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# Making Scope 3 emissions management count: enhancing shared responsibility in the supply chain

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## Abstract

**Purpose** – Despite the initial efforts of companies to tackle Scope 3 emissions, how to effectively manage emissions that are shared across a diverse network of actors is still unclear. Building on Young's (2006) social connectedness model of responsibility, our study's objective is to analyse in which conditions boundary-spanning functions as a mechanism for constructing shared responsibility.

**Design/methodology/approach** – We used a longitudinal qualitative abductive research design based on content analysis of self-reported and tertiary data from 31 European manufacturing companies' leaders in climate action to unravel Scope 3 emissions management practices adopted. Overall, we analysed 412 documents for 16,919 pages and two online databases.

**Findings** – Our findings demonstrate that boundary-spanning does not always function as a mechanism that leads to shared responsibility. Companies' ability to utilise boundary-spanning to generate shared responsibility is influenced by structural conditions, particularly supply chain complexity, which can expand opportunities for collaboration.

**Originality/value** – The adoption of social connectedness in the context of sustainable supply chain management emphasises that not all Scope 3 emissions management practices are equally effective in promoting shared responsibility, and it is imperative to consider potential unintended consequences.

**Keywords** Boundary-spanning, Scope 3 emissions, Sustainable supply chain management, Net zero strategies, Corporate social responsibility

**Paper type** Research article

## 1. Introduction

Greenhouse gas (GHG) emissions mitigation in manufacturing companies can yield significantly different results, depending on whether the focus is on the company's internal operations or its supply chain's upstream and downstream components (Ellram and Tate, 2025; Lintukangas *et al.*, 2022). Most manufacturing incumbent companies present low operational Scope 1 emissions linked to their directly controlled assets; however, those figures can change dramatically when Scope 3 emissions are accounted for (Dooley *et al.*, 2019). Scope 3 emissions refer to all indirect emissions (apart from Scope 2 emissions related to energy purchasing) linked to value-adding activities upstream and downstream of a focal firm, often representing most of a company's total carbon footprint (WRI, 2011). As such, those are more than emissions related to suppliers of materials and services; they include activities such as the use of sold products and end-of-life treatment (WRI, 2011). As defined by Wieland and Creutzig (2025), Scope 3 emissions in supply chains comprise "the total greenhouse gas emissions generated by the entire network of interconnected and interdependent actors involved in all value-related activities—from upstream to downstream". Although companies can be legally responsible for managing only Scope 1 emissions, many have also included Scope 3 emissions in their climate targets to respond to market and civil society pressures (De Stefano and Montes-Sancho, 2023). Such a setting might change with European policy



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developments such as the Due Diligence Directive, which seeks to increase companies' accountability for Scope 3 carbon emissions linked to their supply chains (European Commission, 2024).

Due to their role as global supply chain orchestrators, incumbents occupy a privileged position to diffuse carbon mitigation practices with upstream and downstream actors and shape transition trajectories (Vieira *et al.*, 2024; Wieland and Creutzig, 2025). However, what kind of approach companies need to effectively manage Scope 3 emissions shared with a diverse network of actors remains unclear (Wieland and Creutzig, 2025). Previous studies on Scope 3 emissions have mainly explored the process of reporting and accounting for emissions related to upstream suppliers. Particularly, the focus has been on how companies can access suppliers' data on emissions (Dahlmann and Roehrich, 2019; Lintukangas *et al.*, 2022; Villena and Dhanorkar, 2020). While acquiring information about suppliers' GHG emissions is a crucial step for planning and implementing effective practices, the kinds of management practices companies adopt to address this diffused sustainability issue remain poorly understood. Studies have started to investigate how the management of upstream emissions can take place (Butt *et al.*, 2025); however, Scope 3 emissions also require engagement with downstream actors.

When dealing with a sustainability issue of a diffused origin, such as Scope 3 emissions, companies' recognition as socially connected to emissions generated by supply chain actors becomes a first step required to create action (Young, 2006). To delve deeper into these aspects, we draw on Young's (2006) social connectedness model of responsibility, which addresses the attribution of responsibility within a network context when analysing sustainability issues with a diffused origin. This model posits that when sustainability challenges arise from the actions and interactions of multiple actors, it is impractical to assign responsibility to a single entity. In such a shared responsibility setting, these issues can only be effectively resolved through coordinated individual actions (Schrempf, 2012; Young, 2006). This approach differs from a chain-liability effect context (Hartmann and Moeller, 2014), where stakeholders hold solely focal firms accountable for sustainability challenges within their supply chain. Applying the construct of shared responsibility to Scope 3 emissions management enables a more nuanced analysis that leverages on broader structural connections to Scope 3 emissions. It also allows exploring further when Scope 3 emissions management promotes decarbonisation of supply chains or inadvertently fosters dynamics which may negatively influence the effectiveness and legitimacy of management practices (e.g. free-riding effects as described by Falcone *et al.*, 2024).

The concept of shared responsibility allows us to elaborate on the potential systemic impact of Scope 3 emissions management practices; however, it provides less clarity on the efforts required from companies to engage with external stakeholders when managing Scope 3 emissions. The sources of companies' Scope 3 emissions comprise a wide range of activities and actors that extend beyond their operational control. Thus, companies are required to adopt management practices capable of coping with the dynamics that emerge when dealing with organisations that are independent entities but might be key in a company's value creation process. Prior studies have shown that cultivating boundary-spanning capabilities with upstream actors was essential for addressing sustainability issues with suppliers (Jia *et al.*, 2021; Soundararajan and Brammer, 2018). Boundary-spanning refers to the communication and coordination activities carried out with external stakeholders to establish connections, interactions and exchanges (Schotter *et al.*, 2017). Gaining insight into companies' boundary-spanning activity can assist in clarifying which relational attributes are required for performing different Scope 3 emissions management practices. Moreover, it remains unclear if boundary-spanning is accessible to all kinds of companies and with all supply chain actors.

By building on Young's (2006) social connectedness model of responsibility, our study's objective is to analyse under which conditions boundary-spanning functions as a mechanism for constructing shared responsibility. To achieve this, we employed a longitudinal qualitative

abductive research design based on content analysis to explore the Scope 3 emissions management practices of 31 European manufacturing companies classified as leaders in climate action. Our analysis first examines the boundary-spanning requirements of Scope 3 management practices and when they lead to responsibility sharing. Secondly, we analyse different clusters of companies to explore in which conditions boundary-spanning is developed only with upstream or downstream supply chain actors and how this impacts responsibility sharing.

Our investigation into the Scope 3 emissions management practices employed by companies allows us to make theoretical and practical contributions to sustainable supply chain management literature. By integrating the concepts of shared responsibility and boundary-spanning, we elaborate on sustainable supply chain management's systemic impacts and the relational effort they require. Our findings demonstrate that boundary-spanning relational efforts do not always function as a mechanism that leads to shared responsibility. Companies' ability to utilise boundary-spanning attributes that generate shared responsibility is influenced by structural conditions, particularly supply chain complexity, which can reduce or expand opportunities for collaboration. Theoretically, our contribution lies in the perspective that social connectedness Corporate Social Responsibility (CSR) and the shared responsibility construct bring to sustainable supply chain management, as opposed to the prevailing chain-liability approach. Our discussion emphasises that not all supply chain management practices are equally effective in promoting shared responsibility for diffused sustainability issues, and it is imperative to consider potential unintended consequences associated with these practices.

## 2. Theoretical background

The management of Scope 3 emissions represents an emergent area of inquiry within the domain of sustainable supply chain management (Wieland and Creutzig, 2025). Prior research has particularly focused on one dimension of Scope 3 emissions management, which is concerned with mechanisms through which companies can access suppliers' emissions data related to procured goods and services. Among the pioneering works, Jira and Toffel (2013) explored suppliers' willingness to disclose carbon emissions data to buyers. Their findings suggest that buyers' commitment to utilise this information, coupled with repeated requests, significantly enhances suppliers' availability to engage in data-sharing practices. Building upon this study, Villena and Dhanorkar (2020) examined the influence of diverse institutional pressures on suppliers' disclosure of high-quality carbon emissions data, demonstrating that coercive pressures exerted by buyers increase suppliers' willingness to participate in data-sharing initiatives.

Lintukangas *et al*. (2022) further elucidated the notion that buyer-induced pressures are pivotal in driving supplier engagement in emissions management beyond data provision, surpassing the influence of contextual factors such as environmental regulations or the socioeconomic welfare of the country. Dahlmann and Roehrich (2019) conducted an in-depth analysis of the complexities surrounding suppliers' acquisition, processing and transfer of climate change-related information to focal firms. By distinguishing between basic, transactional and collaborative forms of engagement, they demonstrate the increasing comprehensiveness required to mitigate uncertainties related to supply chain information.

De Stefano and Montes-Sancho (2023) highlighted the compounding effects of spatial complexity on the sharing of emissions data, positing the critical role of first-tier suppliers in facilitating this exchange. While constructing an inventory of Scope 3 emissions is essential for effective management, it is notable that companies engaging with multiple suppliers may initially observe an increase in reported emissions levels (Dahlmann *et al*., 2023). Nevertheless, after a period of approximately six years dedicated to emission management practices, organisations typically gain sufficient experience to realise reductions (Dahlmann *et al*., 2023).

The exchange of carbon emissions data within supply chains is fundamental in the management of Scope 3 emissions. Subsequent research is imperative to enhance our understanding of effective management strategies for Scope 3 emissions and to ascertain the similarities and differences of these practices in relation to the sustainable supply chain management of other issues. Butt *et al*. (2025) have commenced to examine the management practices that organisations adopt when engaging with upstream supply chain actors, extending our knowledge of practices beyond data collection on supplier carbon performance. Employing a multiple case study methodology, the authors delineate practices related to securing supplier commitment to emissions reduction through written contracts, provision of training programs, performance feedback and the establishment of long-term partnerships.

