expanded the RATS protocol to accommodate a variety of methodological approaches (e.g., quantitative, qualitative, and mixed methods) and study designs, as well as different communities of practice. This protocol provided a foundation for the screening process, ensuring that each entry was thoroughly reviewed before acceptance or removal from the sample set.

The screening process was completed using Covidence and adopted a structured five-stage process based on the PRISMA 2020 flow diagram (Page et al., 2021). Both tools were selected due to their relevance and previous adoption in integrative literature reviews (Toronto & Remington, 2020). This multi-level process is presented in Figure 1 and resulted in 146 articles. However, after exporting the literature dataset from Covidence, it was discovered that six entries were not from peer-reviewed journals. As such, those six entries were manually removed, leaving the final total of 140 articles for the integrative review.

Table 2. Inclusion and exclusion criteria for the integrative literature review.

Inclusion Criteria	Exclusion Criteria
Peer-reviewed journal articles	Non-peer-reviewed journal articles and other non-academic works (e.g., whitepapers)
English language articles	Non-English language articles
Keywords or topics related to:	Keywords or topics related to:
• sustainability reporting or disclosure • Social, Governance (ESG) disclosure • climate change risk disclosures • Corporate Social Responsibility (CSR) disclosure • financial stability or financial performance • transition risks • physical risks • Single financial materiality • Double materiality	• CSR performance • CSR practices • ESG performance • ESG practices • Greenhouse Gas (GHG) emissions reduction • GHG emission measurement

2.3. Literature coding and theme development

The thematic analysis was conducted using an inductive coding approach (Braun & Clarke, 2006) and implemented in two distinct phases following the guidelines proposed by Skjott Linneberg and Korsgaard (2019). This approach to thematic analysis was adopted since it enables the identification of recurring or dominant themes across literature sources, and the thematic analysis process outlined by it is recommended for integrative literature reviews (Toronto & Remington, 2020).

In the first round, open coding was applied to the selected articles, generating initial descriptive codes that captured key concepts, arguments, and findings (Bryman, 2012; Skjott Linneberg & Korsgaard, 2019). During this phase, each article was assigned to one or more of the six research concepts based on the article's primary research focus. The articles were then sorted into six corresponding worksheets within an Excel database, where initial (first-level) codes were generated to capture the key findings, claims, or theoretical contributions presented in each article in relation to its assigned concept(s) (Braun & Clarke, 2006; Skjott Linneberg & Korsgaard, 2019). Since many articles addressed multiple topics and cross-cut multiple research concepts, an individual article could receive several first-level codes distributed across the database. After the initial coding, an additional round of coding grouped the initial codes within each conceptual worksheet based on conceptual similarity, recurring patterns or themes, or shared topical focus (Skjott Linneberg & Korsgaard, 2019). This process resulted in twenty-six second-level themes that provided a higher level of abstraction of the underlying materials but remained within the original research concept.

Once the second-level themes for all six concepts were generated, the second phase of the coding process systematically organized the second-level codes into broader themes. This involved identifying patterns or themes and exploring the connections or relationships between each theme (Skjott Linneberg & Korsgaard, 2019) and across the six concepts. As such, each theme represents associative linkages between the research concepts. Those intersections among second-order codes across categories served as the foundation for developing the conceptual model (Braun & Clarke, 2006; Torraco, 2016), yielding 12 themes presented in Table 4. Some second-level codes emerged as standalone themes and were not grouped with other second-level codes because of their distinctiveness and their connection to research concepts. The final themes were then organized to generate a relationship map (Torraco, 2005) that illustrates how the literature conceptualizes the connections among the research concepts.

Table 3. Overview of the Relevance, Appropriateness, Transparency, and Soundness (RATS) protocol (Source: Adapted from Clark (2003)).

Assessment	Description
Relevance of study question(s)	Determine whether the research questions posed are relevant to the intentions of the study and are linked to existing knowledge in the community of practice.
Appropriateness of method(s)	Assess the methods (e.g., quantitative, qualitative, or mixed) and the study design to ensure alignment with the study's intentions. Also, consider whether the methods are reasonably justified.
Transparency of procedures	Review the data collection and data analysis procedures to ensure the exact processes utilized are clearly explained. The source's application and discussion of research ethics should also be considered.
Soundness of interpretative approach	Determine the credibility of the results and claims in light of the evidence provided. Assess whether research limitations, counterarguments, and overall contributions of the findings to the community of practices are articulated.

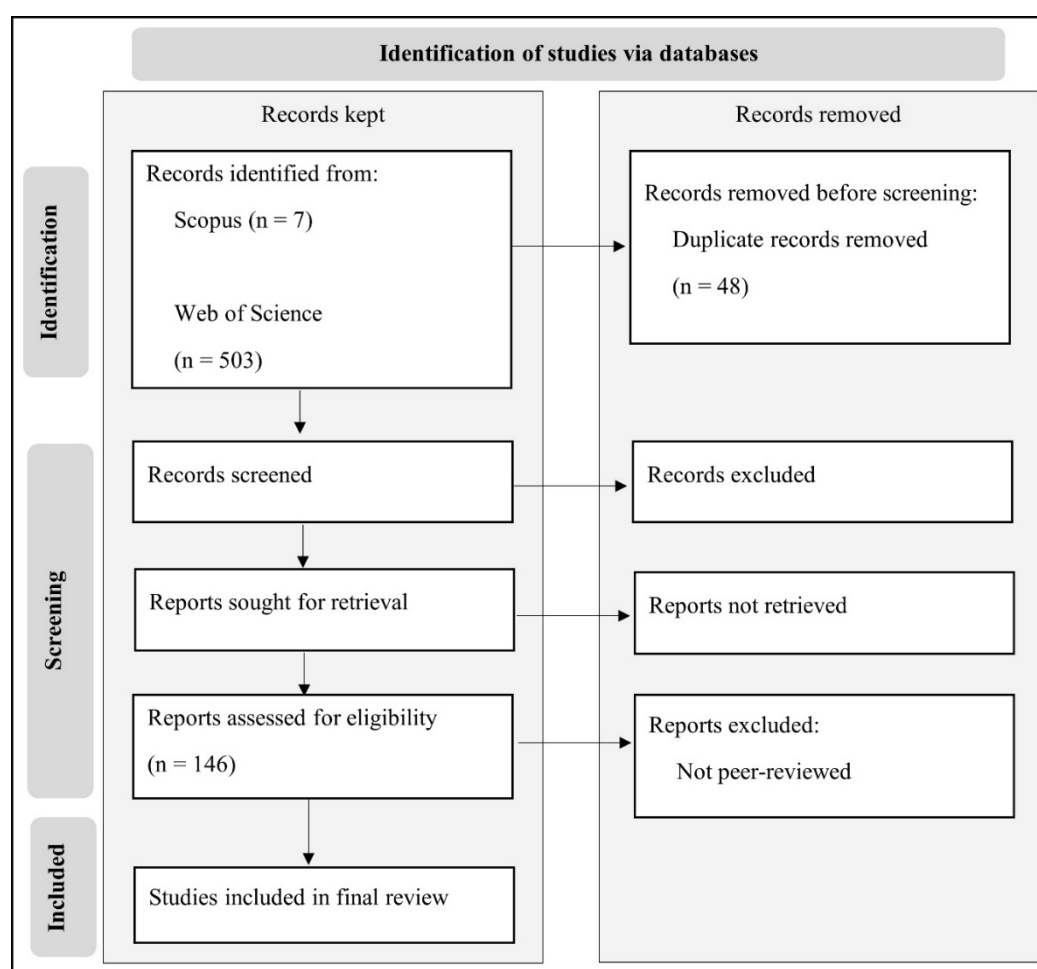


Figure 1. Flow chart of the integrative review process based on PRISMA 2020. **Source:** Adapted from Toronto and Remington (2020), and Page et al. (2021).

Given that an essential feature of integrative reviews is to generate higher-order themes from foundational insights (Cronin & George, 2023), the application of this two-phase coding process is highly appropriate since its inductive approach enables the synthesis and ordering of themes based on lower-order codes (Braun & Clarke, 2006). The generated themes reveal connections among climate change risks, materiality, corporate disclosures, financial stability, financial performance, and stakeholders, which were included in the mapping due to their recurring appearance in the literature. The outcome of this stage is a conceptual map (Figure 2) that illustrates how the themes connect the research concepts.

It is important to note that not all second-level codes were linked to additional research concepts. A total of 16 second-level codes were associated with one of the six research concepts, and did not appear within the 12 themes. Instead, these single-concept codes were synthesized within their corresponding research concepts to understand how the literature explored this topic. The decision not to integrate these codes into the conceptual map was twofold. First, these single-concept codes indicated domain summary themes, whereby insights into a shared topic were highlighted, and the meanings or approaches within that common topic were identified (Braun & Clarke, 2019). As such, they were retained as domain summaries. Second, as noted by Skjott Linneberg and Korsgaard (2019), codes within the second phase should be more analytical and highlight shared patterns or insights. Since these codes did not reveal broader patterns or shared meanings across concepts, they were neither elevated to the level of nor integrated into existing themes. Nevertheless, these codes were retained to help establish the conceptual boundaries and nuance within each research construct.

The transition from 26 second-level codes to 12 overarching themes was guided by an inductive process that identified shared patterns in research concepts, arguments, and findings across the sampled literature. The second-level codes were merged when they reflected similar underlying conceptual relationships, particularly. Distinct themes were generated when multiple codes described comparable financial, institutional, or disclosure from different research concepts. The inductive process enabled the development of themes based on the content of the literature sources and did not require the establishment of specific coding criteria (Skjott Linneberg & Korsgaard, 2019), nor did it conform to any analytic preconceptions (Braun & Clarke, 2006). As such, the final overarching themes represented integrative patterns emerging from the sampled literature rather than domain summaries, which instead focused on meaning in the data related to a topic but did not expand into how the concepts across topics relate to each other (Braun & Clarke, 2019; Skjott Linneberg & Korsgaard, 2019).

The remaining 16 codes that were associated only with one of the six research concepts (e.g., stakeholder, materiality, financial performance, climate change disclosure, climate change risks, and financial stability) were akin to domain summaries. Those codes aptly organized around a single topic, effectively summarizing the related research, but did not lead to a shared meaning in terms of an overarching theme with another research concept (Braun & Clarke, 2019). In summary, the literature coding was conducted in a two-phase approach, with themes developing from shared patterns among research concepts and summaries arising from the literature associated with each research topic. The overarching themes and domain summaries were integrated into the final conceptual model.

Table 4. Summary of the 12 themes identified from the literature.

Theme Name	Second-level Code Name
Smart Policy and Tools	Multi-level financial impacts Constraints on Climate Financial Stability Policy Adoption Importance of Financial Stability and Performance in Climate Policy
Resilience Building	Resilience Building
Mixed Financial Impacts	Predominantly Negative Financial Impacts of Climate Change Climate Risk Sensitivity Exacerbates Financial Risks
Crisis-based Resilience	Crisis-based Resilience
Disclosure Benefits	Sustainability Reporting Facilitates Financial Gains Benefits of Mandatory and Voluntary Disclosure Enhancing Climate Disclosure Value Through Assurance Various Financial Impacts of Climate Change Disclosures
Shaping Disclosure	Pressures Leading to Disclosure Manipulation Board of Directors' Influence on Disclosure
Financial Focused	Stakeholders' Interests Influence Disclosures
Contextual Materiality	National Influences on Climate Change Disclosure Impacts of Materiality Definitions
Socio-economic Expectations	Financially Material Climate Risks Stakeholders Hold Material Agency
Financial Trade-offs	Mixed Financial Implications for Material Disclosures Contextual Benefits of Materiality Benefits of Single-Financial Materiality Diverse Financial Impacts of Materiality Disclosure
Double Materiality	Double Materiality
Multi-level Impacts	Climate Change Risks are Material Widespread Stability Impacts

3. Results

Following the thematic analysis, 12 themes were identified in the literature and synthesized into the conceptual model, as illustrated in Figure 2. Within the conceptual model, the six research concepts are indicated by the white text boxes. The themes that connect the research concepts are indicated by black text boxes and represent associative linkages between them.

In this results section, we provide insights into the findings of the codes associated with the six research concepts and the themes contained within the conceptual mode. A narrative approach is adopted for the remainder of this section, as it offers an opportunity to explain how communities of practice are connected through relationships rather than simply stating the findings from the review (Cronin & George, 2023). This approach ensures that the major themes from the review are emphasized in the discussion, rather than focusing on the individual articles (Toronto & Remington, 2020). Finally, this approach to presenting the results aligns with the literature review process, thereby enabling this paper to “build toward a synthesis of ideas that offers refreshing, new perspectives on the topic and catalyzes further research” (Torraco, 2016). However, to ensure transparency in the coding process,

detailed hierarchical coding structures for the research concepts and the coding structures for the 12 themes are provided in the supplemental materials.

3.1. Summary of the six research concepts

In this section, we focus on how the literature considers and discusses each of the six research concepts. Some concepts, such as financial stability and financial performance, were explored in greater detail in the literature, while others were examined in a more contextual or cursory manner, such as climate change risks or stakeholders. These summaries were based solely on the sources collected during the review process and should therefore be interpreted within the context of this integrative review and conceptual model.

3.1.1. Climate change risks

In light of this research area, the literature highlights a focus on understanding the challenges that exist when addressing climate change risks, with specific consideration for the variability in how climate change impacts nations and firms (Di Febo et al., 2023; Sun et al., 2020, 2023; Wu & Wan, 2023) and the interconnected nature between climate change risks and other socio-economic risks (D’Orazio, 2023). Due to the uneven impacts of climate change, a unified reporting framework should be developed to ensure that the implications are considered, addressing the complex effects of climate change (Fabris, 2020).