Butt *et al*. (2025) and Wieland and Creutzig (2025) have started to elucidate further the management practices adopted when managing Scope 3 emissions. However, more clarity regarding how focal companies can manage downstream Scope 3 emissions is still missing. Initiatives from the practice have started to provide companies with guidance on how to manage downstream supply chain emissions (Farsan *et al*., 2018). In addition to exploring the management practices adopted by companies, our study seeks to elaborate on the systemic impacts of these practices, particularly in their potential to foster shared responsibility. In the next section, we will detail this concept and elucidate its significance in addressing sustainability challenges of a diffused origin.

### *2.1 Scope 3 emissions management and shared responsibility*

Organisational structures have been changing due to increased activities such as outsourcing, sub-contracting and platform models (Phillips and Schrempf-Stirling, 2022). The fragmentation of companies within global supply chains leads to social and environmental impacts related to value creation that extend beyond the operations of the focal firm (Soundararajan and Brown, 2016). Scandals regarding working conditions in supply chains have heightened pressure from external stakeholders on companies to establish sustainability policies that encompass their entire supply chain (Awaysheh and Klassen, 2010). Hartmann and Moeller (2014) argue that a "chain liability effect" emerges, where consumers fail to distinguish between different members of the supply chain when faced with instances of unsustainable behaviour, thereby attributing responsibility to the focal firm for adverse impacts that may arise in their supply chain. In a context characterised by a chain liability effect setting, mitigating harmful impacts primarily lies with the lead firms that orchestrate these global factory networks (Enderwick, 2018). Consequently, stakeholders attribute responsibility more in terms of connection rather than causality (Enderwick, 2018).

The literature on CSR has long debated how to move beyond a liability approach in determining when a company should manage sustainability issues in contexts where the responsibility is diffused among numerous actors (Lim and Pope, 2020; Phillips and Schrempf-Stirling, 2022). Focusing on expanding companies' liabilities becomes particularly impractical when supply chains are viewed as networks. The network perspective emphasises how structures of value creation work globally and have a range of independent business actors that are part of their value-adding process (Acquier *et al*., 2017). When value is generated by a network of diverse contributors, traditional cause-and-effect logic becomes less applicable, making it insufficient to attribute the responsibility for a social or environmental externality to a single entity within the supply chain (Enderwick, 2018).

Young (2006) challenges the construction of responsibility based on liability by developing the social connection model of responsibility. She elaborates on the attribution of responsibility within a contemporary network context characterised by systemic societal issues (Schrempf, 2012; Young, 2006). Social connection views sustainability issues as outcomes of the actions and interactions among multiple actors, making it impossible to attribute responsibility to a single entity. Once issues are diffused, individual actors cannot resolve them alone. Young (2006) states that issues for which responsibility is shared can only

be resolved through collective action. Shared responsibility should not be considered as something interchangeable with collaboration (Phillips and Schrempf-Stirling, 2022). Collaboration requires a group to act as a unit, whereas shared responsibility, while applicable to a group, still requires individual action (Phillips and Schrempf-Stirling, 2022). Thus, through the lens of shared responsibility, individual actions of network members can either contribute to or help alleviate the harm arising from their interactions (Schrempf, 2012). Furthermore, the social connection CSR adopts a proactive stance, prioritising efforts to minimise future harm rather than attributing blame to actors for past damages (Phillips and Schrempf-Stirling, 2022).

Young (2006) states that power, privilege, interest and collective ability are four parameters that can help devise an actor's level of shared responsibility in socially connected issues. Power relates to an agent's capacity to influence a structural process and how easily they can collectively organise to address those. Privilege concerns the extent to which companies themselves are knowledgeable of practices to contrast sustainability issues. Interest deals with actions that allow different actors to develop agency and capacity to solve issues by themselves. Collective ability relates to companies joining external parties to resolve issues. In the context of global manufacturing networks, Enderwick (2018) highlights that responsibility attribution depends on power relations and network connections, calling for more empirical studies using a social connectedness approach.

Although shared responsibility was originally theorised concerning social issues in companies' supply chains, we argue that it is equally applicable to Scope 3 emissions. These emissions illustrate an environmental impact arising from the actions of a network of actors. Specifically, they are associated with the value creation processes of a company but stem from activities that multiple stakeholders influence. Although each actor possesses distinct opportunities to mitigate these emissions, achieving global decarbonisation targets will require more than the efforts of a single organisation (WRI, 2011). However, in which conditions shared responsibility for Scope 3 emissions manifests remain unclear. It is uncertain when companies recognise their connection to this diffused sustainability challenge and to what extent they perceive themselves as socially connected to its impacts. Furthermore, when companies acknowledge their social connection to Scope 3 emissions, do their management practices foster shared responsibility? Utilising the concept of shared responsibility enables a deeper investigation into when the management of Scope 3 emissions supports the decarbonisation of supply chains or, conversely, may give rise to dynamics that impact the efficacy and credibility of Scope 3 practices. The concept of shared responsibility allows us to elaborate on the systemic impact of managing Scope 3 emissions; however, it provides less clarity on the efforts required to engage with external stakeholders. To address this, we will introduce the concept of boundary-spanning in the next section.

### *2.2 Scope 3 emissions management and boundary-spanning*

When facing complex evolving environments alongside different stakeholders' requests, boundary-spanning theory argues that organisations must manage their boundaries with external entities that supply services or materials essential to their value creation processes (Aldrich and Herker, 1977; Zhang *et al*., 2011). Boundary-spanning refers to communication and coordination activities that individuals or organisations undertake to connect, interact and exchange with external entities or groups (Schotter *et al*., 2017). Developing boundary-spanning facilitates collaboration across multiple cultural, institutional and organisational contexts to achieve a common goal (Lim and Pope, 2020; Schotter *et al*., 2017). Initially, the concept of boundary-spanning was focused within organisations, examining how the interactions among different departments could be enhanced through boundary-spanners' efforts (Marrone, 2010). Later, the concept has been applied to consider the relationship of focal firms with other organisations, particularly suppliers. Zhang *et al*. (2011) explore how purchasing agents act as boundary-spanners, utilising communication and mediation to foster

supplier trust. Chakkol *et al.* (2018) highlight that providing suppliers with training and technical expertise is another boundary-spanning function aimed at strengthening the entire network.

Studies have also focused on using boundary-spanning practices in the specific context of sustainable supply chain management. Soundararajan *et al.* (2018) investigate the individual boundary work done by sourcing agents in developing economies, who strive to govern working conditions in global supply chains. As intermediaries between buyers and suppliers, these sourcing agents engage in boundary-spanning practices that may involve reinforcing the boundaries between the two parties, flexing those boundaries or repairing relationships in confrontational situations. Recent studies also expose how focal firms can leverage their power over first-tier suppliers to delegate boundary-spanning responsibilities in a multi-tier supply chain context, ensuring that lower-tier suppliers adhere to specific sustainability standards (Jia *et al.*, 2021). Jia *et al.* (2021) examine this setting and divide boundary-spanning actions between compliance-oriented and improvement-oriented. Compliance-oriented actions exhibit a lower degree of boundary-spanning, requiring merely attributes related to shared language and codes among the actors involved. The authors illustrate that only companies that develop the additional attribute of aligning their values with their suppliers can successfully implement improvement-oriented boundary-spanning actions.

Previous studies have primarily focused on the boundary-spanning role of individual actors (Schotter *et al.*, 2017); this article explores the concept of boundary-spanning as an organisational-level function. The existing literature has largely examined boundary-spanning concerning suppliers' interactions. However, Scope 3 emissions also comprise other actors, which challenge companies to develop boundary-spanning attributes also with those (Acquier *et al.*, 2017). An additional aspect that has been overlooked is the assumption that these boundary-spanning attributes are inherent to companies operating in global supply chains (Schotter *et al.*, 2017); however, little is known about whether companies use those attributes to manage Scope 3 emissions.

## 3. Method

This study analyses under which conditions boundary-spanning functions as a mechanism for constructing shared responsibility. We adopt an exploratory qualitative research design with an abductive approach to refine existing theories with empirical observations that do not fit within established frameworks (Lin *et al.*, 2013). Abductive reasoning enables researchers to iteratively refine theory and practice, making it particularly valuable in dynamic and uncertain environments, and in early-stage developments of phenomena, such as Scope 3 emissions management, and to shed light on grand challenges like climate change (Kistruck and Slade Shantz, 2022; Nava *et al.*, 2025). In the abductive research process, the empirical data collection and theory-building phases overlap in a learning loop.

We employed a longitudinal content analysis of companies' secondary data. This design provides several advantages that fit well with the purpose of our study. Content analysis allows for an objective, systematic and reliable study of published information as it offers the possibility to investigate implicit assumptions (latent content) alongside explicit statements (manifest content) in a text (Ellinger *et al.*, 2003; Guthrie *et al.*, 2004). Also, the longitudinal design facilitates the identification of patterns and themes that emerge over time (Derrington, 2019).

### *3.1 Case selection and companies' profile*

We used a purposive sample approach to select companies from a context that highlights the dynamics we are interested in and provides sufficiently deep information (Given, 2008; Oliver, 2006). Purposive sampling is a nonprobability method where units are selected for inclusion because of their characteristics. This sampling method relies on the researcher's judgment to identify and select cases that can provide the best information for the study's aims. We selected

companies classified as climate leaders to unearth unique and rich insights into companies' Scope 3 emissions management, rather than serve as an attempt to produce statistical generalisability (Eisenhardt *et al*., 2016). One limitation of this approach is its limited external validity. However, it offers the advantage of enabling the identification of homogeneous samples whose characteristics can be more readily understood.

The first criterion for selecting our sample was manufacturing companies, given that they usually have Scope 3 emissions as its predominant category of emissions (De Stefano and Montes-Sancho, 2023). The second criterion was companies with emission reduction targets, including Scope 3 emissions verified by the Science-Based Targets Initiative (SBTi). As such, we selected companies with targets that will likely require action from other supply chain actors. The third selection criterion was companies that have achieved an A score in the CDP 2021 classification. The classification ranking used by CDP consists of six categories (A, A-, B, C, D, E), and each reflects a level of disclosure. Fourthly, we included in the sample only companies that reported to CDP at the two time points of the analysis (2018 and 2021). The two-time points were selected considering data availability and allowed us to balance a comprehensive group of companies with a gap that reflects sufficient time to develop new management practices. The last selection criterion was the geographic location: We only included companies in the European Union to ensure a homogeneous external context. European Union companies are subjected to equal public policies and similar societal pressures in climate change mitigation (Backman *et al*., 2017). The European Union has agreed to achieve climate neutrality by 2050 via the European Green Deal, which could help motivate companies to develop net-zero strategies and manage indirect emissions. Thus, our final sample contains 31 companies (Table 1).

### *3.2 Data collection*

We used a broad range of different data sources to develop a thorough understanding of companies' Scope 3 emissions management practices (Table 2). A share of the collected data comprised self-reported data from CDP questionnaires. The CDP has been a key player in climate disclosure since 2002, and its questionnaires are a complete source of public information on companies' decarbonisation strategies (Callery, 2022; Dahlmann *et al*., 2019; Backman *et al*., 2017). Moreover, we included companies' sustainability reports or integrated reports from 2018 to 2021 and any other associated documents relevant to comprehending companies' climate strategies (e.g. TCFD reports and net-zero roadmaps). We recognise that the use of secondary data has its limitations (Callery, 2022). However, the comprehensiveness of the documents utilised provided us with access to a unique set of data regarding the range and detail of companies' strategies. We sought to address this limitation by adding other data sources published by third parties, hence not self-reported by companies.

The second bulk of data included information collected from the SBTi database that includes companies' targets and whether the initiative has verified them. An additional source of data included news articles detailing companies' net-zero strategies or decarbonisation actions. We used the LexisNexis database to collect those by conducting individual searches for each company using the search string "title (*company's name*) AND net-zero OR decarbonisation" OR "Scope 3 emissions" OR "indirect emissions". We excluded duplicate entries, resulting in 266 news articles. The articles were separated into those before and those after 2018. We finally collected reports from third parties that evaluate the decarbonisation strategies of some of the analysed companies, such as the Financial Times European Climate Leaders analysis (Hawcock, 2022) and reports from the New Climate Institute (Day *et al.*, 2022, 2023). Overall, we collected 381 documents for a total of 16,680 pages in addition to two online databases.

### *3.3 Data analysis*

The material collected was uploaded to the NVivo 11 software and categorised by company and year to facilitate defining and documenting categories, codes and coded text passages. In

**Table 1.** Companies included in the analysis

| Company | Country | Sector | Turnover bn USD (2021) | No. of Employees (2021) |
|---|---|---|---|---|
| Bayer AG | Germany | Pharmaceutical | 51.3 | 99,637 |
| Borregaard AG | Norway | Chemicals | 0.7 | 1,062 |
| Carlsberg Breweries A/S | Denmark | Brewer | 10.2 | 39,375 |
| Coca-Cola HBC AG | Switzerland | Beverages | 8.1 | 26,787 |
| Compagnie Financière Richemont SA | Switzerland | Luxury goods | 21.7 | 167,816 |
| Danone | France | Food | 27.5 | 98,105 |
| Firmenich SA | Switzerland | Consumer Durables | 4.3 | 160 |
| GEA Group AG | Germany | Food, chemicals, pharma | 5.4 | 18,143 |
| Givaudan SA | Switzerland | Consumer Durables | 7.4 | 16,842 |
| Heidelberg Materials | Germany | Building materials | 21.6 | 51,209 |
| Holcim Ltd | Switzerland | Building materials | 29.4 | 69,672 |
| Kering | France | Luxury goods | 17.6 | 42,000 |
| KONE Corporation | Finland | Electrical Equipment and Machinery | 11.9 | 62,720 |
| Koninklijke Philips NV | Netherlands | Consumer Durables | 21.3 | 78,189 |
| L'Oréal | France | Consumer Durables | 36.6 | 85,412 |
| LANXESS AG | Germany | Chemicals | 8.7 | 14,866 |
| Lundbeck A/S | Denmark | Pharmaceutical | 0.3 | 161 |
| Metsä Board Corporation | Finland | Paper and forestry | 2.4 | 2,389 |
| Michelin | France | Tires | 27.1 | 124,760 |
| Novo Nordisk A/S | Denmark | Pharmaceutical | 21.5 | 47,792 |
| Pirelli | Italy | Tires | 6.4 | 30,690 |
| Saint-Gobain | France | Building materials | 50 | 167,816 |
| Salvatore Ferragamo Group | Italy | Luxury goods | 1.3 | 3,561 |
| SANOFI | France | Pharmaceutical | 44.9 | 95,442 |
| Schneider Electric | France | Electrical Equipment and Machinery | 32.9 | 147,468 |
| Signify N.V. | Netherlands | Lights | 7.8 | 36,824 |
| Sofidel S.p.A | Italy | Tissue and sanitary paper | 2.4 | 6,737 |
| Symrise AG | Germany | Consumer Durables | 4.4 | 11,151 |
| The LEGO Group | Denmark | Toys | 6.2 | 4,409 |
| Thyssenkrupp AG | Germany | Building materials | 39.8 | 101,275 |
| Vallourec | France | Mining | 3.9 | 16,685 |

**Source(s):** Bureau van Dijk (2021), Authors' own creation

coding the information, we first conducted an exploratory coding procedure on the data to collect passages that referred to a specific topic (NVivo node). After collecting several passages, the main themes that emerged from the firms' statements were grouped into distinct practices that were divided into two macro groups of upstream and downstream practices. Our data analysis followed three steps (Figure 1). The first step consisted of the identification of Scope 3 emissions management practices upstream and downstream. The analysis of the 2018 and 2021 documents was done separately, seeking to capture changes in the practices adopted. The authors worked collaboratively on data analysis, attempting to reach consensus on the different categories of management practices. Our analysis used as general guidance theoretical pre-understanding on practices used mentioned in the literature on sustainable supply chain management, while allowing new insights to inductively emerge from the data (Micheli and Muctor, 2021). An iterative process was followed where management practices identified were confronted with previous literature, seeking to find the best explanation. Since few studies focus on Scope 3 emissions management, we also confronted practices with broader literature on sustainable supply chain management, as practices could be similar.

**Table 2.** Data sources used in the content analysis

| Data | Type | N. companies[a] | N. documents | N. pages (overall) | Source |
|---|---|---|---|---|---|
| CDP Questionnaires | Self-reported | 31 | 62 | 6,275 | CDP website |
| Sustainability and Integrated Reports | Self-reported | 31 | 62 | 9,206 | Company's website |
| TCFD Reports | Self-reported | 6 | 6 | 93 | Company's website |
| Climate action focused documents | Self-reported | 14 | 14 | 288 | Company's website |
| News articles | Third-party | 31 | 266 | 752 | LexisNexis database |
| New Climate Institute reports | Third-party | 4 | 2 | 305 | New Climate Institute website |
| Financial Times European Climate Leaders analysis | Third-party | 25 | 1 | Online database | FT website[b] |
| SBTi targets | Third-party | 31 | 1 | Online database | SBTi website[c] |

**Note(s):** [a]Number of companies from our sample with the data source type., [b]https://www.ft.com/climate-leaders-europe-2022., [c]https://sciencebasedtargets.org/companies-taking-action.

**Source(s):** Authors' own creation

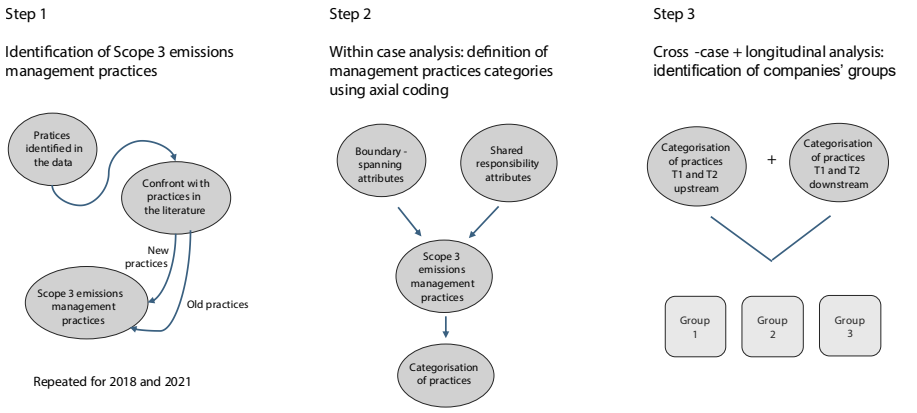



**Figure 1.** Data analysis process. Source: Authors

When our data showed a different practice, a new category of management practice was created.

The second step was a within-case analysis that used axial coding (Corbin and Strauss, 2008) to generate more abstract categories that merged different management practices. This was done by assessing the presence of boundary-spanning and shared responsibility attributes in the management practices identified. We applied attributes identified by previous studies and adapted them when necessary. For the construct of boundary-spanning, we built on the work of Jia *et al*. (2021) and started with the attributes of "shared languages and codes" and "shared values". We later added the attribute of "shared knowledge". Considering shared responsibility, we utilised Young's (2006) constructs of "power" and "privilege", as described in the literature review section. We adapted the construct of collective ability to action on problem-solving that could be done individually or collectively in our data. We did so to

capture whether companies' actions alone or with others allowed them to contribute to Scope 3 emissions reduction. Once an agreement was reached between the authors, descriptions for each category were added.