3.1.2. Climate change risk disclosure

Regarding the disclosure of climate change risks, the literature has noted the importance of the reporting landscape and standard setters in influencing a firm’s disclosures. The debate around harmonizing reporting standards was explored, with some studies suggesting that a universal standard would be beneficial for addressing the reporting challenges companies face (de Villiers et al., 2022; Giner & Luque-Vílchez, 2022; Ngo et al., 2023). However, the challenge with translating sustainability or climate change into reporting metrics was also raised (Afolabi et al., 2022; Ascui & Lovell, 2012), thereby leaving the question of how a unified standard should be designed unresolved.

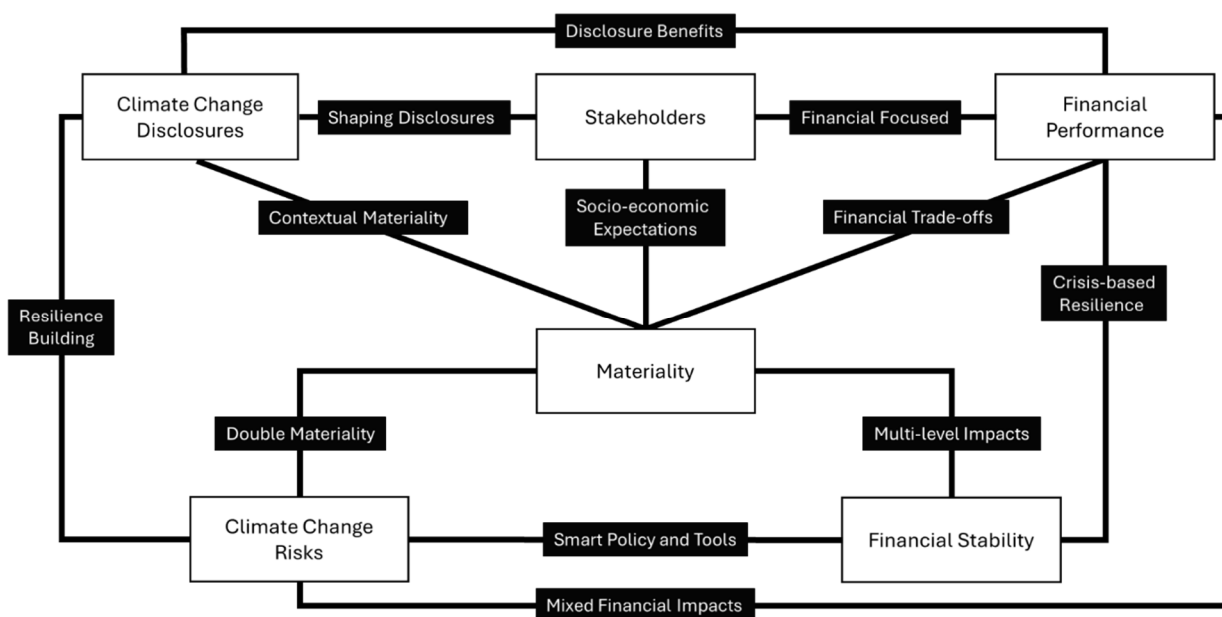


Figure 2. Conceptual model of the linkages between the key research concepts. **Source:** Authors' own elaboration.

Additionally, the literature has noted the role of firm-level traits in climate change risk disclosures. The impact of firm size is discussed, but no conclusive insights are provided in terms of whether there is a positive (Eleftheriadis & Anagnostopoulou, 2015; Kouloukoui et al., 2019) or negative (Amran et al., 2014) impact on disclosure. Yet, the ownership type (Acar et al., 2021; Bilala et al., 2022; Bose et al., 2024; de Grosbois & Fennell, 2022) and managerial abilities (Daradkeh et al., 2023) appear to influence the quality of the firm's disclosures. Further, the business model employed (Aldoseri & Albaz, 2023; Amran et al., 2014; Galeone et al., 2023; Ooi et al., 2019), the degree of embeddedness of Corporate Social Responsibility (CSR), and overall sensitivity of the firm to climate change (Halkos & Skouloudis, 2016) can also influence the disclosure of climate change risk information. This section of the literature highlights the importance of considering firm-level factors in assessing corporate disclosures.

Another discussion arising from this literature relates to comparability and trust in public disclosures. Through public disclosure, firms can share their processes and progress in addressing their climate change impacts and risks. However, the literature has noted how firms have been able to misuse disclosure to greenwash or manipulate their actual performances (Cong et al., 2020), while the overall quality of disclosures is highly variable (Santos & Rodrigues, 2021). There is also a tendency for firms not to link non-financial information with their balance sheets (Scholten et al., 2020). These insights suggest considerable room for improvement for firms in the depth of their disclosures and their honesty, while ensuring that action is taken to address firms' real-world impacts (Ameli et al., 2021; Christophers, 2017; Galeone et al., 2023).

The extant literature has also explored the rationale for climate change disclosures through various theories and institutional pressures. The role of institutional pressures (Abhayawansa & Adams, 2022; Caby et al., 2020; Grauel & Gotthardt, 2016; Shui et al., 2023) and stakeholder theory (Caby et al., 2020; Cosma et al., 2022; Cotter & Najah, 2012; de Grosbois & Fennell, 2022; Galeone et al., 2023; Shui et al., 2023; Ziegler et al., 2011) were examined to help explain disclosure. Additional theories include, but

are not limited to, Agency theory (Aldoseri & Albaz, 2023; Alshahrani et al., 2023; Amran et al., 2014; Giannarakis et al., 2018), signaling theory (Caby et al., 2020; Dawkins & Fraas, 2011), voluntary disclosure theory (Cong et al., 2020; Giannarakis et al., 2018; Park et al., 2023), and legitimacy theory (Antonini et al., 2021; Arian & Sands, 2024; Kouloukoui et al., 2019; Shimizu & Goto, 2023).

Overall, this section of the literature has examined the landscape of climate change risk disclosures, firm-level characteristics, and institutional pressures, revealing challenges and opportunities for improvement.

3.1.3. Financial stability

When discussing financial stability, the sampled literature focused on the impacts of climate change on stability and on potential solutions to mitigate those effects. Climate change risks can lead to challenges for the stability of local and global economies (Fabris, 2020; Karydas & Xepapadeas, 2022; Lamperti & Roventini, 2022; Li, 2023) due to the direct, physical impacts (Song & Fang, 2023), and challenges generated by transitioning to a low-carbon economy or a shift in stakeholder expectations (An et al., 2022). The effects of physical and transition risks are not isolated to one geographical region but can have widespread impacts at all socio-economic levels (e.g., the firm, nation, and global economy) (Battiston et al., 2021; Chabot & Bertrand, 2023), with the approach used to address physical risks and climate shocks being additional factors in these impacts (Y. Liu et al., 2021; Malik et al., 2023; Mandel et al., 2021). Given the possible range of impacts, climate change is a material risk for the financial stability of nations and firms (Lamperti & Roventini, 2022; Migliorelli, 2023).

It is important to remember that climate change risks do not affect financial stability alone. The literature also notes that there could be other economic or social risks that intersect with climate change risks (D'Orazio, 2023). The development of policy to facilitate resilience to climate change and promote financial stability is an option explored within the literature, but several caveats should be considered (Chenet et al., 2021; Dafermos & Nikolaidi, 2021; Lamperti et al., 2021; N. Li, 2023; Ramos et al., 2022).

The financial sector and central banks could play an important role in maintaining overall economic stability (Campiglio et al., 2018; Lupu & Criste, 2023). Their ability to develop and disseminate financial policies could be leveraged to facilitate green and climate-related policies within a national system (Lamperti et al., 2021; Ünüvar & Yeldan, 2023). The adoption of bank-led and other climate-related policies could be affected by the nation's exposure or sensitivity to climate change risks (Gupta et al., 2023), with those most sensitive to these risks in the best position to support these policies. Additionally, a nation's fiscal space or financial leverage can be a factor affecting policy adoption (Gupta et al., 2023; Mandel et al., 2021). Nevertheless, these policies must, at their core, be focused on financial stability, since sustainable outcomes are not their primary goal and may not be achieved without regulatory interventions (Christophers, 2017; Dafermos et al., 2018; Li, 2023).

Although climate-related financial policies are a tool for addressing climate-related instability and associated risks, the literature suggests that additional factors should be considered. An important factor in promoting stability is the equitable inclusion of economic participants. Ensuring fair access to essential financial services can enhance the resilience of these actors to climate change risks, which, in turn, can contribute to the overall stability of the financial system (Malik et al., 2023). Additionally, adopting a double materiality perspective could enhance financial stability by prompting firms to consider and address material climate risks (Gruenewald et al., 2024). Finally, the inclusion of sub-annual and sub-national economic factors within climate change risk evaluations could further support stability since

the heterogeneity of the economy is taken into account, which might have been overlooked in evaluation processes (Stan et al., 2021; Wu et al., 2023).

In addition to policies, financial stability could be supported through the implementation of other tools and mechanisms, since current approaches to macroeconomic modeling do not fully consider climate change risks (Battiston et al., 2021; Fabris, 2020). Tools focused on climate-related market instruments could facilitate stability by improving access to funds or capital for firms that participate in reducing their climate change risks (Dafermos et al., 2018; Dafermos & Nikolaidi, 2021). Climate stress testing (DeMenno, 2023; Weber, 2024) and climate hedging (Bressan & Romagnoli, 2021) are additional tools that could support further understanding of the implications of climate change risks and whether firms can endure those impacts.

The literature on financial stability emphasizes the need to address climate change risks to mitigate potential financial instability. Implementing climate-related financial policies, along with other market instruments and subnational factors, can help nations and businesses build resilience to such risks. However, it is crucial not to overlook the complex relationship between climate change risks and financial stability.

3.1.4. Financial performance

Strong financial performance is essential for companies, and the literature has examined the impacts of climate change on corporate performance. A firm's financial performance may be adversely affected if it fails to address climate change risks, particularly GHG emissions (Sueyoshi & Goto, 2010). Nevertheless, methods for measuring emissions may yield better financial performance when relative rather than absolute emissions are used (Busch & Lewandowski, 2018).

The literature also notes that climate change can impact financial performance through reductions in labor productivity (He et al., 2021), access or allocation of capital (He et al., 2021; B. Huang et al., 2022), or sales growth (Bergmann et al., 2016). A reduction in financial performance might be avoided by addressing climate change risks through environmental performance (Betti et al., 2018) or offset through ESG investments (Erhemjamts et al., 2024). Yet, some sources suggest that firm-level climate initiatives have the potential to support (Busch & Hoffmann, 2011; Castilho & Barakat, 2022; Secinaro et al., 2020; Sun et al., 2023) and hinder financial performance (Busch & Hoffmann, 2011). To add further complexity to this relationship, the time horizon used when planning firm-level climate initiatives can lead to negative financial performance if the firm considers only the short-term financial impacts of those actions, such as adopting a clean development mechanism (Zhang et al., 2018). Yet, the long-term implications might result in financial gains (Delmas et al., 2015), suggesting a need to consider the broader temporal implications of climate change risks.

With that said, the literature notes that the disclosure of climate change information might support financial performance, but does not provide any real value since such disclosures can be symbolic and do not accurately reflect the firm's real impacts (Busch et al., 2022). These symbolic disclosures could be a result of the exclusion of non-financial information from the firm's balance sheets (Scholten et al., 2020), leading to vague disclosures or purposeful non-disclosure of poor performance.

Overall, the literature indicates that firms should not overlook the risks associated with climate change, as these risks could adversely affect financial performance. Implementing corporate climate initiatives can help mitigate these risks; however, these initiatives must be executed comprehensively and meaningfully to ensure positive long-term financial outcomes.

3.1.5. Materiality

Within the materiality-related literature, there has been consideration given to the impact of materiality definitions, with some sources noting that competing interpretations (i.e., financial and double materiality) could lead to confusion or challenges for firms attempting to identify and disclose materiality issues (Jørgensen et al., 2022). A potential solution could be the harmonization of sustainability reporting standards (Jørgensen et al., 2022), but previous attempts did not achieve the desired harmonisation due to a focus on comparing or mapping rather than synthesizing the standards (Abhayawansa & Adams, 2022).

The challenge of harmonization is not the only one the literature has identified; issues remain regarding the disclosure of material information. Several firm-level factors have been identified as important determinants of material information disclosure. The industry type may influence information disclosure (Andersson & Arvidsson, 2023; Fasan & Mio, 2017; Sichigea et al., 2021), leading some industries (e.g., telecommunications) to be more likely to disclose information voluntarily (Fasan & Mio, 2017). Moreover, factors such as board size, board diversity (Fasan & Mio, 2017), and financial factors, including profitability and corporate leverage (Farooq et al., 2021), may also affect the disclosure of material information.

In addition to the firm-level factors, there has been discussion related to the low adoption rate of public disclosures (Farooq et al., 2021) and the vagueness of the information being shared (Ng et al., 2022), which could generate challenges for comparability and relevance for stakeholders (Andersson & Arvidsson, 2023). Finally, the approach to public disclosures supports a short-sighted perspective on climate change and sustainability risks (Abhayawansa & Adams, 2022), leading to little consideration of long-term implications in some disclosures. Yet, such short-sighted disclosures do not necessarily imply that the firm's internal information is equally short-sighted (Andersson & Arvidsson, 2023).

In summary, the literature has examined the challenges of harmonizing and disclosing climate change information, highlighting the potential limitations of standardizing reporting standards and the influence of firm-level traits on material disclosures.

3.1.6. Stakeholders

The literature review makes clear that stakeholders should be treated as a distinct concept given their inherent connections to materiality, climate change risk disclosures, and financial performance. Recognizing stakeholders as a separate element adds depth to the model by highlighting their significant influence on climate change risk disclosures.

When considering the development and implementation of climate change interventions, stakeholders are vital actors at national and sub-national levels. The literature indicates that the financial stability of an economy can be supported by the work and initiatives undertaken by central banks and other financial regulators, which, through their influence, can disseminate climate change policies (Gruenewald et al., 2024; Lamperti et al., 2021). Other financial actors, such as investors, play a role in the disclosure of climate change information, as their knowledge needs can influence what the market expects from firms and what firms decide to disclose (An et al., 2022). Finally, within the firm, internal actors (i.e., managers) are also important stakeholders, as their knowledge and skills support the development of public disclosures and help address firm-level climate change risks (Almaghrabi, 2023).

Overall, the stakeholder-related literature recognizes stakeholders as a distinct component of climate change risk disclosures, acknowledging the need to consider their influence and equity in climate change interventions or policies. These insights highlight the importance of stakeholder engagement in developing impactful climate change solutions.

3.2. *Summary of themes*

In this section, we present the findings from the thematic analysis of the 12 emerging themes, which interpret the connections among the six concepts. Several themes identified in this review are supported by a smaller number of studies, reflecting emergent areas of inquiry within the literature. Each theme is explored individually to provide a clear, systematic trace of how connections among research concepts are articulated across studies.

3.2.1. Smart policy and tools

This theme explores the relationship between climate change risk literature and financial stability, identifying tools and policies to enhance financial stability and manage climate risks at the firm and national levels. The potential financial implications of climate risks have been examined through climate stress testing (Weber, 2024) and climate hedging (Bressan & Romagnoli, 2021), while the application of green quantitative easing programs has been considered (Dafermos et al., 2018). These climate finance tools offer solutions to the financial ramifications at the firm level by navigating the impacts of climate risks on asset prices (Dafermos et al., 2018) while highlighting the importance of addressing mispricing to ensure that climate risks are properly captured in financial instruments (Bressan & Romagnoli, 2021). Thus, these tools could be used to better understand firms' vulnerabilities to climate risks (Weber, 2024).

Beyond firm-level tools, the literature also notes that financial stability could be enhanced through national or supranational policies. By carefully designing climate-related policies that improve financial leverage (Mandel et al., 2021) or fiscal space (Gupta et al., 2023), a nation's exposure to climate change risks could be lessened (Gupta et al., 2023; Mandel et al., 2021; Stan et al., 2021), thereby lowering the potential economic instability caused by such risks (Chenet et al., 2021; Y. Liu et al., 2021). However, firms must also be considered within such policies, since stability requires not only planning for climate risks but also enhancing the equity inclusion of financial institutions in the market (Malik et al., 2023). As such, national climate-related financial policies offer means to address the economic system's financial stability and improve the accessibility of financial services.

While these firm-level tools and national policies offer meaningful mechanisms for managing climate-related financial risks, a fundamental limitation lies in their potential to prioritize financial performance at the expense of broader environmental and social sustainability imperatives (D'Orazio, 2021; Li et al., 2023; Mähönen, 2020). As such, the insights from works associated with this theme suggest that climate-related financial tools and policies must embody smart design principles to simultaneously mitigate climate-related financial risks while advancing comprehensive sustainability objectives.

3.2.2. Resilience building

This theme connects the climate change disclosure and climate change risks research areas by considering how public disclosures could aid in building resilience to broader climate risk impacts (Jung & Song, 2023). Although financial tools, such as climate stress testing, could be employed to identify possible climate risks, tools alone are not enough to eliminate those risks (DeMenno, 2023; Weber, 2024). Publicly disclosing information on climate risks, including potential risks and a company's mitigation efforts, is a strategy firms use to improve communication with potential investors by sending positive signals about their efforts and emphasizing their superior performance in climate risk management (Erhemjamts et al., 2024; Jung & Song, 2023). In doing so, the firm communicates its resilience to systemic climate risks. Yet, some firms may not fully disclose their climate risks due to concerns about potential financial implications (Khalifa et al., 2024; Principale & Pizzi, 2023). Therefore, stronger regulatory frameworks governing climate risk disclosure are essential to ensuring that firms can meaningfully communicate and demonstrate their resilience to systemic climate risks, contributing to broader climate resilience across the financial system.

3.2.3. Mixed financial impacts

The literature sampled for this theme reveals mixed implications of climate change risks on financial performance, indicating positive and negative effects. While climate change risks are largely associated with adverse financial consequences, the literature suggests that positive outcomes are possible under specific conditions, particularly for firms operating in low-carbon industries or sectors benefiting from asset repricing during the low-carbon transition (Campiglio et al., 2023; Sun, 2023; Thai et al., 2023). Yet, the magnitude of such benefits depends on the firm's overall sensitivity to climate risks (Migliorelli, 2023; Sun et al., 2020; Thai et al., 2023).

The adverse financial effects identified in the literature include declining asset prices due to transition risks hindered asset prices since the market value diminishes due to transition risks (Mastouri et al., 2022), rising risk premiums (Karydas & Xepapadeas, 2022), and the poor integration of climate change risks into bond and credit markets (Mastouri et al., 2022). Such negative effects could result from the multifaceted relationship between climate change risks and the firm (Nikolaou et al., 2015) or could be a result of the transfer of transition risks from one economy to another (Wu & Wan, 2023), thereby expanding the range of climate risks companies may need to account for.

Addressing these impacts is important for companies because those with higher climate change risks may have higher default probabilities, which lead to higher interest rates and affect financial performance (H. Huang et al., 2022). Furthermore, physical climate impacts might lead firms to misallocate capital, reduce productivity (He et al., 2021), or hinder sales growth (Bergmann et al., 2016), thereby affecting their financial performance. However, it is important to note that, in seeking to reduce their GHG emissions, companies may weaken their financial performance by constraining economic growth (Di Febo et al., 2023), placing them in a difficult position when attempting to address climate-related risks, underscoring the inherently complex and context-dependent nature of climate change risks on financial performance.

3.2.4 Crisis-based resilience

Literature related to financial stability and financial performance suggests that integrating climate risks into economic systems is imperative for system resilience during economic crises. Markets do not fully integrate climate change risks into their pricing or evaluations (Mastouri et al., 2022), and participation in carbon-focused indices may not yield the short-term gains firms seek (de Lima et al., 2022). Such insights indicate that the volatility generated by climate-related economic events could increase firms' stress, as a firm's asset value may drop as risks are realized (Mastouri et al., 2022). Nevertheless, during an economic crisis, firms that have adopted CSR practices or focused on addressing their environmental performance may perform better than those that do not (Gallego-Alvarez et al., 2014), while maintaining stakeholder confidence in the firm (de Lima et al., 2022). As such, existing or pre-crisis environmental or climate-related initiatives could support firms' financial stability and performance during economic crises.

3.2.5 Disclosure benefits

The literature associated with this theme highlights how climate change risk disclosures are directly linked to financial performance, as the disclosure process can generate financial and organizational benefits for firms. Through public disclosures, firms may see improved financial performance, since the process requires them to leverage resources to maximize cost savings or other efficiencies, thereby creating a competitive advantage that could bolster financial gains (Alsaifi et al., 2020; Maji & Kalita, 2022). Other financial benefits could include avoiding potential financial penalties for non-disclosure imposed by stakeholders (Shui et al., 2023), improved stock performance, and greater resilience to market fluctuations (Jung & Song, 2023; Ziegler et al., 2011). The disclosure process could also enable firms to reduce financial distress when external auditing (Alshahrani et al., 2023) or assurance services are applied (Dutta & Dutta, 2021; Giannarakis et al., 2018).

Beyond direct financial gains, disclosure also generates broader organizational benefits, including addressing information asymmetry, thereby supporting investors' decision-making (Schiemann & Sakhel, 2019) while improving internal reporting, even if firms do not publicly disclose all climate-related information (Andersson & Arvidsson, 2023). Additionally, the firm's legitimacy may be improved through climate-related disclosures, as such disclosures could help avoid reputational risks associated with nonparticipation (Shimizu & Goto, 2023).

Nevertheless, it is important to recognize that the literature also highlights several limits to the positive financial benefits of disclosure. A key concern is that climate change disclosures may be purposely designed or strategically employed to support financial performance rather than to genuinely address climate risks (Abhayawansa & Adams, 2022; Adams & Mueller, 2022; Caby et al., 2022; Ma et al., 2023; Zitti & Guttormsen, 2023). Moreover, disclosure may not produce real-world effects on firm behavior due to the lack of tangible initiatives employed by firms, and attempts to mandate disclosures may counterintuitively result in lower-quality reporting (Tang & Demeritt, 2018; Fiandrino et al., 2022a). Furthermore, any positive financial gains derived from disclosure are not permanent, as they may diminish over time if the firm's operational costs of addressing climate change risks increase (Chen et al., 2022). The disclosure of material climate change information could also carry negative financial implications when stakeholders perceive such information as a potential hindrance to firm performance (Sichigea et al., 2021). Finally, evidence suggests that firms exhibiting strong financial

performance are more inclined to disclose climate change information (Carvajal & Nadeem, 2023), implying that disclosure may serve to reinforce financial advantages rather than generate new ones.

3.2.6. Shaping disclosures

For this theme, the literature notes that public climate disclosures could be shaped or influenced by the firm's stakeholders and specific firm-level traits, leading to a nuanced understanding of how the information shared is connected to factors beyond reporting requirements or standards. Stakeholders' influence could lead to the manipulation of disclosures to align with the expectations of internal and external stakeholders (Cotter & Najah, 2012; de Grosbois & Fennell, 2022; Yu & Ting, 2012), suggesting that the climate change information contained within public disclosures is dictated by the potential adverse reaction by stakeholders or impact on the firm's reputation (Dawkins & Fraas, 2011). Nevertheless, stakeholder influence may not lead to such a negative or misguided outcome for disclosure. Firms with greater exposure to climate change risks (Amar et al., 2022) or to carbon-intensive industries (Amran et al., 2014) may be more likely to disclose information to enhance transparency or align with industry practices. Additionally, firms may be motivated to disclose because another market actor, such as a central bank, shares information that could affect the financial stability of the market or the firm (Lupu & Criste, 2023).

Furthermore, firms may be prompted to share climate change information by firm-level characteristics. For example, the firm's board could direct the quality and type of information included in public disclosures (Cosma et al., 2022; Mehedi et al., 2024), with the carbon intensity of the firm (Toukabri & Youssef, 2023), the degree of independence the directors have (Ooi et al., 2019), and the diversity of the board (Ararat & Sayedy, 2019; Ben-Amar et al., 2017) being important factors in the board's influence. Establishing a board committee focusing on corporate sustainability or climate change could enhance disclosures (Cosma et al., 2022), with the caveat that the committee size is not an influential factor (Ooi et al., 2019). Thus, the stakeholders, along with firm-level factors, determine whether specific positive or negative climate-related information is shared, thereby shaping what firms disclose publicly.

3.2.7. Financial focused

At its core, this theme captures the information needs of stakeholders through the lens of financial performance, directly supporting the interests of financially focused stakeholders (e.g., investors). This connection highlights financial stakeholders' influence on what firms disclose and the importance of providing climate change information to support sound investment decision-making (Aibar-Guzmán et al., 2023; Kamarudin et al., 2023).

In this context, climate-related disclosures function as part of broader governance mechanisms that can signal a firm's long-term viability to institutional investors, who are typically attracted to strong and stable financial performance (Aibar-Guzmán et al., 2023). Furthermore, other financial actors, such as auditors, may be interested in learning more about how firms address climate risks due to the possible effects on the financial reporting of the firm (Kamarudin et al., 2023).

Beyond disclosure, the literature highlights the role of upper management in developing strategies that minimize the financial impacts of climate risks (Almaghrabi, 2023). In doing so, firms with stronger managerial capabilities can see improved financial performance, thereby aligning corporate actions with stakeholder expectations (Almaghrabi, 2023). Overall, this theme suggests that climate

disclosures are not only a response to stakeholder information needs but also a mechanism to enhance financial performance and attract financially focused stakeholders.

3.2.8. Contextual materiality

Literature connected to the materiality and climate change disclosure concept indicates that climate change risks are material for businesses due to the financial risks arising from physical or transition risks (Andersson & Arvidsson, 2023; Migliorelli, 2023), but it also suggests that materiality plays a crucial role in the disclosure of climate change information, as the definition or perspective a firm adopts influences what information is shared (Raith, 2023). This, in turn, outlines the firm's accountability to society and the natural environment (Abhayawansa, 2022), but other factors could still influence climate change disclosures. For instance, corporate disclosures can be customized to address stakeholders' material interests, which may lead firms to adopt single- and double-materiality perspectives in their reports (De Cristofaro & Gulluscio, 2023). Additionally, a firm's materiality perspective can impact its engagement with global sustainability initiatives, such as the Sustainable Development Goals (SDGs) (Betti et al., 2018). The relevance of these initiatives will depend on whether they align with the firm's materiality perspective.

Other factors affecting what may be disclosed are external regulations and national governments, whose political agendas or values can determine whether climate-related information is publicly disclosed (Antonini et al., 2021). The legal system under which a firm operates could facilitate the disclosure of climate change information (Grauel & Gotthardt, 2016; Kouloukoui et al., 2019). Moreover, participation in and expansion of supranational legislation, such as the EU's Corporate Sustainability Reporting Directive (CSRD), could enable a unified approach to materiality while enabling flexibility in disclosure (Lee et al., 2023). Finally, the economic development (Bilala et al., 2022; Caby et al., 2020; Yu & Ting, 2012), social and cultural traditions (Antonini et al., 2021), and the strength of the economic policy within a country could influence the disclosure of climate change information (Assaf et al., 2023). Overall, this theme highlights that the relationship between materiality and climate disclosures is inherently contextual and shaped by internal and external forces, leading to variability in disclosure practices.