The third step incorporated the cross-case and longitudinal analysis. Pattern-matching techniques were employed within each group to identify similarities or differences in the kinds of management practices adopted upstream and downstream in the two time periods. The cross-case analysis allowed us to define three different groups considering the typology of practices adopted and how they evolve with time.

### *3.4 Validity and reliability*

To ensure the validity and reliability of our study, we followed established quality criteria adopted when conducting qualitative research (Eisenhardt, 1989; Yin, 2018). Concerning external validity, we adopted a clear sampling logic encompassing sufficient variety in the investigated context. Our sample comprised 31 companies with different products and value chains, and we had similar data sources for them all. This approach increases external validity as it mitigates the need for more generalisability, which is often a challenge in qualitative research. The consistency between the construct and its measurement (construct validity) was ensured using different data sources comprising self-reported and tertiary sources. Internal validity (i.e. ensuring that a relationship between cause and effect has been established) was strengthened by pattern matching between the a priori categories in the literature and our empirical evidence, and using different theoretical perspectives (boundary-spanning theory and social connection CSR). Reliability was created by providing as much transparency as possible in the research process. A clear sampling logic was used, and we explicitly state the companies that were analysed and the material sources (mostly publicly available and verified by third parties, e.g. sustainability report and CDP questionnaire). We have also used a transparent coding scheme and kept a record of our coding process using the software NVivo.

## 4. Results

In this section, we first identify the practices that focal firms adopt to manage Scope 3 emissions in their supply chains. Next, we will analyse when practices require boundary-spanning and if they function as a mechanism for constructing shared responsibility. Finally, we present the results of the cross-case and longitudinal analysis that examines in which conditions boundary-spanning attributes evolve and generate shared responsibility.

### *4.1 Scope 3 emissions management practices*

The Scope 3 management practices identified among the analysed companies are summarised in Table 3, which includes descriptions and specifies whether upstream, downstream or no external actors were involved. The table highlights the number of companies that adopted these practices in 2018 and 2021. The identified practices are compared with existing studies on sustainable supply chain management and Scope 3 emissions management. This double comparison was necessary to assess the novelty of practices, given the limited research specifically addressing Scope 3 emissions. The comparison demonstrates how most practices are not unique to Scope 3 emissions management, except those focused on downstream emissions, as sustainable supply chain management typically emphasises engagement with upstream actors.

A range of practices implemented upstream aimed at monitoring supplier activities, primarily through collecting information regarding their carbon performance and requirements for carbon targets. Companies evaluate their suppliers' carbon performance by gathering data independently or utilising third-party data sources. Some organisations have created proprietary platforms like Danone's Cool Farm Tool and Saint-Gobain's R-net. Alternatively, they may rely on third-party data from platforms like Ecovadis and the CDP

**Table 3.** Scope 3 emissions management practices identified

| Scope 3 management practice | Description | Actors involved | Adoption 2018 | Adoption 2021 | Identified by sustainable supply chain management studies | Identified by Scope 3 emissions management studies |
|---|---|---|---|---|---|---|
| Performance measurement | Collecting information using surveys or questionaries to evaluate performance | Upstream: suppliers | 18 | 29 | Tachizawa and Yew Wong (2014), Um and Oh (2020), Villena *et al*. (2021), Johnsen *et al*. (2022), Matinheikki *et al*. (2022), Kähkönen *et al*. (2023) | Jira and Toffel (2013), Dahlmann and Roehrich (2019), Butt *et al*. (2025), Wieland and Creutzig (2025) |
| Information collection | Gathering information related to suppliers' emissions or carbon targets from third-party sources | Upstream: suppliers | 14 | 14 | Tachizawa and Yew Wong (2014), Kähkönen *et al*. (2023) | Dahlmann and Roehrich (2019) |
| Auditing | The focal firm conducts in-loco assessments to verify if suppliers are meeting requirements and opportunities for improvement | Upstream: suppliers | 11 | 12 | Awaysheh and Klassen (2010), Tachizawa and Yew Wong (2014), Jia *et al*. (2021), Villena *et al*. (2021), Johnsen *et al*. (2022), Matinheikki *et al*. (2022), Kähkönen *et al*. (2023) | Dahlmann and Roehrich (2019) |
| Request for certifications | The focal firm requires a certification of the supplier itself or materials provided | Upstream: suppliers | 6 | 6 | Awaysheh and Klassen (2010), Tachizawa and Yew Wong (2014), Johnsen *et al*. (2022), Kähkönen *et al*. (2023) | None |
| Adoption of a code of conduct | The company elaborates a set of criteria that suppliers take a formal commitment of being compliant with, whereas the focal firm reserves the right to terminate the relationship | Upstream: suppliers | 14 | 19 | Awaysheh and Klassen (2010), Tachizawa and Yew Wong (2014), Johnsen *et al*. (2022), Kähkönen *et al*. (2023) | Dahlmann and Roehrich (2019), Butt *et al*. (2025) |

(*continued*)

**Table 3.** Continued

| Scope 3 management practice | Description | Actors involved | Adoption 2018 | Adoption 2021 | Identified by sustainable supply chain management studies | Identified by Scope 3 emissions management studies |
|---|---|---|---|---|---|---|
| Personalised consultancy | Companies will engage with key members of their value chain to provide tailored guidance on action plans to reduce their carbon emission | Upstream: key suppliers | 2 | 4 | None | None |
| Request for target adoption | The focal firm pushes suppliers to adopt climate mitigation goals aligned with the focal firm objectives | Upstream: suppliers | 6 | 12 | None | Wieland and Creutzig (2025) |
| | | Downstream: B2B clients | – | 2 | None | None |
| Conduction of workshops | The focal firm organises training workshops to exchange on best-practices and expert suggestions on how to reduce their carbon emissions | Upstream: suppliers | 8 | 15 | Tachizawa and Yew Wong (2014), Um and Oh (2020), Jia *et al*. (2021), Villena *et al*. (2021), Johnsen *et al*. (2022), Matinheikki *et al*. (2022), Kähkönen *et al*. (2023) | Dahlmann and Roehrich (2019), Butt *et al*. (2025), Wieland and Creutzig (2025) |
| | | Downstream: clients | 5 | 8 | None | None |
| Development of experimental projects | Development of projects with value chain members to reduce the carbon impact of materials, products or packaging | Upstream: Suppliers | 2 | 4 | Um and Oh (2020), Johnsen *et al*. (2022), Kähkönen *et al*. (2023) | Butt *et al*. (2025) |
| | | Downstream: B2B clients | 2 | 3 | None | None |
| Financial incentives | Use of monetary incentive systems to achieve common targets | Downstream: final consumer | – | 2 | None | None |
| Development of low-carbon products | The company develops low-carbon products that help others reduce their Scope 1 emissions | None | 17 | 25 | None | None |
| Increase products or packaging circularity | The company develops solutions related to increasing recycling rates or reconditioning of products | None | 2 | 7 | None | None |

**Source(s):** Authors' own creation

Supply Chain Program to assess supplier performance. In addition to monitoring, companies often require suppliers to set targets that align with their corporate strategies or validate them with the SBTi. Companies communicate their requirements using phrases like "ask" (L'Oréal), "proactively push" (Lundbeck) or "leverage its relationship" (Vallourec) to describe how they will encourage suppliers to adopt decarbonisation targets. This practice distinguishes itself from a collaborative goal congruence approach, which requires dialogue to establish shared objectives. In the companies analysed, similar targets often stem from requests by the focal firm rather than mutual agreement. Less frequently, this approach is also extended to B2B clients to promote the reduction of carbon emissions. L'Oréal brands actively raise awareness of the environmental issues they prioritise, including climate change and encourage key stakeholders to act.

The requirement of committing to a code of conduct, the conduction of auditing activities to confirm that companies comply with the code, and the request for certifications are other examples of actions used with suppliers. Codes of conduct are the second management practice that focal firms use more often with suppliers to formalise their commitments, and guarantee that suppliers will work towards emissions reductions. One example is the code of conduct from the Philips Supplier Sustainability Declaration that states, "Energy consumption and greenhouse gas emissions are to be tracked and documented, at the facility and/or corporate level. Participants are to look for cost-effective methods to improve energy efficiency and to minimize their energy consumption and greenhouse gas emissions".

Focal companies can conduct workshops with upstream and downstream actors. When working with suppliers, the emphasis is on sharing best practices derived from past performance measurement and auditing initiatives. Companies in direct contact with agricultural raw material suppliers (e.g. Bayer, Carlsberg, Coca-Cola and Danone) develop workshops with those focusing on optimising farming practices to reduce emissions (e.g. precision growing and efficient use of fertilisers). When collaborating with suppliers of semi-finished goods, the focus shifts to measures that enhance energy efficiency or promote the adoption of renewable energy sources. Novo Nordisk mentions "a dedicated programme where we encourage and support suppliers in implementing renewable energy and energy efficiency measures through best practice sharing and energy screenings/site visits" (Novo Nordisk CDP questionnaire, 2021). Workshops were also developed with consumers, a practice not identified by previous studies. Workshops with downstream actors focused on assisting them in better using their products or informing clients on available low-carbon solutions and how they can be used to reduce clients' carbon impact.

Measuring supplier performance is crucial for focal companies aiming to identify key suppliers regarding emissions and assess the impact of their adopted actions. By gaining a deeper understanding of their suppliers, these companies can pinpoint opportunities for collaborative action. Several organisations have reported engaging with key suppliers to co-develop action plans to reduce emissions, a new practice we refer to as *personalised consultancy*. This approach is more advanced than the traditional method of hosting workshops, as it necessitates a higher level of collaboration between the focal firm and the supplier. Schneider Electric mentions that it will elaborate action plans only with suppliers that can measure emissions and provide GHG reporting:

> To optimize efforts and resources, and maximize impact, Schneider chose to focus on its most $CO_2$ impacting suppliers (about 2% of suppliers by number ie 1,000/52,000, but 70% of supplier-related $CO_2$ emissions). Under the program, Schneider will provide tools and resources to program participants to help them set and achieve their own carbon reduction targets. Suppliers will be first encouraged to quantify their $CO_2$ emissions using the company's digital tools. Suppliers will then use that data to set goals and strategies for emissions reduction. Suppliers will also work towards their goals through decarbonization initiatives such as energy efficiency or renewables. The Zero Carbon Project will enable best practice exchange with peers and partners to access other innovative solutions for decarbonization. (Schneider Electric, CDP questionnaire, 2021).