3.2.9. Socio-economic expectations

In the literature on stakeholders and materiality, the impact of stakeholders' interests and expectations on the materiality of climate change risks varies across stakeholder groups (Jørgensen et al., 2022). Moreover, the importance of materiality may change depending on the issue under consideration by stakeholders (Sepulveda-Alzate et al., 2022). This variability might entice firms to tailor their disclosures to the needs of key stakeholders rather than providing information for all stakeholder groups (Reimsbach et al., 2020).

In terms of specific stakeholder groups, financial stakeholders would find climate change risks material when there is a potential for positive or negative impacts on a firm's financial performance or stability (Kamarudin et al., 2023; Migliorelli, 2023), with these stakeholders having the potential to sway the development of disclosure standards (Abhayawansa & Adams, 2022; Adams & Mueller, 2022). In addition to external stakeholder groups, firms could influence the development or application of disclosure standards (De Cristofaro & Raucci, 2022). This implies that firms are also stakeholders in the development and disclosure of climate change information.

3.2.10. Financial trade-offs

This theme explores the relationship between materiality and financial performance, emphasizing that the effects of materiality on financial performance can differ. There can be positive implications from applying a single financial materiality perspective that could support financial performance in terms of enhanced ESG ratings (Aras & Kazak, 2022) or CSR scores (Badía et al., 2022), and improve alignment with the SASB reporting standards (Carvajal & Nadeem, 2023; Jebe, 2019). When firms are required to disclose information under a mandatory reporting scheme that focuses on financial materiality, it enhances investors' decision-making abilities (Gibbons, 2023). Similarly, disclosures based on a double-materiality perspective, such as the GRI standards, may lead to improved financial performance resulting from enhanced environmental performance by the firm (Jadhav et al., 2022).

However, the literature also notes possible adverse impacts of materiality on financial performance. For instance, performance indicators derived from material topics might not lead to reliable predictions of stock performance (Berchicci & King, 2022), and the portfolio performance of firms in emerging economies that provide a substantial amount of information about materiality can be lower than that of companies that disclose less information (Gill et al., 2022), creating doubt about the ability of materiality measures to predict a firm's financial performance. Moreover, there is variability in how individual materiality measures or topics affect financial performance, suggesting that firms might inadvertently harm their financial performance if they disclose such information (Sichigea et al., 2021). On the other hand, how the firm's environmental performance of material topics is measured, outcome-based or process-based, could lead to positive or negative implications for financial performance (Busch & Hoffmann, 2011), suggesting that materiality alone may not directly affect financial performance. With these insights, the literature indicates that the financial implications of materiality are inherently uncertain in the context of climate disclosures. The potential benefits in terms of transparency and stakeholder decision-making are offset by concerns with appropriate impact measurement or market response. As a result, materiality does not guarantee improved financial performance; rather, it serves as a mechanism that balances financial gains against potential impacts.

3.2.11. Double materiality

This theme focuses on the notion of double materiality in the context of climate change risks, where firms assess their external effects on climate change and its consequences for their operations (Gruenewald et al., 2024). The literature denotes the value of a double materiality perspective for addressing systemic climate change risks and the transition to a low-carbon economy (Gruenewald et al., 2024) while meeting the information needs of financial and non-financial stakeholders (Jørgensen et al., 2022). Although double materiality offers firms an opportunity to assess internal and external considerations, integrating it can be challenging because it is often conflated with other materiality perspectives (e.g., single-financial materiality) when firms apply it (Jørgensen et al., 2022). Additionally, an important caveat is that double materiality may not be a central feature of corporate disclosures and lacks a uniform reporting standard, which could lead to lower-quality disclosures with vague details or make comparisons across companies difficult (Ng et al., 2022). Overall, this theme suggests that the double materiality perspective may help firms broaden the scope of their climate-related disclosures, but further refinement is needed given ongoing challenges in its practical application.

3.2.12. Multi-level impacts

Collectively, the literature demonstrates the multiple pathways through which climate risks could affect firms, financial systems, and the broader economy. Systematic climate risks can indirectly influence the financial stability of the economy, from the household level to financial institutions (Battiston et al., 2021; Chabot & Bertrand, 2023), leading to a climate-related tipping point for financial instability (Lamperti & Roventini, 2022). Market instability could impede firms' performance (Migliorelli, 2023) and be shaped by regional and cultural norms, which can influence how investors perceive climate change risks, leading to differing valuations of corporate CSR and climate initiatives (Badía et al., 2022; Sepulveda-Alzate et al., 2022).

Furthermore, physical and transition risks could disrupt economic stability by impacting the predictability of adverse economic events (Karydas & Xepapadeas, 2022; Lamperti & Roventini, 2022). As such, creating strategies to directly tackle physical climate risks can help reduce the potential economic consequences (Malik et al., 2023; Mandel et al., 2021) and potentially avoid the implications of climate-related shocks (Z. Liu et al., 2021). However, these risks do not operate in isolation; rather, their impacts are shaped by interactions with other climate and socio-economic factors, further complicating their effects across levels of analysis (D'Orazio, 2023). In summary, this theme shows that climate risks are systemic and interdependent, with impacts that spread across levels of the economy. The literature, therefore, highlights the need for more integrated approaches to understanding the financial and material implications of climate risks across interconnected economic layers.

3.3. Cross-theme synthesis

Our aim of this integrative review was to examine how the literature related to the six research concepts, connected by shared conceptual similarities and research foci, manifested as 12 associative themes. By doing so, the climate disclosure literature and associated research areas were synthesized into a conceptual model that reframes the fragmentation from diverse research concepts into a multi-dimensional research agenda. As part of this process, 12 themes were developed based on the overarching research topics or questions explored in the literature. Although each theme is a distinct output of the integrative review, there are some overarching patterns to consider. Each of these cross-themes represents a pattern, tension, or shared logic that arises from considering the conceptual model as a whole. With that understanding in mind, four apparent cross-themes emerge from the model.

First, the issue of substantial versus symbolic disclosures arises within several themes. The disclosure benefits theme considers how disclosures can be used to improve the financial performance of firms (Adams & Mueller, 2022; Caby et al., 2022; Ma et al., 2023; Zitti & Guttormsen, 2023), but the shaping disclosure and financial focused themes highlight how disclosures can be strategically designed to meet financial interests (Cotter & Najah, 2012; de Grosbois & Fennell, 2022). All three of these themes connect back to the climate change disclosure concept, thereby demonstrating that disclosures are not merely tools for communicating climate resilience, or corporate climate action, but can also be strategically used by firms to avoid the negative financial and reputational risk associated with poor climate risk management (Khalifa et al., 2024; Principale & Pizzi, 2023; Shimizu & Goto, 2023). As such, a shared concern is the potential for climate change disclosures to mask minimal efforts, leading to superficial and symbolic disclosures (Busch et al., 2022; Scholten et al., 2020).

Second, the inconsistent financial outcomes from climate change disclosures outlined within the financial-focused, disclosure benefits, and mixed financial impacts themes may stem from the differing temporal impacts of these disclosures. Firms may experience temporal benefits when first disclosing climate-related information, but those benefits may diminish over time (Chen et al., 2022). Additionally, firms may consider only the negative short-term impacts (Zhang et al., 2018), effectively overlooking the possibility of greater benefits over the long term, and the support established environmental initiatives could provide in future economic crises due to the upfront investment costs (Delmas et al., 2015; Gallego-Alvarez et al., 2014). These insights suggest that financial inconsistencies observed in the literature may be driven by the shifting value of climate disclosures over time rather than the incongruency between firm profits and climate risk management. In fact, the literature has noted that climate initiatives could support financial performance (Busch & Hoffmann, 2011; Castilho & Barakat, 2022; Sun et al., 2023), but such benefits may occur only under specific temporal framing. Thus, accounting for these temporal and contextual dynamics may provide a more coherent basis for future empirical investigation.

Third, insights from several themes indicate that materiality can be a critical source of conflict, leading to variability within disclosures. As noted in the contextual materiality theme, the materiality definition or perspective adopted by a firm can shape the type of information disclosed (Raith, 2023), and adopting a single- and double-materiality approach within a single report could lead to the merging of core tenets that inherently conflict and generate confusion for end users of such disclosures (De Cristofaro & Gulluscio, 2023; Jørgensen et al., 2022). This conflicting nature of materiality could be traced to its foundational goal of addressing stakeholders' information needs. The socio-economic expectations theme indicates that firms must satisfy the interests of competing stakeholder groups, each with distinct information needs (Almaghrabi, 2023; An et al., 2022; Jørgensen et al., 2022). Consequently, companies must prioritize the interests of their most influential stakeholders (Reimsbach et al., 2020), meaning these stakeholders' interests significantly influence what is disclosed (Adams & Mueller, 2022; De Cristofaro & Raucci, 2022). Moreover, the financial trade-offs theme reinforces this conflict by demonstrating that the financial consequences of materiality perspectives are not uniform. While there is some evidence that single and double materiality approaches could enhance firm performance (Aras & Kazak, 2022; Jadhav et al., 2022), the financial trade-offs theme further supports the conflicting nature of materiality by highlighting how disclosing materiality topics could negatively impact financial performance (Gill et al., 2022; Sichigea et al., 2021). These insights suggest that materiality does not function as a neutral tool for identifying disclosure topics; rather, it is a contested (Raith, 2023), context-dependent process shaped by stakeholder priorities (Reimsbach et al., 2020). In attempting to balance competing interests, materiality introduces structural conflicts that promote variability in disclosure practices and produce uneven financial outcomes.

Fourth, the literature suggests that climate change disclosures are not merely an internal firm-level practice but part of a multi-level system in which firms' disclosures, stakeholders, and economic systems intersect. As noted in the multi-level impacts and crisis-based resilience themes, climate change risks can transfer across economic levels (Battiston et al., 2021; Chabot & Bertrand, 2023), and the implications of climate risks could be further exacerbated by the weak integration of climate risks into the financial system, generating concerns for the future financial stability (Gallego-Alvarez et al., 2014; Mastouri et al., 2022). Additionally, the smart policy and tools theme complements these concerns by highlighting the role of national and supranational policies in addressing climate risks (Gupta et al., 2023; Mandel et al., 2021; Stan et al., 2021), but additional mandates may make it difficult for firms to balance the

mandatory disclosure requirements and stakeholder expectations or reactions (An et al. 2022; Dawkins & Fraas, 2011; De Bernardi et al., 2019; Hahn et al., 2015). Therefore, the literature suggests that climate disclosure is best understood as a multi-level phenomenon, in which interactions among firms, stakeholders, and economic systemic contexts contribute to the variability and complexity observed in disclosure practices and outcomes.

4. Discussion

In this study, we sought to understand how the finance, management, and sustainability literatures conceptualized the intersections among six key research concepts: materiality, climate change risk, corporate disclosures, financial performance, financial stability, and stakeholders. Other reviews have examined these concepts in isolation (e.g., Alam & Costa, 2025; Borghei, 2021; Ma et al., 2023; Shui et al., 2023), but there has yet to be a comprehensive framework that has considered all six concepts simultaneously. To address this gap and understand the intersections among these six research concepts, an integrative literature review (Toronto & Remington, 2020; Torraco, 2016) was conducted for 140 articles. The literature analysis identified 12 themes that interconnect the six concepts, illustrating shared research interests. The conceptual model developed from these findings offers an integrated perspective that unifies the previously fragmented climate change disclosure literature, providing a foundation for advancing theory and future research.

This discussion is organized into two parts to provide an opportunity to summarize the conceptual model and intersections. In the first section, we examine the conceptual model in more detail, highlighting how the six concepts are integrated with the 12 themes. In the second section, we examine the three key intersections: climate change disclosure and materiality, the role of stakeholders in disclosures, and economic resilience and materiality.

4.1. Overview of the conceptual model

The conceptual model presented in Figure 2 delineates the thematic linkages among the six research concepts within the sampled literature. In addition to mapping the scholarly landscape, this model reaffirms the complex interrelationships between the concepts that other reviews have discussed but not fully integrated. By outlining the underlying thematic connections across these research domains, the model offers new insights that clarify the structure of the fragmented climate disclosure literature. More specifically, the resulting conceptual model demonstrates that the fragmentation previously highlighted (Borghei, 2021; Shui et al., 2023) may be superficial, as hidden coherences among the research concepts are revealed by shared themes that link discrete research areas, forming a relational research network. While researchers have treated the six research concepts independently (e.g., Arian & Sands, 2024; Atz et al., 2023; Fiandrino et al., 2022a), the model reveals how the literature considers the intersections among these concepts and highlights a possible reason why the fragmentation persists. The thematic analysis suggests that the inconsistencies or tensions in the literature are not merely the result of disciplinary silos but stem from cross-cutting topics, including symbolic versus substantive disclosures, variations in temporal focus, contentions between materiality perspectives, and the multi-level nature of climate change risks. The conceptual model aids in reframing fragmentation as a possible outcome of one or more cross-cutting themes rather than a result of incoherence or lack of investigation. Therefore, this integrative review provides a foundation for more integrative and interdisciplinary research, enabling

future studies to move beyond isolated examinations of individual constructs and consider how multiple themes jointly shape climate disclosure practices and outcomes.

The conceptual model can be utilized in future empirical work in three ways. First, each of the 12 themes represents a relationship or association between two research concepts, thereby informing variable selection for testing associations or mediating effects (Elsbach & Van Knippenberg, 2020). For example, the socio-expectations theme demonstrates the influence that stakeholders can exert on the material importance of specific climate-related topics, and researchers could incorporate variability in stakeholder pressures into the outcomes of a firm's materiality assessment process or into how firms implement external reporting standards. Second, the model illustrates a research network in which each research concept is associated with multiple themes. This structure enables researchers to trace multiple pathways linking concepts, thereby supporting the development of more complex and integrative research designs. For example, the materiality concept is connected to the contextual materiality and multi-level impacts themes, linking it to climate change disclosure and financial stability. This pathway suggests that the contextual interpretation of materiality may influence how climate risks are transmitted across firms and financial systems, providing a basis for more integrated empirical studies. Finally, although we did not seek to establish a theoretical framework (Elsbach & Van Knippenberg, 2020), the conceptual model provides a foundation for theory development through empirical testing. The associative linkages developed through the thematic analysis could be explored using hypothesis testing to assess their robustness and, possibly, their boundary conditions. In doing so, those empirical insights could be used to refine those linkages, contributing to a more theoretically grounded understanding of how the themes are connected. Overall, the conceptual model presents a thematic structure of the literature, illustrating how distinct research areas connect (Cronin & George, 2023) and further supporting future conceptual and empirical work (Torraco, 2016).

4.2. Exploring key intersections

To extend insights from the conceptual model, the remainder of this discussion entail the relationships between the climate change disclosures, stakeholders, and materiality research concepts, and is organized into three parts. In the first section, we examine how the literature conceptualizes climate change disclosure and materiality, establishing the foundation for understanding how these constructs intersect with climate risk, stakeholder expectations, and financial considerations. This focus is warranted because materiality is a fundamental component of climate change disclosure and determines what information is disclosed (Font et al., 2016). Additionally, although researchers have investigated the materiality of climate-related risks (Arian & Sands, 2024; Schiemann & Sakhel, 2019) and conducted an integrative review related to corporate climate communications (Allam, 2023), the climate disclosure literature remains fragmented (Borghei, 2021; Shui et al., 2023). This fragmentation underscores the need to explore how materiality and disclosure are integrated with other key concepts examined in this literature review.

The second intersection concerns the thematic connections among materiality, financial performance, and resilience building. This intersection highlights that literature tends to focus on identifying climate risks based on financial materiality (Aibar-Guzmán et al., 2023; Kamarudin et al., 2023) and understanding the implications for financial performance (Mastouri et al., 2022; He et al., 2021; Betti et al., 2018). Yet, the thematic analysis demonstrates the material importance of climate risks for broader stability in financial and economic systems (Chabot & Bertrand, 2023; D'Orazio, 2023;

Nikolaou et al., 2015), and resilience to disruptive events is imperative for sustaining financial performance (Battiston et al., 2021; Fabris, 2020; Gallego-Alvarez et al., 2014; Mastouri et al., 2022). As such, we examine how resilience to climate-related economic events requires an understanding of climate risks in terms of materiality and financial performance.

In the final section, we examine how stakeholders' connections to other research concepts enhance understanding of how their information needs and interests shape their relationships with these concepts. This focus on stakeholders is reasonable due to their critical importance when selecting the information to disclose (Hahn et al., 2015; Reimsbach et al., 2020), and the overall intentions of climate change disclosures are to convey information to internal and external stakeholders (Font et al., 2016; Hahn et al., 2023). Taken together, these insights clarify how stakeholders interact with materiality, disclosure practices, and the remaining concepts to structure the broader landscape of climate-related reporting.

4.2.1. The conceptualization of climate change disclosure and materiality

The analysis shows how the literature places climate change disclosures as a response to systemic climate change. In doing so, corporate climate change disclosures could act as a tool to facilitate resilience to the external effects of climate change (Erhemjamts et al., 2024; Jung & Song, 2023). However, the literature indicates that climate disclosures can be malleable due to the underlying materiality perspective and the various ways in which firms apply this principle (Raith, 2023), as well as the external forces at play (Grauel & Gotthardt, 2016; Kouloukoui et al., 2019; Lee et al., 2023). These insights suggest that, although climate change disclosures may help build firm-level resilience, materiality could impede these efforts if an inside-out rather than an outside-in perspective is adopted (Raith, 2023).

The conceptual model further suggests that the relationship between climate change disclosures and materiality is not an isolated connection. We found that the influence of financial performance, in terms of impacts and gains, is an important factor to consider when examining the relationships between materiality and climate disclosures. The literature related to financial performance and materiality discusses the possible financial implications of materiality for a company's bottom line, but the evidence is mixed due to the potential for positive (Aras & Kazak, 2022; Jadhav et al., 2022) and negative impacts (Berhicci & King, 2022; Sichigea et al., 2021). In terms of materiality, disclosing material topics might lead to lower portfolio performance of some firms in emerging markets (Gill et al., 2022). The mixed impacts of climate change disclosure are important to consider in relation to materiality. In other words, the connection between climate change disclosure and materiality may be further influenced by financial performance.

Additionally, financial performance is linked to climate change disclosures through the disclosure benefits theme. This theme includes literature that entails the positive connection between voluntary public disclosures and financial performance (Alsaifi et al., 2020; Jung & Song, 2023; Shui et al., 2023; Ziegler et al., 2011), as well as insights related to the underlying financial purpose of public disclosures (Abhayawansa & Adams, 2022; Adams & Abhayawansa, 2022; Arian & Sands, 2024; Caby et al., 2020). These insights also suggest that firms might be more inclined to disclose climate change information if they are already experiencing positive financial performance due to their current initiatives (Carvajal & Nadeem, 2023). Overall, this theme highlights the potential financial motivations for public disclosures, and the relationship between materiality and climate change disclosures warrants consideration.

Moreover, the multi-level impacts theme suggests that the materiality of climate change risks for economic stability (Chabot & Bertrand, 2023; Lamperti & Roventini, 2022) may also be influenced by social or cultural perceptions of those risks (An et al., 2022; Badía et al., 2022). This finding reinforces

the notion that materiality is not a static or universally defined concept but rather a socially constructed, context-dependent judgment (Raith, 2023; Reimsbach et al., 2020). As such, it plays a critical role in guiding disclosure practices and strengthening firm-level resilience and system-wide financial stability.

This study reveals that materiality is evolving from being a purely technical accounting principle to a more dynamic concept that impacts financial performance and corporate climate change disclosures. The conceptual model presented illustrates a triadic relationship among climate disclosures, materiality, and financial performance, reconfirming their interdependence.

4.2.2. Climate-related economic resilience, financial stability, and materiality

In this integrative review, we show that climate-related disclosures are often framed through a financial materiality lens, which emphasizes the financial outcomes for firms, while overlooking the importance of long-term economic resilience to climate-related shocks. As noted in the disclosure benefits, financial focused and financial trade-offs themes, climate change risks are material for financial reasons, be it to support investor decision-making (Gibbons, 2023; Kamarudin et al., 2023) or to inform asset pricing and stock performance (Berchicci & King, 2022; Mastouri et al., 2022). Thus, it is not surprising that the mixed-financial Impacts theme further reinforces this linkage, positioning financial performance as the primary channel for evaluating climate risks. However, the crisis-based resilience and multi-level impacts themes highlight tensions with that framing, suggesting that the economic stability that firms require to maintain their financial performance could be affected by climate-related economic crises (Chabot & Bertrand, 2023; Karydas & Xepapadeas, 2022; Lamperti & Roventini, 2022). In this context, firms with limited environmental or climate change initiatives could be exposed to more financial stress during climate-related economic events (Gallego-Alvarez et al., 2014; Mastouri et al., 2022).

As a result, this review illustrates an important gap in the literature, whereby the financial materiality of climate risks is conceptualized in terms of firm-level financial impacts, such as ESG ratings or short-term financial performance (Aras & Kazak, 2022; Campiglio et al., 2023; Sichigea et al., 2021), but the role of materiality in shaping longer-term economic resilience is underexamined. There is some consideration for how economic resilience could be promoted via economic policy, as noted in the smart policy and tools theme (Chenet et al., 2021; Gupta et al., 2023; Z. Liu et al., 2021; Mandel et al., 2021). However, we did not find substantial discussion of the connection to the role of materiality in facilitating resilience at the economic and firm levels. Thus, the insights from this review suggest that the materiality of climate change risks extends beyond immediate financial impacts to include a firm's capacity to anticipate, absorb, and adapt to climate-related economic shocks. Accordingly, researchers should move beyond outcome-based measures of financial performance to examine how materiality assessments and disclosure practices contribute to resilience-building at the firm and broader economic levels.

4.2.3. Stakeholder roles in shaping disclosures

The role of stakeholders emerged as a central analytical category within the conceptual map. This, in itself, is not a novel finding, as the literature has already noted the critical importance of stakeholders in the disclosure process (Arian & Sands, 2024; Bingler et al., 2022; Hahn et al., 2015). However, what is novel is that the model reveals three distinct pathways through which stakeholders intersect with the research concepts of climate change disclosures, materiality, and financial performance.

The first pathway occurs via the socio-economic expectations theme, whereby the literature considers how stakeholders shape the materiality of climate change issues (Jørgensen et al., 2022; Reimsbach et al., 2020; Sepulveda-Alzate et al., 2022). Further, external actors, such as national governments and regulators, could have an influential role in climate change disclosures (Antonini et al., 2021; Grauel & Gotthardt, 2016). This theme underscores the central role of stakeholders in identifying material topics (Font et al., 2016) and the importance of addressing stakeholder information needs (Jørgensen et al., 2022; Reimsbach et al., 2020).

The second pathway consists of the financial focused theme, which outlines how the financial information needs and interests of stakeholders could impact firms' decisions to disclose climate change information (Aibar-Guzmán et al., 2023; Cotter & Najah, 2012; Dawkins & Fraas, 2011; Kamarudin et al., 2023). From this perspective, the role of financial stakeholders (e.g., investors) is highlighted in the literature (Aibar-Guzmán et al., 2023; Kamarudin et al., 2023), whereas internal stakeholders (e.g., managers) are also examined with respect to capacity building (Almaghrabi, 2023). This theme emphasizes the importance of considering financial implications while highlighting the risk of overlooking the non-financial impacts of climate change.

The final pathway includes the shaping disclosures theme, where the literature focused on understanding how stakeholders and their expectations could influence the information disclosure within corporate reports (Cotter & Najah, 2012; Dawkins & Fraas, 2011; de Grosbois & Fennell, 2022). This theme also considers how firm-level traits (Ararat & Sayedy, 2019; Cosma et al., 2022; Toukabri & Youssef, 2023) might also have a role in the disclosure of climate change information. Unlike the socio-economic expectations theme, the literature for this theme entailed the stakeholders' reactions to disclosure (Dawkins & Fraas, 2011) or how they could have some control over the disclosure process (Ben-Amar et al., 2017; Cosma et al., 2022; Mehedi et al., 2024; Ooi et al., 2019).

These three pathways provide nuanced insights into how researchers examine the influence of stakeholders on climate change disclosures, highlighting the importance of financial implications and information needs. When exploring the relationships between climate change disclosure, financial performance, and materiality, it becomes clear that these themes are interconnected. In this review, we clarify these connections, thereby bridging fragmented research areas and contributing to a better understanding of the influences on climate change disclosures.

5. Conclusion and future work

In summary, in this integrative literature review, we sought to synthesize the fragmented literature on corporate climate change disclosures by employing an integrative review process (Cronin & George, 2023; Snyder, 2019; Toronto & Remington, 2020; Torraco, 2016). We drew on a sample of 140 peer-reviewed articles to develop a conceptual model comprising 12 thematic linkages, offering novel insights into the diverse and evolving landscape of climate risk disclosure and materiality research. While the conceptual model developed in this study offers valuable insights into the connections between the six research concepts, several limitations must be acknowledged. These limitations not only define the scope of this study but also highlight valuable opportunities for future research.

First, we employed an inductive, qualitative methodology characteristic of integrative literature reviews. While this approach enables rich conceptual synthesis and the emergence of novel thematic patterns, it does not permit statistical generalization or empirical validation. Thus, researchers could build on the current conceptual model by employing quantitative methods, such as hypothesis testing,

structural equation modeling, or bibliometric network analysis, to assess the robustness and significance of the identified thematic relationships.

Second, although we synthesized 140 peer-reviewed articles across disciplines and followed systematic inclusion and exclusion criteria, the review is not exhaustive. The decision to limit the scope to English-language articles indexed in Scopus and Web of Science may have excluded relevant contributions published in other languages or indexed in alternative databases. This potential selection bias may result in underrepresentation of certain perspectives, particularly those from the Global South or non-English-speaking academic communities.

Third, we aimed to conceptualize the relationships among constructs, rather than to evaluate them empirically or to explore their practical applications in depth. The resulting themes offer a high-level mapping of the field but may gloss over important contextual nuances or sector-specific dynamics. Researchers could address this gap by conducting in-depth content analyses or sector-specific systematic reviews to examine how these themes materialize within particular industries (e.g., energy, finance, healthcare) or geographic regions.

Finally, while this review highlights the conceptual salience of stakeholders, financial stability, and materiality, it does not fully theorize the power dynamics, institutional logics, or political-economic structures that shape disclosure practices. Despite its limitations, this integrative review makes a timely and meaningful contribution to the evolving discourse on materiality and climate risk disclosure. By systematically mapping conceptual themes across the literature, the paper offers a novel framework that bridges disparate strands of research, enabling scholars and practitioners to better understand how perceptions of materiality shape disclosure practices in the context of climate change. Furthermore, by synthesizing insights from interdisciplinary fields, this study offers a holistic understanding of the multi-level implications of climate risk materiality. As such, it provides a valuable foundation for future empirical work, regulatory policy, and corporate strategy, especially as sustainability standards become more stringent and globally harmonized.