The development of experimental projects is also done with upstream and downstream actors and covers projects seeking to reduce emissions with a very limited scope. Thyssenkrupp Oxyfuel solution is an example of an R&D project to facilitate the carbon capture needs of the cement industry. The company mentions that attempts to upscale this technology required an "unusual partnership approach between Thyssenkrupp Polysius and a customer consortium comprising no less than four major customers (Buzzi Unicem SpA – Dyckerhoff GmbH, HeidelbergCement AG, SCHWENK Zement GmbH and Co. KG and Vicat S.A.)" (Thyssenkrupp, 2024).

Schneider, Symrise, Holcim and Danone mentioned pilot projects developed to make transportation more efficient by sharing data and technical knowledge with logistics providers. An example is Symrise's development of the tool Symchronize:

> This so-called Symchronize™ [. . .] addresses order frequencies, optimizes batch sizes, full pallets and trucks as key criteria to reduce transport and distribution efforts and expenditures. We offer the usage of the Symchronize™ system to all of our customers and suppliers. Thus, we aim to reduce down- and upstream transport emissions as much as possible. (Symrise CDP questionnaire, 2021)

Coca-Cola and Salvatore Ferragamo have worked with packaging suppliers seeking to reduce emissions. Danone, L'Oréal and Givaudan mention projects developed together with farmers seeking to adopt agricultural practices that can reduce GHG emissions, such as regenerative agriculture. Givaudan mentions different projects executed by its Agronomy team based on regenerative agriculture promotion, such as the creation of a guarana "model farm" in Brazil and work with turmeric farmers in India (Givaudan, 2024; Givaudan Sustainability Report, 2021).

The new practice of *providing financial incentives* was used only with downstream actors. Holcim develops a sustainable design award with a cash prize for promoting the development of cement infrastructure with a focus on reducing $CO_2$ emissions throughout its lifecycle. Bayer has developed a program with farmers that provides financial incentives through carbon credits acquisition:

> The program's 2020/2021 season will include approximately 1,200 farmers in Brazil and the U.S. In both countries, farmers will receive assistance in implementing climate-smart agricultural practices and Bayer will acquire the carbon removals created by those practices at transparent prices. (Bayer, CDP questionnaire 2021)

Finally, two new practices targeting downstream emissions did not involve supply chain actors. Those targeted the *development of products with a lower carbon impact* and an *increased circularity of products and packages*. The Heidelberg Cement project to bind $CO_2$ to reuse it as a building material and increase the decarbonisation potential of recycled concrete (CO2-WIN, 2023) is an example of practice focusing on lowering the carbon impact. Examples of attempts to increase the circularity of products and packaging are identified in Michelin's involvement in the European project BlackCycle, which aims to create a closed loop for tires (BlackCycle, 2020) or Philips and Novo Nordisk's efforts to build an avenue for product reconditioning by developing take-back schemes for medical equipment.

### *4.2 Within case analysis*

Based on the identified Scope 3 emissions management practices, we will now analyse when practices require boundary-spanning and if they function as a mechanism for constructing shared responsibility. The boundary-spanning attributes considered include shared language and codes, shared technical knowledge and shared values. The shared responsibility attributes include power, privilege and individual or collective action in problem-solving. Figure 2 presents the upstream and downstream practices divided into four categories. We named the categories of practices internal optimisation, control of compliance, exchange and co-creation, which will be further detailed in the sequence (Table V in the supplementary material for additional quotes).

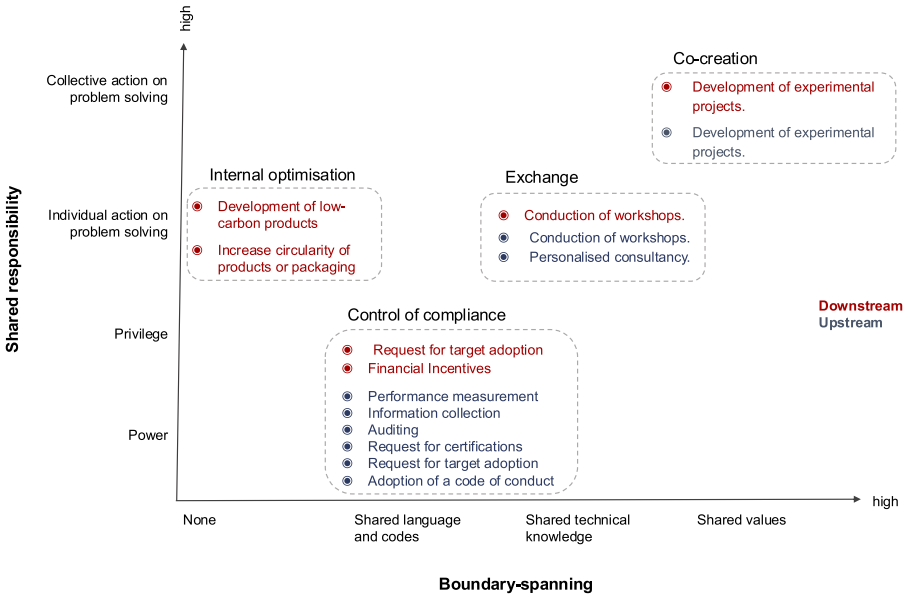



**Figure 2.** Categorisation of Scope 3 emissions management practices. Source: Authors

Internal optimisation practices refer to exclusive opportunities that only the focal firm can implement and will reduce emissions of its supply chain. The focal firm utilises its internal resources to develop solutions to lower emissions associated with its products in the downstream supply chain. One example of an exclusive opportunity is modifying product designs to enhance energy efficiency. If the focal firm neglects to make these changes, the product's energy inefficiency emissions will remain unabated. These internal optimisation practices embody some attributes of shared responsibility, as companies leverage their privileged knowledge of carbon mitigation strategies to take independent action in addressing downstream emissions. For many firms, these initiatives did not necessitate collaboration with external stakeholders; therefore, boundary-spanning was not necessary. Moreover, clients, who are crucial stakeholders in utilising these services or products, are not included in the process and a top-down approach is taken by presenting a final solution directly to them.

Control of compliance represents a category of practices that is often developed with upstream actors, though it has also been observed downstream in some cases. Upstream, the focal firm employs monitoring practices to verify that suppliers are effectively reducing carbon emissions, relying on a one-directional flow of information. In the context of downstream practices, the focal firm aims to align clients with its decarbonisation objectives and may offer incentives to clients who achieve specific targets. Overall, these practices necessitate basic boundary-spanning by establishing a common language and shared codes. However, performance measurement and certification position suppliers as subjects of assessment outside the focal firm's boundaries. This dynamic contradicts the notion of implicit belonging necessary for effective organisational boundary-spanning; when implemented in isolation, these practices can reinforce boundaries. Additionally, the sharing of responsibility is nearly absent, as focal firms continue to place the onus of emission reductions solely on other actors. While companies exercise their influence to mitigate Scope 3 emissions, they do so without sharing solutions or equipping other actors with the tools needed to address the issue; thus, they are not actively participating in problem-solving.

Management practices categorised as exchange facilitate a multi-directional flow of information, aiming to provide feedback on supplier performance and share insights on

opportunities for improvement. These practices necessitate an additional boundary-spanning attribute, specifically the sharing of technical knowledge. In terms of responsibility sharing, companies leverage their power and privilege to assist other stakeholders and engage in individual problem-solving actions. While most companies primarily implement this practice with upstream suppliers, similar collaborations also occur with downstream actors.

The last category of practices is co-creation, where the focal firm shares both tangible and intangible resources to create product or process innovation with others. Here, in addition to sharing language and codes and sharing technical knowledge, another boundary-spanning attribute that relates to shared values is present. Also, for shared responsibility, the attribute of collective action in problem solving emerges apart from power and privilege. A limited number of companies have developed co-creation practices with upstream or downstream actors. The experimental nature of co-creation means that emerging opportunities often drive these practices. While it is important for companies to develop diverse boundary-spanning attributes to co-create with supply chain partners, they utilise these capabilities if and when suitable opportunities arise. In the next section, we will delve into our longitudinal analysis by demonstrating the starting point of different clusters of companies' and how they progress or not in their categories of management practices.