Researchers could build on this study by addressing the limitations noted above and applying robust theoretical frameworks to deepen our understanding of the complex dynamics of climate-related disclosures. Utilizing institutional theory, stakeholder salience theory, or critical accounting perspectives could help further unpack these dynamics and explore their implications for the credibility, comparability, and utility of climate-related disclosures.

Author contributions

Tia Rebecca Driver: Conceptualization, Investigation, Methodology, Writing—original draft, Writing – review & editing. Amr ElAlfy: Supervision, Funding acquisition, Validation, Writing – review & editing. Amelia Clarke: Writing – review & editing. Jeffrey Wilson: Supervision, Writing – review & editing.

Acknowledgments

The authors would like to thank the anonymous reviewers for their constructive feedback, which undoubtedly helped improve the quality of this study. We would also like to acknowledge that this work has received funding from the Social Sciences and Humanities Research Council of Canada (Insights Development Grant: 430-2024-00601), and Smart Prosperity Institute's (SPI's) Economic

and Environmental Policy Research Network (EEPRN) funded by Environment and Climate Change Canada (ECCC).

This project was undertaken with the financial support of the Government of Canada through the federal Department of Environment and Climate Change. Ce projet a été réalisé avec l'appui financier du gouvernement du Canada agissant par l'entremise du ministère fédéral de l'Environnement et du Changement climatique.

Use of AI tools declaration

The authors declare they have not used Artificial Intelligence (AI) tools in the creation of this article.

Conflict of interest

All authors declare no conflicts of interest in this paper.

Data Availability Statement

The data used for this study are provided within the published article or supplemental materials.

References

- Abhayawansa S (2022) Swimming against the tide: Back to single materiality for sustainability reporting. *Sustain. Account Manag Policy J* 13: 1361–1385. <https://doi.org/10.1108/SAMPJ-07-2022-0378>
- Abhayawansa S, Adams C (2022) Towards a conceptual framework for non-financial reporting inclusive of pandemic and climate risk reporting. *Meditari Account Res* 30: 710–738. <https://doi.org/10.1108/MEDAR-11-2020-1097>
- Acar E, Çaliyurt K, Zengin-Karaibrahimoglu Y (2021) Does ownership type affect environmental disclosure? *Int J Clim Chang Strateg Manag* 13: 120–141. <https://doi.org/10.1108/IJCCSM-02-2020-0016>
- Adams C, Abhayawansa S (2022) Connecting the COVID-19 pandemic, environmental, social and governance (ESG) investing and calls for ‘harmonisation’ of sustainability reporting. *Crit Perspect Account* 82: 102309. <https://doi.org/10.1016/j.cpa.2021.102309>
- Adams C, Mueller, F (2022) Academics and policymakers at odds: The case of the IFRS foundation trustees’ consultation paper on sustainability reporting. *Sustain Account Manag Policy J* 13: 1310–1333. <https://doi.org/10.1108/SAMPJ-10-2021-0436>
- Afolabi H, Ram R, Rimmel G (2022) Harmonization of sustainability reporting regulation: Analysis of a contested arena. *Sustainability* 14: 5517. <https://doi.org/10.3390/su14095517>
- Aibar-Guzmán B, Raimo N, Vitolla F, et al. (2023) Corporate governance and financial performance: Reframing their relationship in the context of climate change. *Corp Soc Responsib Environ Manag* 31: 1493–1509. <https://doi.org/10.1002/csr.2649>
- Alam S, Costa E (2025) Climate change disclosure: A conceptual framework and future research avenues. *Corp Soc Responsib Environ Manag* 32: 4019–4034. <https://doi.org/10.1002/csr.3168>

- Aldoseri M, Albaz M (2023) Climate change risks disclosure: Do business strategy and management characteristics matter? *Int J Financ Stud* 11: 150. <https://doi.org/10.3390/ijfs11040150>
- Allam M (2023) Staying legitimate in a changing climate: A framework for studying corporate climate change communication, In: I Arraiano, B Díaz, M Del Baldo, R Schmidpeter, & S Idowu (Eds.), *Corporate Social Responsibility in a Dynamic Global Environment*, Springer International Publishing, 65–88. https://doi.org/10.1007/978-3-031-24647-0_4
- Almaghrabi K (2023) Climate change exposure and firm performance: Does managerial ability matter? *Sustainability* 15: 12878. <https://doi.org/10.3390/su151712878>
- Alsaiifi K, Elnahass M, Salama A (2020) Carbon disclosure and financial performance: UK environmental policy. *Bus Strateg Environ* 29: 711–726. <https://doi.org/10.1002/bse.2426>
- Alshahrani F, Eulaiwi B, Duong L, et al. (2023) Climate change performance and financial distress. *Bus Strateg Environ* 32: 3249–3271. <https://doi.org/10.1002/bse.3298>
- Amar J, Demaria S, Rigot S (2022) Enhancing financial transparency to mitigate climate change: Toward a climate risks and opportunities reporting index. *Environ Model Assess* 27: 425–439. <https://doi.org/10.1007/s10666-021-09800-7>
- Ameli N, Kothari S, Grubb M (2021) Misplaced expectations from climate disclosure initiatives. *Nat Clim Change* 11: 917–924. <https://doi.org/10.1038/s41558-021-01174-8>
- Amran A, Periasamy V, Zulkafli A (2014) Determinants of climate change disclosure by developed and emerging countries in Asia Pacific. *Sustain Dev* 22: 188–204. <https://doi.org/10.1002/sd.539>
- An Q, Zheng L, Li Q, et al. (2022) Impact of transition risks of climate change on Chinese financial market stability. *Front Environ Sci* 10. <https://doi.org/10.3389/fenvs.2022.991775>
- Andersson F, Arvidsson S (2023) Understanding, mapping and reporting of climate-related risks among listed firms in Sweden. *Clim Policy* 23: 945–958. <https://doi.org/10.1080/14693062.2022.2116383>
- Antonini C, Olczak W, Patten D (2021) Corporate climate change disclosure during the trump administration: Evidence from standalone CSR reports. *Account Forum* 45: 118–141. <https://doi.org/10.1080/01559982.2021.1909819>
- Ararat M, Sayedy B (2019) Gender and climate change disclosure: An interdimensional policy approach. *Sustainability* 11: 7217. <https://doi.org/10.3390/su11247217>
- Aras G, Kazak E (2022) Enhancing firm value through the lens of ESG materiality: Evidence from the banking sector in OECD countries. *Sustainability* 14: 15302. <https://doi.org/10.3390/su142215302>
- Arian A, Sands J (2024) Corporate climate risk disclosure: Assessing materiality and stakeholder expectations for sustainable value creation. *Sustain Account Mana Policy J* 15: 457–481. <https://doi.org/10.1108/SAMPJ-04-2023-0236>
- Ascui F, Lovell H (2012) Carbon accounting and the construction of competence. *J Clean Prod* 36: 48–59. <https://doi.org/10.1016/j.jclepro.2011.12.015>
- Assaf C, Benlemlih M, El Ouadghiri I, et al. (2023) Does policy uncertainty affect non-financial disclosure? Evidence from climate change-related information. *Int J Financ Econ* 29: 4613–4629. <https://doi.org/10.1002/ijfe.2888>
- Atz U, Van Holt T, Liu ZZ, et al. (2023) Does sustainability generate better financial performance? Review, meta-analysis, and propositions. *J Sustain Financ Invest* 13: 802–825. <https://doi.org/10.1080/20430795.2022.2106934>

- Badía G, Gómez-Bezares F, Ferruz L (2022) Are investments in material corporate social responsibility issues a key driver of financial performance? *Account Financ* 62: 3987–4011. <https://doi.org/10.1111/acfi.12912>
- Battiston S, Dafermos Y, Monasterolo I (2021) Climate risks and financial stability. *J Financ Stab* 54: 100867. <https://doi.org/10.1016/j.jfs.2021.100867>
- Ben-Amar W, Chang M, McIlkenny P (2017) Board gender diversity and corporate response to sustainability initiatives: Evidence from the carbon disclosure project. *J Bus Ethics* 142: 369–383. <https://doi.org/10.1007/s10551-015-2759-1>
- Benz-Saliasi E (2020) Climate disclosure and climate risk for Asian companies, In: J Fu & AW Ng (Eds.), *Sustainable Energy and Green Finance for a Low-carbon Economy: Perspectives from the Greater Bay Area of China*, Springer International Publishing, 25–45. https://doi.org/10.1007/978-3-030-35411-4_2
- Berchicci L, King A (2022) Material sustainability and stock return: Faith is not enough. *J Financ Report* 7: 41–42. <https://doi.org/10.2308/JFR-2022-011>
- Bergmann A, Stechemesser K, Guenther E (2016) Natural resource dependence theory: Impacts of extreme weather events on organizations. *J Bus Res* 69: 1361–1366. <https://doi.org/10.1016/j.jbusres.2015.10.108>
- Betti G, Consolandi C, Eccles R (2018) The relationship between investor materiality and the Sustain. Dev. goals: A methodological framework. *Sustainability* 10: 2248. <https://doi.org/10.3390/su10072248>
- Bilala Tan, D Komal, B Ezeani, et al. (2022) Carbon emission disclosures and financial reporting quality: Does ownership structure and economic development matter? *Environ Sci Policy* 137: 109–119. <https://doi.org/10.1016/j.envsci.2022.08.004>
- Bingler JA, Kraus M, Leippold M, et al. (2022) Cheap talk and cherry-picking: What ClimateBert has to say on corporate climate risk disclosures. *Financ Res Lett* 47: 102776. <https://doi.org/10.1016/j.frl.2022.102776>
- Borghei Z (2021) Carbon disclosure: A systematic literature review. *Account Financ* 61: 5255–5280. <https://doi.org/10.1111/acfi.12757>
- Bose S, Lim E, Minnick K, et al. (2024) Do foreign institutional investors influence corporate climate change disclosure quality? International evidence. *Corp Gov Int Rev* 32: 322–347. <https://doi.org/10.1111/corg.12535>
- Braun V, Clarke V (2006) Using thematic analysis in psychology. *Qual Res Psychol* 3: 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Braun V, Clarke V (2019) Reflecting on reflexive thematic analysis. *Qual Res Sport Exerc Health* 11: 589–597. <https://doi.org/10.1080/2159676X.2019.1628806>
- Bressan G, Romagnoli S (2021) Climate risks and weather derivatives: A copula-based pricing model. *J Financ Stab* 54: 100877. <https://doi.org/10.1016/j.jfs.2021.100877>
- Bryman A (2012) *Social research methods* (4th ed.), Oxford University Press.
- Busch T, Hoffmann VH (2011) How hot is your bottom line? Linking carbon and financial performance. *Bus Soc* 50: 233–265. <https://doi.org/10.1177/0007650311398780>
- Busch T, Lewandowski S (2018) Corporate carbon and financial performance: A meta-analysis. *J Ind Ecol* 22: 745–759. <https://doi.org/10.1111/jiec.12591>

- Busch T, Johnson MP, Schnippering M (2022) A change will do you good: Does continuous environmental improvement matter? *Organ Environ* 35: 551–578. <https://doi.org/10.1177/10860266221107648>
- Caby J, Ziane Y, Lamarque E (2020) The determinants of voluntary climate change disclosure commitment and quality in the banking industry. *Technol Forecast Soc Change* 161: 12028. <https://doi.org/10.1016/j.techfore.2020.120282>
- Caby J, Ziane Y, Lamarque E (2022) The impact of climate change management on banks profitability. *J Bus Res* 142: 412–422. <https://doi.org/10.1016/j.jbusres.2021.12.078>
- Campiglio E, Dafermos Y, Monnin P, et al. (2018) Climate change challenges for central banks and financial regulators. *Nat Clim Change* 8: 462–468. <https://doi.org/10.1038/s41558-018-0175-0>
- Campiglio E, Daumas L, Monnin P, et al. (2023) Climate-related risks in financial assets. *J Econ Surv* 37: 950–992. <https://doi.org/10.1111/joes.12525>
- Cao X, Mei T, Li S (2024) Research on the relationship between ESG disclosure quality and stock liquidity of Chinese listed companies. *Green Financ* 6: 24–51. <https://doi.org/10.3934/GF.2024002>
- Carvajal M, Nadeem M (2023) Financially material sustainability reporting and firm performance in New Zealand. *Meditari Account Res* 31: 938–969. <https://doi.org/10.1108/MEDAR-06-2021-1346>
- Castilho A, Barakat S (2022) The relationship between climate change mitigation strategies and the financial performance of Brazilian companies. *J Ind Ecol* 26: 1294–1305. <https://doi.org/10.1111/jiec.13265>
- Chabot M, Bertrand J (2023) Climate risks and financial stability: Evidence from the European financial system. *J Financ Stab* 69: 101190. <https://doi.org/10.1016/j.jfs.2023.101190>
- Chen H, Kuo T, Chen J (2022) Impacts on the ESG and financial performances of companies in the manufacturing industry based on the climate change related risks. *J Clean Prod* 380: 13495. <https://doi.org/10.1016/j.jclepro.2022.134951>
- Chenet H, Ryan-Collins J, van Lerven F (2021) Finance, climate-change and radical uncertainty: Towards a precautionary approach to financial policy. *Ecol Econ* 183: 106957. <https://doi.org/10.1016/j.ecolecon.2021.106957>
- Christophers B (2017) Climate change and financial instability: Risk disclosure and the problematics of neoliberal governance. *Ann Am Assoc Geogr* 107: 1108–1127. <https://doi.org/10.1080/24694452.2017.1293502>
- Clark J (2003) How to peer review a qualitative manuscript, In: F. Godlee & T. M. Jefferson (Eds.), *Peer review in health sciences* (2nd ed), BMJ Books, 219–235.
- Cong Y, Freedman M, Park J (2020) Mandated greenhouse gas emissions and required SEC climate change disclosures. *J Clean Prod* 247:119111. <https://doi.org/10.1016/j.jclepro.2019.119111>
- Cosma S, Leopizzi R, Nobile L, et al. (2022) Revising the non-financial reporting directive and the role of board of directors: A lost opportunity? *J Appl Account Res* 23: 207–226. <https://doi.org/10.1108/JAAR-04-2021-0102>
- Cotter J, Najah M (2012) Institutional investor influence on global climate change disclosure practices. *Aust J Manag* 37: 169–187. <https://doi.org/10.1177/0312896211423945>
- Cronin MA, George E (2023) The why and how of the integrative review. *Organ Res Methods* 26: 168–192. <https://doi.org/10.1177/1094428120935507>