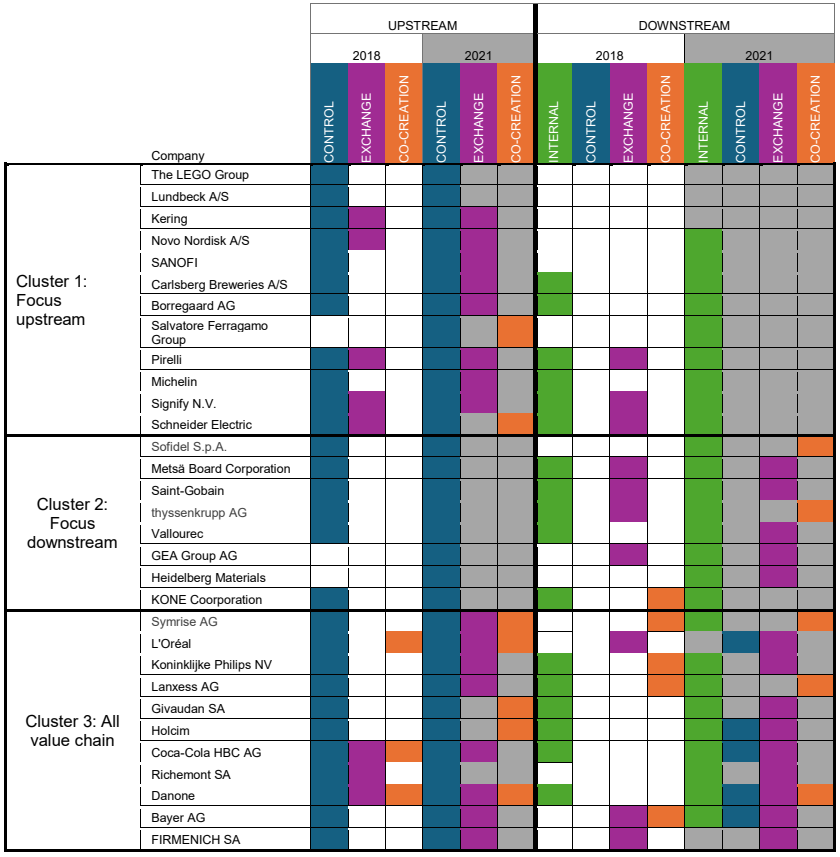
### *4.3 Cross-case and longitudinal analysis*

Three clusters of companies with a distinct sequencing of Scope 3 management practices adoption emerge when the two time periods of the analysis are observed (Table 4). In this section, we will explore the degree to which companies have engaged in boundary-spanning and examine the implications of such engagement for responsibility sharing with supply chain actors. Secondly, we will explore what common characteristics among companies that compose each cluster might explain the different types of practices adopted (please see Table VI in the supplementary material for additional quotes).

The first cluster of companies focuses on managing upstream Scope 3 emissions. They initially adopt control of compliance and exchange practices upstream. They progress by maintaining upstream practices and adding co-creation ones. Downstream practices are kept limited to internal ones in both periods. Companies in this cluster develop boundary-spanning attributes only with upstream actors, but share responsibility with actors upstream and downstream. The lack of practices that require boundary-spanning with downstream actors might be related to the typology of products from those companies, which creates fewer opportunities to reduce emissions related to usage or disposal that represent marginal sources of emissions. A few companies in this group with downstream emissions as a primary source have engaged with exchange practices in 2018 with clients, but those were not reported in 2021 (Pirelli, Signify and Schneider Electric). This drawback further hints at companies' limited capacity to achieve results in downstream emissions management through engagement with actors. Instead, considering upstream networks, those companies have higher horizontal (number of direct suppliers of the focal firms, Sharma *et al.*, 2020) and vertical complexity (number of supply chain tiers, Sharma *et al.*, 2020), meaning that the diversity of actors in their supply chains can also provide them with different opportunities to tackle operational emissions from suppliers by sharing their technical knowledge. Control of compliance practices works as an opportunity for companies to know their suppliers better and recognise how they can indeed contribute to problem-solving. For instance, auditing can act as an opportunity to develop other kinds of engagement practices with suppliers, which require new boundary-spanning attributes. Kering mentions that after developing a series of audits with suppliers, they identified a range of simple changes that could reduce energy costs and GHG emissions, which were then shared through workshops:

> The initial audits from the Clean-By-Design programme, conducted in 2014 and 2015, identified simple changes that could reduce energy costs and greenhouse gas emissions of suppliers, mostly weaving mills, and printing and dyeing workshops by 15% to 25% without affecting production, and with a return on investment in less than five years. (Kering, CDP questionnaire 2018)

**Table 4.** Longitudinal and cross-case analysis of Scope 3 emissions management practices




**Source(s):** Authors' own creation

The second cluster of companies focuses on managing Scope 3 emissions downstream and is mostly composed of B2B manufacturing companies. Their engagement with upstream emissions is limited to control of compliance practices, which do not create a shared responsibility setting despite requiring a moderate level of boundary-spanning. This choice is likely related to the lower complexity upstream and the limited, readily available opportunities to contribute to suppliers' emissions management. In the case of Clusters 1 and 3, suppliers might likely profit from energy efficiency improvements guided by focal firms; here, suppliers are raw material providers, who require a complete technological change for reducing emissions. Sharing responsibility with those actors requires co-creation, which becomes a more complex task. Downstream, instead, companies maintained the adoption of internal and external practices during the analysed period. They also developed boundary-spanning attributes with downstream actors, which enhances their focus on responsibility sharing with those. The downstream focus is likely related to the higher carbon impact of usage and disposal of those companies' products, meaning that clients are highly interested in solutions that can assist in their decarbonisation process. The interest of clients in products with a low-carbon impact also means that opportunities to exchange knowledge and, as a consequence, share the responsibility for the management of those emissions are more frequent.

The third cluster comprises companies that develop Scope 3 emissions management practices across the supply chain, developing boundary-spanning attributes and creating a shared responsibility setting both upstream and downstream. They start by adopting control of compliance practices upstream and internal practices downstream. Boundary-spanning efforts are then extended to develop exchange and co-creation practices upstream, with the last kind being present more often than in other groups. This means shared responsibility with upstream actors occurs more often in this cluster. Downstream practices also tap on boundary-spanning attributes and expand to include exchange and, in some cases, control of compliance, which is only present in this group. Control of compliance practices downstream was adopted by companies with retailers as part of their clients and a strong brand image (L'òreal, Danone, Holcim, Coca-Cola and Bayer). This signals the potential stability of client relationships that allows companies to develop such control of compliance practices.

## 5. Discussion

Our study analysed under which conditions boundary-spanning functions as a mechanism for creating shared responsibility. In the following, we will first discuss when relational efforts required by boundary-spanning result in responsibility sharing. After, we will unpack further those mechanisms by exploring in which conditions companies are able to adopt boundary-spanning practices that lead to shared responsibility with upstream or downstream actors.

Integrating shared responsibility and boundary-spanning when analysing Scope 3 emissions management disentangles the potential systemic impact of practices and the relational effort it requires. A key analytical insight from our analysis is that even if companies acknowledge their social connection to Scope 3 emissions and engage in boundary-spanning efforts with supply chain actors, it does not inherently result in shared responsibility. For instance, practices related to control of compliance (e.g. establishing a code of conduct or conducting audit activities) require boundary-spanning efforts but do not create shared responsibility. Internal practices related to product development, instead, often do not necessitate boundary-spanning efforts, yet can enable companies to share responsibility with their supply chains. This distinction highlights that, in these cases, the intensity of boundary-spanning efforts does not necessarily relate to outcomes of shared responsibility.

Analysed companies often could not share responsibility with both upstream and downstream supply chain actors. We will explore how supply chain structural conditions may interfere with companies' boundary-spanning capacity and shared responsibility outcomes. Starting from upstream emissions, effective management requires a minimum level of boundary-spanning by communicating standards and expectations that allow the

establishment of shared language and codes (Schotter *et al*., 2017). According to De Stefano and Montes-Sancho (2023), managing Scope 3 emissions in complex vertical supply chains necessitates written guidelines to reduce equivocality. Consequently, all companies start with some level of boundary-spanning to ensure their standards are effectively communicated and enforced among first-tier suppliers and beyond; however, this does not create a shared responsibility setting. Horizontal complexity seems to play a role in allowing companies to advance boundary-spanning and share responsibility. Previous studies have exposed how horizontal complexity can serve as a valuable source of information regarding best practices in sustainable supply chain management (De Stefano and Montes-Sancho, 2023; Falcone *et al*., 2024). Our findings also indicate that access to information on best practices through audits encourages companies to implement information exchange practices (e.g. conducting workshops). Thus, focal companies exposed to horizontal complexity are particularly well-equipped to share effective practices and knowledge from more advanced actors with those at earlier stages in their decarbonisation efforts, ultimately enhancing their boundary-spanning mechanisms and shared responsibility.

Previous studies have primarily examined how companies engage with upstream suppliers to manage sustainability challenges (Butt *et al*., 2025; Lintukangas *et al*., 2022; Marttinen and Kähkönen, 2022; Jia *et al*., 2021). However, our findings reveal that B2B companies (Cluster 2) with lower upstream complexity place greater emphasis on reducing downstream Scope 3 emissions. The reduced complexity of their upstream supply chains and their closer relationships with carbon-intensive raw material suppliers restrict the opportunities for focal firms to transfer actionable knowledge, as the so-called low-hanging fruit opportunities tend to be less impactful or unavailable. This indicates that cultivating boundary-spanning attributes necessary for sharing responsibility may require more significant relational and economic investments to co-create solutions than the other two company clusters (1 and 3), ultimately limiting engagement. Consequently, these companies have concentrated on sharing responsibility primarily with downstream partners. Downstream engagement becomes preferable as it is less subject to complicated trade-offs, as companies address their clients' problems, which can yield immediate economic returns, without requirements for elaborated boundary-spanning relational efforts.

Finally, additional structural and relational assumptions can explain under what conditions boundary-spanning enables companies to share responsibility with both upstream and downstream partners. Companies that successfully cultivate boundary-spanning attributes throughout the supply chain often occupy influential positions, serving as central players within those networks (Malacina *et al*., 2025; Lintukangas *et al*., 2022; Marttinen and Kähkönen, 2022). Holding a central position, such as companies with a higher level of betweenness centrality as defined by Borgatti and Li (2009), affords organisations greater visibility into management practices utilised across supply chains and helps them identify fruitful opportunities to engage in boundary-spanning activity that will create responsibility sharing. Further evidence of their enhanced influence is reflected in their adoption of control of compliance practices with downstream partners, a strategy other groups of companies have not pursued. Another important structural aspect is these companies' exposure to end consumers, highlighting their social connectedness to Scope 3 emissions to stakeholders. Stakeholder pressures to engage in Scope 3 emissions management may also be a potent incentive for developing practices across the supply chain (Malacina *et al*., 2025; Damert *et al*., 2017; Lintukangas *et al*., 2022).

### *5.1 Theoretical implications*

The use of social connectedness CSR and boundary-spanning in the context of Scope 3 emissions management provided opportunities to refine assumptions of both theories. Social connectedness CSR posits that shared responsibility can only be achieved through collective action (Schrempf, 2012; Young, 2006). However, our findings indicate that a company can

share responsibility with downstream actors without necessarily engaging in collective efforts or boundary-spanning. When companies proactively work to develop products or solutions aimed at reducing downstream carbon impacts, they assume responsibility for emissions that their customers may generate, even in the absence of boundary spanning. The absence of boundary-spanning also makes it easier in terms of relational effort for companies to share responsibility with downstream actors compared to upstream ones. Although boundary-spanning is not a prerequisite for responsibility sharing in the context of downstream emissions, it can enhance the process by facilitating opportunities for mutual learning (e.g. by co-creating solutions with customers).

This study also enhances understanding of organisational boundary-spanning capacity in sustainable supply chain management. Boundary-spanning states that companies must manage their boundaries with those of external organisations critical to their value creation process when facing complex, changing environments and different stakeholders' requests (Aldrich and Herker, 1977; Zhang *et al*., 2011). While our findings demonstrate that management practices with boundary-spanning attributes can be developed with both upstream and downstream actors, many companies engage in boundary-spanning only in one direction of the supply chain. This suggests that boundary-spanning may not always be feasible or desirable with all supply chain participants. We have explored how a company's capacity or willingness to engage in boundary-spanning across supply chains can be related to structural complexity. Supply chain structural complexity works as a proxy for higher company influence or visibility, both from outside the supply chain and within the supply chain. Overall, in the current early stage of companies' engagement with Scope 3 management, supply chain complexity seems to provide companies with more opportunities to engage in boundary-spanning activities that result in responsibility sharing.

Finally, introducing the shared responsibility construct adds a new dimension to the prevailing *chain-liability effect* approach (Hartmann and Moeller, 2014). While the chain-liability approach views controlling compliance and exchanging information as equally valid ways for a focal company to address its share of responsibility, shared responsibility emphasises that not all relational activities have the same impact and that some can yield broader implications. Relying solely on the power of focal companies by using control of compliance practices can hinder the creation of a genuinely shared responsibility setting. Prior studies show that cascading requirements down the supply chain, with limited action by focal firms themselves, often leads to unintended consequences such as ineffective private regulation (Villena *et al*., 2021) or policing mechanisms (Soundararajan and Brown, 2016). Moreover, focusing only on Scope 3 compliance may enable free-riding, as firms reduce their own efforts when perceiving progress from their partners (Falcone *et al*., 2024). Thus, responsibility sharing through collective individual action in problem-solving when managing sustainability issues in supply chains becomes key to alleviate power asymmetries and avoiding disengagement of actors from their share of responsibility.

### *5.2 Managerial and policy implications*

As a significant portion of manufacturing companies' carbon emissions originates from Scope 3 categories, it is crucial to incorporate these into decarbonisation strategies. Three main insights can be shared with managers. Firstly, companies with many suppliers should use these connections to exchange information and co-develop low-carbon solutions, fostering a culture of shared responsibility. Secondly, companies need to balance efforts in monitoring suppliers with other types of practices. Simply investing broadly in tracking supplier performance or collecting compliance data may not create the desired emissions reductions. Managers should balance their engagement in monitoring activities with opportunities to exchange information and co-create to increase their impact. Finally, embracing downstream opportunities (e.g. related to product use and end-of-life) can be a starting point to generate shared responsibility without requiring complex coordination across the supply chain.

For policymakers, our findings suggest that a chain-liability approach has limits when addressing diffused sustainability issues. Policies based on extending the company's liability to supply chain impacts need to match responsibility extension with companies' capacity to influence their supply chains. This is required to reduce the risks of greenwashing and enhance real decarbonisation outcomes. For instance, when considering upstream emissions, policies encouraging cooperation and joint initiatives among supply chain actors may deliver better results than top-down private regulation (e.g. orchestrators in the study of Malacina *et al*., 2025). Moreover, focal firms are in a better position to take responsibility for emissions that are closely linked to their activities, such as those occurring during product use and at the end of the product's life, where they can implement changes to avoid those.

### *5.3 Concluding remarks: limitations and future research*

This study has limitations that warrant consideration. Firstly, this study focused on manufacturing companies. Future research can examine the management of indirect emissions within service-oriented sectors such as finance. Secondly, the reliance on CDP questionnaires and self-reported data introduces concerns regarding the completeness and accuracy of the information collected. While these questionnaires are subjected to verification processes and are intended to reflect the actions of companies, they may present only a partial perspective. Additionally, despite employing two temporal periods to analyse changes and the evolution of boundary-spanning practices, our study could not ascertain the specific impact of various management practices on emissions reductions. Scope 3 emissions data are predominantly derived from estimations, and the inventories often exhibit variations in total emissions across different periods due to factors such as the inclusion of new Scope 3 categories or alterations in calculation methodologies. Consequently, the reliability of the data precludes conclusive inferences regarding the efficacy of diverse management practices.

Future research can adopt alternative methodological approaches, such as in-depth case studies. Investigating companies' practices in greater detail could better elucidate the information flows facilitated by boundary-spanning activities. While the current focus emphasises the transfer of information from companies to external entities, it remains uncertain to what extent companies might learn from others or leverage such interactions to defer action.

Quantitative methodologies may also offer valuable insights into the role of supply chain complexity within sustainable supply chain management, serving as either an alternative or a complementary perspective to power dynamics. Our findings suggest that supply chain complexity can foster responsibility sharing by generating increased opportunities to exchange useful information. Subsequent research could leverage supply network data to assess the influence of network structure on the adoption of exchange and co-creation practices. Lastly, extending the duration of longitudinal analyses in future studies, once additional data become available, could significantly enhance the robustness of findings in this area.

**Supplementary material**

The supplementary material for this article can be found online.

**References**

Acquier, A., Valiorgue, B. and Daudigeos, T. (2017), "Sharing the shared value: a transaction cost perspective on strategic CSR policies in global value chains", *Journal of Business Ethics*, Vol. 144 No. 1, pp. 139-152, doi: 10.1007/s10551-015-2820-0.

Aldrich, H. and Herker, D. (1977), "Boundary spanning roles and organization structure", *Academy of Management Review*, Vol. 2 No. 2, pp. 217-230, doi: 10.2307/257905.

Awaysheh, A. and Klassen, R.D. (2010), "The impact of supply chain structure on the use of supplier socially responsible practices", *International Journal of Operations and Production Management*, Vol. 30 No. 12, pp. 1246-1268, doi: 10.1108/01443571011094253.

Backman, C.A., Verbeke, A. and Schulz, R.A. (2017), "The drivers of corporate climate change strategies and public policy: a new resource-based view perspective", *Business and Society*, Vol. 56 No. 4, pp. 545-575, doi: 10.1177/0007650315578450.

BlackCycle (2020), "A major European project for recycling end-of-life tyres into new tyres", available at: https://blackcycle-project.eu/.

Borgatti, S.P. and Li, X. (2009), "ON social network analysis in a supply chain context", *Journal of Supply Chain Management*, Vol. 45 No. 2, pp. 5-22, doi: 10.1111/j.1745-493X.2009.03166.x.

Butt, A.S., Alghababsheh, M., Sindhwani, R. and Gwalani, H. (2025), "Role of supplier engagement to reduce scope 3 emissions in circular supply chains", *Business Strategy and the Environment*, Vol. 34 No. 1, pp. 598-611, doi: 10.1002/bse.3994.

Callery, P.J. (2022), "The influence of strategic disclosure on corporate climate performance ratings", *Business and Society*, Vol. 62 No. 5, pp. 950-988, doi: 10.1177/00076503221115715.

Chakkol, M., Karatzas, A., Johnson, M. and Godsell, J. (2018), "Building bridges: boundary spanners in servitized supply chains", *International Journal of Operations and Production Management*, Vol. 38 No. 2, pp. 579-604, doi: 10.1108/IJOPM-01-2016-0052.

CO2-WIN (2023), "Funded projects on CO2-utilization", available at: https://co2-utilization.net/en/projects/

Corbin, J. and Strauss, A. (2008), "Basics of qualitative research", in *Techniques and Procedures for Developing Grounded Theory*, 3rd ed., SAGE Publications, doi: 10.4135/9781452230153.

Dahlmann, F. and Roehrich, J.K. (2019), "Sustainable supply chain management and partner engagement to manage climate change information", *Business Strategy and the Environment*, Vol. 28 No. 8, pp. 1632-1647, Article 8 doi: 10.1002/bse.2392.

Dahlmann, F., Branicki, L. and Brammer, S. (2019), "Managing carbon aspirations: the influence of corporate climate change targets on environmental performance", *Journal of Business Ethics*, Vol. 158, pp. 1-24, doi: 10.1007/s10551-017-3731-z.

Dahlmann, F., Brammer, S. and Roehrich, J.K. (2023), "Navigating the "performing-organizing" paradox: tensions between supply chain transparency, coordination, and scope 3 GHG emissions performance", *International Journal of Operations and Production Management*, Vol. 43 No. 11, pp. 1757-1780, doi: 10.1108/ijopm-09-2022-0622.

Damert, M., Paul, A. and Baumgartner, R.J. (2017), "Exploring the determinants and long-term performance outcomes of corporate carbon strategies", *Journal of Cleaner Production*, Vol. 160, pp. 123-138, doi: 10.1016/j.jclepro.2017.03.206.