- D’Orazio P (2021) Towards a post-pandemic policy framework to manage climate-related financial risks and resilience. *Clim Policy* 21: 1368–1382. <https://doi.org/10.1080/14693062.2021.1975623>
- D’Orazio P (2023) Navigating financial stability through the dual challenges of climate change and pandemics. *Curr Opin Environ Sustain* 65: 101386. <https://doi.org/10.1016/j.cosust.2023.101386>
- Dafermos Y, Nikolaidi M (2021) How can green differentiated capital requirements affect climate risks? A dynamic macrofinancial analysis. *J Financ Stab* 54: 100871. <https://doi.org/10.1016/j.jfs.2021.100871>
- Dafermos Y, Nikolaidi M, Galanis G (2018) Climate change, financial stability and monetary policy. *Ecol Econ* 152: 219–234. <https://doi.org/10.1016/j.ecolecon.2018.05.011>
- Daradkeh H, Shams S, Bose S, et al. (2023) Does managerial ability matter for corporate climate change disclosures? *Corp Gov Int Rev* 31: 83–104. <https://doi.org/10.1111/corg.12436>
- Dawkins C, Fraas J (2011) Coming clean: The impact of environmental performance and visibility on corporate climate change disclosure. *J Bus Ethics* 100: 303–322. <https://doi.org/10.1007/s10551-010-0681-0>
- De Bernardi P, Venuti F, Bertello A (2019) The relevance of climate change related risks on corporate financial and non-financial disclosure in Italian listed companies, In: P De Vincentiis, F Culasso, & SA Cerrato (Eds.), *The Future of Risk Management, Volume I*, Springer International Publishing, 77–107. https://doi.org/10.1007/978-3-030-14548-4_4
- De Cristofaro T, Gulluscio C (2023) In search of double materiality in non-financial reports: First empirical evidence. *Sustainability* 15: 924. <https://doi.org/10.3390/su15020924>
- De Cristofaro T, Raucci D (2022) Rise and fall of the materiality matrix: Lessons from a missed takeoff. *Adm Sci* 12: 186. <https://doi.org/10.3390/admsci12040186>
- de Grosbois D, Fennell D (2022) Determinants of climate change disclosure practices of global hotel companies: Application of institutional and stakeholder theories. *Tour Manag* 88: 104404. <https://doi.org/10.1016/j.tourman.2021.104404>
- de Lima C, Barbosa S, Neto R, et al. (2022) Corporate financial performance: A study based on the carbon efficient index (ICO2) of Brazil stock exchange. *Environ Dev Sustain* 24: 4323–4354. <https://doi.org/10.1007/s10668-021-01617-4>
- de Villiers C, La Torre M, Molinari M (2022) The global reporting initiative’s (GRI) past, present and future: Critical reflections and a research agenda on sustainability reporting (standard-setting). *Pac Account Rev* 34: 728–747. <https://doi.org/10.1108/PAR-02-2022-0034>
- Delmas M, Nairn-Birch N, Lim J (2015) Dynamics of environmental and financial performance: The case of greenhouse gas emissions. *Organ Environ* 28: 374–393. <https://doi.org/10.1177/1086026615620238>
- DeMenno M (2023) Environmental sustainability and financial stability: Can macroprudential stress testing measure and mitigate climate-related systemic financial risk? *J Bank Regul* 24: 445–473. <https://doi.org/10.1057/s41261-022-00207-2>
- Di Febo E, Angelini E, Le T (2023) From transition risks to the relationship between carbon emissions, economic growth, and renewable energy. *Risks* 11: 210. <https://doi.org/10.3390/risks11120210>
- Dutta P, Dutta A (2021) Impact of external assurance on corporate climate change disclosures: New evidence from Finland. *J Appl Account Res* 22: 252–285. <https://doi.org/10.1108/JAAR-08-2020-0162>
- Eleftheriadis I, Anagnostopoulou E (2015) Relationship between corporate climate change disclosures and firm factors. *Bus Strateg Environ* 24: 780–789. <https://doi.org/10.1002/bse.1845>

- Elsbach KD, Van Knippenberg D (2020) Creating high-impact literature reviews: An argument for ‘Integrative Reviews.’ *J Manag Stud* 57: 1277–1289. <https://doi.org/10.1111/joms.12581>
- Erhemjamts O, Huang K, Tehranian H (2024) Climate risk, ESG performance, and ESG sentiment in US commercial banks. *Glob Financ J* 59: 100924. <https://doi.org/10.1016/j.gfj.2023.100924>
- Fabris N (2020) Financial stability and climate change. *J Cent Bank Theory Pract* 9: 27–43. <https://doi.org/10.2478/jcbtp-2020-0034>
- Farkas M, Matolay R (2024) Designing the CSRD system: Insights from management systems to advance a strategic approach. *J Decis Syst* 33: 200–209. <https://doi.org/10.1080/12460125.2024.2354614>
- Farooq M, Zaman R, Sarraj D, et al. (2021) Examining the extent of and drivers for materiality assessment disclosures in sustainability reports. *Sustain Account Manag Policy J* 12: 965–1002. <https://doi.org/10.1108/SAMPJ-04-2020-0113>
- Fasan M, Mio C (2017) Fostering stakeholder engagement: The role of materiality disclosure in integrated reporting. *Bus Strateg Environ* 26: 288–305. <https://doi.org/10.1002/bse.1917>
- Fiandrino S, di Trana M, Tonelli A, et al. (2022a) The multi-faceted dimensions for the disclosure quality of non-financial information in revising Directive 2014/95/EU. *J Appl Account Res* 23: 274–300. <https://doi.org/10.1108/JAAR-04-2021-0118>
- Fiandrino S, Tonelli A, Devalle A (2022b) Sustainability materiality research: A systematic literature review of methods, theories and academic themes. *Qual Res Account Manag* 19: 665–695. <https://doi.org/10.1108/QRAM-07-2021-0141>
- Font X, Guix M, Bonilla-Priego MJ (2016) Corporate social responsibility in cruising: Using materiality analysis to create shared value. *Tour Manag* 53: 175–186. <https://doi.org/10.1016/j.tourman.2015.10.007>
- Galeone G, Onorato G, Shini M, et al. (2023) Climate-related financial disclosure in integrated reporting: What is the impact on the business model? The case of Poste Italiane. *Account Res J* 36: 21–36. <https://doi.org/10.1108/ARJ-04-2022-0107>
- Gallego-Alvarez I, García-Sánchez I, Vieira C (2014) Climate change and financial performance in times of crisis. *Bus Strateg Environ* 23: 361–374. <https://doi.org/10.1002/bse.1786>
- Giannarakis G, Zafeiriou E, Arabatzis G, et al. (2018) Determinants of corporate climate change disclosure for European firms. *Corp Soc Responsib Environ Manag* 25: 281–294. <https://doi.org/10.1002/csr.1461>
- Gibbons B (2023) The financially material effects of mandatory nonfinancial disclosure. *J Account Res* 62: 1711–1754. <https://doi.org/10.1111/1475-679X.12499>
- Gill S, Kohli M, Satija P (2022) Materiality in sustainability disclosures and investment portfolio performance in the Indian context. *J Sustain Financ Invest* 15: 757–779. <https://doi.org/10.1080/20430795.2022.2086844>
- Giner B, Luque-Vílchez M (2022) A commentary on the “new” institutional actors in sustainability reporting standard-setting: A European perspective. *Sustain Account Manag Policy J* 13: 1284–1309. <https://doi.org/10.1108/SAMPJ-06-2021-0222>
- Grael J, Gotthardt D (2016) The relevance of national contexts for carbon disclosure decisions of stock-listed companies: A multilevel analysis. *J Clean Prod* 133: 1204–1217. <https://doi.org/10.1016/j.jclepro.2016.05.182>
- Gruenewald S, Knijp G, Schoenmaker D, et al. (2024) Embracing the brave new world: A response to Demekas and Grippa. *J Financ Regul* 10: 127–134. <https://doi.org/10.1093/jfr/fjad011>

- Gupta B, Cheng R, Rajan R (2023) Climate risks: Nexus between green financial policies and fiscal space. *Appl Econ Lett* 31:1656–1660. <https://doi.org/10.1080/13504851.2023.2205092>
- Hahn R, Reimsbach D, Schiemann F (2015) Organizations, climate change, and transparency: Reviewing the literature on carbon disclosure. *Organ Environ* 28: 80–102. <https://doi.org/10.1177/1086026615575542>
- Hahn R, Reimsbach D, Wickert C (2023) Nonfinancial reporting and real sustainable change: Relationship status—it's complicated. *Organ Environ* 36: 3–16. <https://doi.org/10.1177/10860266231151653>
- Halkos G, Skouloudis A (2016) Exploring the current status and key determinants of corporate disclosure on climate change: Evidence from the Greek business sector. *Environ Sci Policy* 56: 22–31. <https://doi.org/10.1016/j.envsci.2015.10.011>
- He W, Cheng Y, Zhang H, et al. (2021) The microeconomic effects of temperature changes. *J Clean Prod* 326: 129389. <https://doi.org/10.1016/j.jclepro.2021.129389>
- Huang B, Punzi MT, Wu Y (2022) Environmental regulation and financial stability: Evidence from Chinese manufacturing firms. *J Bank Financ* 136: 106396. <https://doi.org/10.1016/j.jbankfin.2021.106396>
- Huang H, Kerstein J, Wang C, et al. (2022) Firm climate risk, risk management, and bank loan financing. *Strateg Manag J* 43: 2849–2880. <https://doi.org/10.1002/smj.3437>
- Jadhav A, Rahman S, Ahsan K (2022) Sustainability practices disclosure of top logistics firms in Australia. *Int J Logist Manag* 33: 244–277. <https://doi.org/10.1108/IJLM-09-2021-0452>
- Jebe R (2019) The convergence of financial and ESG materiality: Taking sustainability mainstream. *Am Bus Law J* 56: 645–702. <https://doi.org/10.1111/ablj.12148>
- Jørgensen S, Mjos A, Pedersen L (2022) Sustainability reporting and approaches to materiality: Tensions and potential resolutions. *Sustain Account Mana J* 13: 341–361. <https://doi.org/10.1108/SAMPJ-01-2021-0009>
- Jung H, Song C (2023) Managerial perspectives on climate change and stock price crash risk. *Financ Res Lett* 51:103410. <https://doi.org/10.1016/j.frl.2022.103410>
- Kamarudin Y, Mohd-Sanusi Z, Musa K, et al. (2023) Climate change risk for sustainability: The implication on financial and environment, social and governance reporting. *J Nusantara Stud J* 8: 277–299. <https://doi.org/10.24200/jonus.vol8iss3pp277-299>
- Karydas C, Xepapadeas A (2022) Climate change financial risks: Implications for asset pricing and interest rates. *J Financ Stab* 63: 101061. <https://doi.org/10.1016/j.jfs.2022.101061>
- Ketonen-Oksi S, Vigren M (2024) Methods to imagine transformative futures. An integrative literature review. *Futures* 157: 103341. <https://doi.org/10.1016/j.futures.2024.103341>
- Khalifa M, Zouaoui H, Ben Othman H, et al. (2024) The impact of climate risk on accounting conservatism: Evidence from developing countries. *J Appl Account Res* 25: 570–593. <https://doi.org/10.1108/JAAR-01-2023-0028>
- Kouloukoui D, Sant'Anna A, Gomes S, et al. (2019) Factors influencing the level of environmental disclosures in sustainability reports: Case of climate risk disclosure by Brazilian companies. *Corp Soc Responsib Environ Manag* 26: 791–804. <https://doi.org/10.1002/csr.1721>
- Lamperti F, Roventini A (2022) Beyond climate economics orthodoxy: Impacts and policies in the agent-based integrated-assessment DSK model*. *Eur J Econ Econ Policy* 19: 357–380. <https://doi.org/10.4337/ejeep.2022.0096>

- Lamperti F, Bosetti V, Roventini A, et al. (2021) Three green financial policies to address climate risks. *J Financ Stab* 54:100875. <https://doi.org/10.1016/j.jfs.2021.100875>
- Lee J, Serafin A, Courteau C (2023) Corporate disclosure, ESG and green fintech in the energy industry. *J World Energ Law Bus* 16: 473–491. <https://doi.org/10.1093/jwelb/jwad018>
- Li N (2023) Measuring the combining effects of financial stability and climate risk for green economic recovery. *Econ Change Restruct* 56: 1225–1241. <https://doi.org/10.1007/s10644-022-09466-5>
- Li Q, Shan H, Tang Y, et al. (2024) Corporate climate risk: Measurements and responses. *Rev Financ Stud* 37: 1778–1830. <https://doi.org/10.1093/rfs/hhad094>
- Li T, Trinh VQ, Elnahass M (2023) Drivers of global banking stability in times of crisis: The role of corporate social responsibility. *Br J Manag* 34: 595–622. <https://doi.org/10.1111/1467-8551.12631>
- Liu Y, Failler P, Chen L (2021) Can mandatory disclosure policies promote corporate environmental responsibility?—Quasi-natural experimental research on China. *Int J Environ Res Public Health* 18: 6033. <https://doi.org/10.3390/ijerph18116033>
- Liu Z, Sun H, Tang S (2021) Assessing the impacts of climate change to financial stability: Evidence from China. *Int J Clim Chang Strateg Manag* 13: 375–393. <https://doi.org/10.1108/IJCCSM-10-2020-0108>
- Lupu I, Criste A (2023) Climate change in the discourse of central banks. Influence on financial stability at the European level. *Stud Bus Econ* 18: 235–246. <https://doi.org/10.2478/sbe-2023-0034>
- Ma B, Lin S, Bashir M, et al. (2023) Revisiting the role of firm-level carbon disclosure in Sustain. Dev. goals: Research agenda and policy implications. *Gondwana Res* 117: 230–242. <https://doi.org/10.1016/j.gr.2023.02.002>
- Mähönen J (2020) Comprehensive approach to relevant and reliable reporting in Europe: A dream impossible? *Sustainability* 12: 5277. <https://doi.org/10.3390/su12135277>
- Maji S, Kalita N (2022) Climate change financial disclosure and firm performance: Empirical evidence from Indian energy sector based on TCFD recommendations. *Soc Bus Rev* 17: 594–612. <https://doi.org/10.1108/SBR-10-2021-0208>
- Malik A, bin Jais M, Rahim S, et al. (2023) Significance of environmental sustainability to maintain financial stability: Mediating roles of financial inclusion. *Asia-Pac J Reg Sci* 7: 1307–1328. <https://doi.org/10.1007/s41685-023-00308-4>
- Mandel A, Tiggeloven T, Lincke D, et al. (2021) Risks on global financial stability induced by climate change: The case of flood risks. *Clim Change* 166: 4. <https://doi.org/10.1007/s10584-021-03092-2>
- Mastouri A, Mendiratta R, Giese G (2022) Corporate bonds and climate change risk. *J Portf Manag* 48: 78–97. <https://doi.org/10.3905/jpm.2022.1.421>
- Matsumura EM, Prakash R, Vera-Muñoz SC (2024) Climate-risk materiality and firm risk. *Rev Account Stud* 29: 33–74. <https://doi.org/10.1007/s11142-022-09718-9>
- Mehedi S, Nahar S, Jalaludin D (2024) Determinants of corporate climate change disclosure: Is the mediating role of corporate strategic response to environmental governance and policy matter? Evidence from emerging market. *Sustain Dev* 32: 195–210. <https://doi.org/10.1002/sd.2641>
- Migliorelli M (2023) Climate change, environmental sustainability, and financial risks: Are we close to an understanding? *Curr Opin Environ Sustain* 65: 101388. <https://doi.org/10.1016/j.cosust.2023.101388>

- Ng AW, Yorke SM, Nathwani J (2022) Enforcing double materiality in global sustainability reporting for developing economies: Reflection on Ghana's oil exploration and mining sectors. *Sustainability* 14: 9988. <https://doi.org/10.3390/su14169988>
- Ngo T, Le T, Ullah S, et al. (2023) Climate risk disclosures and global sustainability initiatives: A conceptual analysis and agenda for future research. *Bus Strateg Environ* 32: 3705–3720. <https://doi.org/10.1002/bse.3323>
- Ngu SB, Amran A (2018) Materiality disclosure in sustainability reporting: Fostering stakeholder engagement. *Strateg Dir* 34: 1–4. <https://doi.org/10.1108/SD-01-2018-0002>
- Nikolaou I, Evangelinos K, Leal W (2015) A system dynamic approach for exploring the effects of climate change risks on firms' economic performance. *J Clean Prod* 103: 499–506. <https://doi.org/10.1016/j.jclepro.2014.09.086>
- O'Dwyer B, Unerman J (2020) Shifting the focus of sustainability accounting from impacts to risks and dependencies: Researching the transformative potential of TCFD reporting. *Account Audit Account J* 33: 1113–1141. <https://doi.org/10.1108/AAAJ-02-2020-4445>
- Ooi S, Amran A, Yeap J, et al. (2019) Governing climate change: The impact of board attributes on climate change disclosure. *Int J Environ Sustain Dev* 18: 270–288.
- Page MJ, McKenzie JE, Bossuyt PM, et al. (2021) The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ* 372: n71. <https://doi.org/10.1136/bmj.n71>
- Park JG, Park K, Noh H, et al. (2023) Characterization of CSR, ESG, and corporate citizenship through a text mining-based review of literature. *Sustainability* 15: 3892. <https://doi.org/10.3390/su15053892>
- Primec A, Belak J (2022) Sustainable CSR: Legal and managerial demands of the new EU legislation (CSRD) for the future corporate governance practices. *Sustainability* 14: 16648. <https://doi.org/10.3390/su142416648>
- Principale S, Pizzi S (2023) The determinants of TCFD reporting: A focus on the Italian context. *Adm Sci* 13: 61. <https://doi.org/10.3390/admsci13020061>
- Raith D (2023) The contest for materiality. What counts as CSR? *J Appl Account Res* 24: 134–148. <https://doi.org/10.1108/JAAR-04-2022-0093>
- Ramos L, Gallagher K, Stephenson C, et al. (2022) Climate risk and IMF surveillance policy: A baseline analysis. *Clim Policy* 22: 371–388. <https://doi.org/10.1080/14693062.2021.2016363>
- Reimsbach D, Schiemann F, Hahn R, et al. (2020) In the eyes of the beholder: Experimental evidence on the contested nature of materiality in sustainability reporting. *Organ Environ* 33: 624–651. <https://doi.org/10.1177/1086026619875436>
- Santos A, Rodrigues L (2021) Banks and climate-related information: The case of Portugal. *Sustainability* 13: 12215. <https://doi.org/10.3390/su132112215>
- Schiemann F, Sakhel A (2019) Carbon disclosure, contextual factors, and information asymmetry: The case of physical risk reporting. *Eur Account Rev* 28: 791–818. <https://doi.org/10.1080/09638180.2018.1534600>
- Scholten R, Lambooy T, Renes R, et al. (2020) The impact of climate change in the valuation of production assets via the IFRS framework. *Account Econ Law* 10: 20180032. <https://doi.org/10.1515/acl-2018-0032>
- Secinaro S, Brescia V, Calandra D, et al. (2020) Impact of climate change mitigation policies on corporate financial performance: Evidence-based on European publicly listed firms. *Corp Soc Responsib Environ Manag* 27: 2491–2501. <https://doi.org/10.1002/csr.1971>

- Sepulveda-Alzate Y, Garcia-Benau M, Gomez-Villegas M (2022) Materiality assessment: The case of Latin American listed companies. *Sustain Account Manag Policy J* 13: 88–113. <https://doi.org/10.1108/SAMPJ-10-2020-0358>
- Shimizu S, Goto M (2023) Why do companies participate in climate change-related initiatives? Theoretical and empirical analyses of motivations for Japanese companies. *Sustain Dev* 32: 3440–3454. <https://doi.org/10.1002/sd.2848>
- Shui X, Zhang M, Smart P (2023) Climate change disclosure and the promise of response-ability and transparency: A synthesizing framework and future research agenda. *Eur Manag Rev* 20: 145–158. <https://doi.org/10.1111/emre.12514>
- Sichigea M, Siminica M, Cristea M, et al. (2021) Materiality conditions in the interplay between environment and financial performance: A graphical modeling approach for EEA oil and gas companies. *Complexity* 2021: 7380759. <https://doi.org/10.1155/2021/7380759>
- Skjott Linneberg M, Korsgaard S (2019) Coding qualitative data: A synthesis guiding the novice. *Qual Res J* 19: 259–270. <https://doi.org/10.1108/QRJ-12-2018-0012>
- Snyder H (2019) Literature review as a research methodology: An overview and guidelines. *J Bus Res* 104: 333–339. <https://doi.org/10.1016/j.jbusres.2019.07.039>
- Solana J (2020) Climate change litigation as financial risk. *Green Financ* 2: 344–372. <https://doi.org/10.3934/GF.2020019>
- Song X, Fang T (2023) Temperature shocks and bank systemic risk: Evidence from China. *Financ Res Lett* 51: 103447. <https://doi.org/10.1016/j.frl.2022.103447>
- Sra JK, Booth AL, Cox RAK (2022) Voluntary carbon information disclosures, corporate-level environmental sustainability efforts, and market value. *Green Financ* 4: 179–206. <https://doi.org/10.3934/GF.2022009>
- Stan K, Watt G, Sanchez-Azofeifa A (2021) Financial stability in response to climate change in a northern temperate economy. *Nat Commun* 12: 7161. <https://doi.org/10.1038/s41467-021-27490-3>
- Sueyoshi T, Goto M (2010) Measurement of a linkage among environmental, operational, and financial performance in Japanese manufacturing firms: A use of data envelopment analysis with strong complementary slackness condition. *Eur J Oper Res* 207: 1742–1753. <https://doi.org/10.1016/j.ejor.2010.07.024>
- Sun Y (2023) Can the innovation in sustainability disclosures reflect organisational sustainable development? An integrated reporting perspective from China. *Sustain Dev* 31: 1668–1680. <https://doi.org/10.1002/sd.2475>
- Sun Y, Yang Y, Huang N, et al. (2020) The impacts of climate change risks on financial performance of mining industry: Evidence from listed companies in China. *Resour Policy* 69: 101828. <https://doi.org/10.1016/j.resourpol.2020.101828>
- Sun Y, Zou Y, Jiang J, et al. (2023) Climate change risks and financial performance of the electric power sector: Evidence from listed companies in China. *Clim Risk Manag* 39: 100474. <https://doi.org/10.1016/j.crm.2022.100474>
- Tang S, Demeritt D (2018) Climate change and mandatory carbon reporting: Impacts on business process and performance. *Bus Strateg Environ* 27: 437–455. <https://doi.org/10.1002/bse.1985>
- Thai H, Huong G, Nguyen T, et al. (2023) Impacts of climate change risks on financial performance of listed firms in agriculture industries in Vietnam. *J Agribus Dev Emerg Econ* 14: 937–957. <https://doi.org/10.1108/JADEE-07-2022-0137>

- Toronto CE, Remington R (Eds.) (2020) *A Step-by-Step Guide to Conducting an Integrative Review*. Springer International Publishing. <https://doi.org/10.1007/978-3-030-37504-1>
- Torraco RJ (2005) Writing integrative literature reviews: Guidelines and examples. *Hum Resour Dev Rev* 4: 356–367. <https://doi.org/10.1177/1534484305278283>
- Torraco RJ (2016) Writing integrative literature reviews: Using the past and present to explore the future. *Hum Resour Dev Rev* 15: 404–428. <https://doi.org/10.1177/1534484316671606>
- Toukabri M, Youssef M (2023) Climate change disclosure and Sustain. Dev. goals (SDGs) of the 2030 agenda: The moderating role of corporate governance. *J Inf Commun Ethics Soc* 21: 30–62. <https://doi.org/10.1108/JICES-02-2022-0016>
- Tsiotsou RH, Koles B, Paul J, et al. (2022) Theory generation from literature reviews: A methodological guidance. *Int J Consum Stud* 46: 1505–1516. <https://doi.org/10.1111/ijcs.12861>
- Ünüvar B, Yeldan A (2023) Green central banking under high inflation-more of a need than an option: An analytical exposition for Turkey. *Dev Policy Rev* 41: e12720. <https://doi.org/10.1111/dpr.12720>
- Vestrelli R, Fronzetti Colladon A, et al. (2024) When attention to climate change matters: The impact of climate risk disclosure on firm market value. *Energ Policy* 185: 113938. <https://doi.org/10.1016/j.enpol.2023.113938>
- Weber O (2024) Climate stress testing in the financial industry. *Curr Opin Environ Sustain* 66: 101401. <https://doi.org/10.1016/j.cosust.2023.101401>
- Wohlgezogen F, McCabe A, Osegowitsch T, et al. (2020) The wicked problem of climate change and interdisciplinary research: Tracking management scholarship's contribution. *J Manag Organ* 26: 1048–1072. <https://doi.org/10.1017/jmo.2020.14>
- Wu GST, Wan WTS (2023) What drives the cross-border spillover of climate transition risks? Evidence from global stock markets. *Int Rev Econ Financ* 85: 432–447. <https://doi.org/10.1016/j.iref.2023.01.027>
- Wu L, Liu D, Lin T (2023) The impact of climate change on financial stability. *Sustainability* 15: 11744. <https://doi.org/10.3390/su151511744>
- Yu V, Ting H (2012) Financial development, investor protection, and corporate commitment to sustainability evidence from the FTSE Global 500. *Manag Decis* 50: 130–146. <https://doi.org/10.1108/00251741211194912>
- Zhang B, Lai K, Wang B, et al. (2018) The clean development mechanism and corporate financial performance: Empirical evidence from China. *Resour Conserv Recycl* 129: 278–289. <https://doi.org/10.1016/j.resconrec.2017.10.004>
- Ziegler A, Busch T, Hoffmann V (2011) Disclosed corporate responses to climate change and stock performance: An international empirical analysis. *Energ Econ* 33: 1283–1294. <https://doi.org/10.1016/j.eneco.2011.03.007>
- Zitti M, Guttormsen A (2023) Climate risk and financial disclosure in salmon aquaculture. *Aquac Econ Manag* 27: 441–467. <https://doi.org/10.1080/13657305.2022.2143934>



AIMS Press

© 2026 the Author(s), licensee AIMS Press. This is an open access article distributed under the terms of the Creative Commons Attribution License (<https://creativecommons.org/licenses/by/4.0>)