Day, T., Mooldijk, S., Hans, F., Smit, S., Posada, E., Skribbe, R., Woollands, S., Fearnehough H., Kuramochi, T., Warnecke, C., Kachi, A. and Hohne, N. (2023), "Corporate climate responsibility monitor 2023: assessing the transparency and integrity of companies' emission reduction and net- zero targets", *New Climate Institute*, available at: http://newclimate.org/publications/

Day, T., Mooldijk, S., Smit, S., Posada, E., Hans, F., Fearehough, H., Kachi, A. Warnecke, C., Kuramochi, T. and Hohne, N. (2022), "Corporate climate responsibility monitor 2022: assessing the transparency and integrity of companies' emission reduction and net-zero targets", *New Climate Institute*, available at: http://newclimate.org/publications/

De Stefano, M.C. and Montes-Sancho, M.J. (2023), "Complex supply chain structures and multi-scope GHG emissions: the moderation effect of reducing equivocality", *International Journal of Operations and Production Management*, Vol. 44 No. 5, pp. 952-986, doi: 10.1108/ijopm-11-2022-0759.

Derrington, M.L. (2019), "The benefits and challenges of longitudinal qualitative studies", in *Qualitative Longitudinal Methods: Researching Implementation and Change*, doi: 10.4135/9781071814277.n1.

Dooley, K.J., Pathak, S.D., Kull, T.J., Wu, Z., Johnson, J. and Rabinovich, E. (2019), "Process network modularity, commonality, and greenhouse gas emissions", *Journal of Operations Management*, Vol. 65 No. 2, pp. 93-113, doi: 10.1002/joom.1007.

Eisenhardt, K.M. (1989), "Building theories from case study research", *Academy of Management Review*, Vol. 14 No. 4, pp. 532-550, doi: 10.2307/258557.

Eisenhardt, K.M., Graebner, M.E. and Sonenshein, S. (2016), "Grand challenges and inductive methods: rigor without rigor mortis", *Academy of Management Journal*, Vol. 59 No. 4, pp. 1113-1123, doi: 10.5465/amj.2016.4004.

Ellinger, A.E., Lynch, D.F., Andzulis, J.K. and Smith, R.J. (2003), "B-to-b e-commerce: a content analytical assessment of motor carrier websites", *Journal of Business Logistics*, Vol. 24 No. 1, pp. 199-220, doi: 10.1002/j.2158-1592.2003.tb00037.x.

Ellram, L.M. and Tate, W.L. (2025), "Impact pathways: a call for impactful research in supply chain GHG emissions reduction", *International Journal of Operations and Production Management*, Vol. 45 No. 1, pp. 236-245, doi: 10.1108/IJOPM-07-2023-0574.

Enderwick, P. (2018), "The scope of corporate social responsibility in networked multinational enterprises", *International Business Review*, Vol. 27 No. 2, pp. 410-417, doi: 10.1016/j.ibusrev.2017.09.008.

European Commission (2024), "Directive (EU) 2024/1760 of 13 June 2024 on corporate sustainability due diligence and amending directive (EU) 2019/1937 and regulation (EU) 2023/2859", *Official Journal of the European Union L*, Vol. 1760, 5 July 2024, available at: https://eur-lex.europa.eu/eli/dir/2024/1760/oj/eng

Falcone, E.C., Yan, T. and Fugate, B.S. (2024), "Follow-suit or free-ride? A relational view of CSR diffusion in a supply chain with customer–supplier closure", *Journal of Operations Management*, Vol. 70 No. 6, pp. 979-1006, doi: 10.1002/joom.1319.

Farsan, A., Chang, A., Kerkhof, A., Cserna, B., Yan, C., Villasana, F.R. and Labutong, N. (2018), "Best practices in scope 3 greenhouse gas management: Value change in the value chain (version 3.0)", *Science Based Targets Initiative, Navigant, and Gold Standard*, available at: https://files.sciencebasedtargets.org/production/files/SBT_Value_Chain_Report-1.pdf?dm=1734357612

Givaudan (2024), "Soils: where food begins", available at: https://www.givaudan.com/sustainability/soils-where-food-begins

Given, L.M. (2008), *The SAGE Encyclopedia of Qualitative Research Methods*, Sage, Vols 1-0, doi: 10.4135/9781412963909.

Guthrie, J., Petty, R., Yongvanich, K. and Ricceri, F. (2004), "Using content analysis as a research method to inquire into intellectual capital reporting", *Journal of Intellectual Capital*, Vol. 5 No. 2, pp. 282-293, doi: 10.1108/14691930410533704.

Hartmann, J. and Moeller, S. (2014), "Chain liability in multitier supply chains? Responsibility attributions for unsustainable supplier behavior", *Journal of Operations Management*, Vol. 32 No. 5, pp. 281-294, doi: 10.1016/j.jom.2014.01.005.

Hawcock, N. (2022), *Europe's Climate Leaders 2022: Interactive Listing*, Financial Times, available at: https://www.ft.com/climate-leaders-europe-2022

Jia, M., Stevenson, M. and Hendry, L.C. (2021), "The boundary-spanning role of first-tier suppliers in sustainability-oriented supplier development initiatives", *International Journal of Operations and Production Management*, Vol. 41 No. 11, pp. 1633-1659, doi: 10.1108/IJOPM-12-2020-0856.

Jira, C., Fern and Toffel, M.W. (2013), "Engaging supply chains in climate change", *Manufacturing and Service Operations Management*, Vol. 15 No. 4, pp. 559-577, doi: 10.1287/msom.1120.0420.

Johnsen, T.E., Caniato, F., Meqdadi, O. and Miandar, T. (2022), "Swimming against the tide: supplier bridging roles in diffusing sustainability upstream and downstream in supply networks", *International Journal of Operations and Production Management*, Vol. 42 No. 10, pp. 1605-1629, doi: 10.1108/ijopm-02-2022-0110.

Kähkönen, A.-K., Marttinen, K., Kontio, A. and Lintukangas, K. (2023), "Practices and strategies for sustainability-related risk management in multi-tier supply chains", *Journal of Purchasing and Supply Management*, Vol. 29 No. 3, 100848, doi: 10.1016/j.pursup.2023.100848.

Kistruck, G.M. and Slade Shantz, A. (2022), "Research on grand challenges: adopting an abductive experimentation methodology", *Organization Studies*, Vol. 43 No. 9, pp. 1479-1505, doi: 10.1177/01708406211044886.

Lim, A. and Pope, S. (2020), "Three types of organizational boundary spanning: predicting CSR policy extensiveness among global consumer products companies", *Business Ethics: A European Review*, Vol. 29 No. 3, pp. 451-470, doi: 10.1111/beer.12266.

Lin, C., Kuei, C.H. and Chai, K.W. (2013), "Identifying critical enablers and pathways to high performance supply chain quality management", *International Journal of Operations and Production Management*, Vol. 33 No. 3, pp. 347-370, doi: 10.1108/01443571311300818.

Lintukangas, K., Arminen, H., Kähkönen, A.-K. and Karttunen, E. (2022), "Determinants of supply chain engagement in carbon management", *Journal of Business Ethics*, Vol. 186 No. 1, pp. 87-104, doi: 10.1007/s10551-022-05199-7.

Malacina, I., Kimpimäki, J., Arminen, H. and Zehendner, A. (2025), "Decoupling firm growth from carbon emissions: a supply network role perspective", *Journal of Operations Management*, Vol. 71 No. 8, pp. 1087-1248, doi: 10.1002/joom.70008.

Marrone, J.A. (2010), "Team boundary spanning: a multilevel review of past research and proposals for the future", *Journal of Management*, Vol. 36 No. 4, pp. 911-940, doi: 10.1177/0149206309353945.

Marttinen, K. and Kähkönen, A.-K. (2022), "Fostering firms' ability to cascade sustainability through multi-tier supply chains: an investigation of power sources", *International Journal of Operations and Production Management*, Vol. 42 No. 8, pp. 1146-1172, doi: 10.1108/IJOPM-11-2021-0739.

Matinheikki, J., Kauppi, K., Brandon–Jones, A. and van Raaij, E.M. (2022), "Making agency theory work for supply chain relationships: a systematic review across four disciplines", *International Journal of Operations and Production Management*, Vol. 42 No. 13, pp. 299-334, doi: 10.1108/IJOPM-12-2021-0757.

Micheli, P. and Muctor, G. (2021), "The roles of performance measurement and management in the development and implementation of business ecosystem strategies", *International Journal of Operations and Production Management*, Vol. 41 No. 11, pp. 1761-1784, doi: 10.1108/IJOPM-05-2021-0317.

Nava, L., Chiapetti, J., da Rocha, R.B. and Tampe, M. (2025), "Die now of hunger or later of thirst: understanding climate change adaptation decisions in vulnerable contexts", *Strategic Management Journal*, Vol. 46 No. 8, pp. 1861-1893, doi: 10.1002/smj.3709.

Oliver, P. (2006), *The SAGE Dictionary of Social Research Methods*, SAGE Publications, Vols 1-0, doi: 10.4135/9780857020116.

Phillips, R. and Schrempf-Stirling, J. (2022), "Young's social connection model and corporate responsibility", *Philosophy of Management*, Vol. 21 No. 3, pp. 315-336, doi: 10.1007/s40926-021-00174-0.

Schotter, A.P.J., Mudambi, R., Doz, Y.L. and Gaur, A. (2017), "Boundary spanning in global organizations: boundary spanning in global organizations", *Journal of Management Studies*, Vol. 54 No. 4, pp. 403-421, doi: 10.1111/joms.12256.

Schrempf, J. (2012), "The delimitation of corporate social responsibility: upstream, downstream, and historic CSR", *Business and Society*, Vol. 51 No. 4, pp. 690-707, doi: 10.1177/0007650312446734.

Sharma, A., Pathak, S., Borah, S.B. and Adhikary, A. (2020), "Is it too complex ? The curious case of supply network complexity and focal firm innovation", *Journal of Operations Management*, Vol. 26 Nos 7-8, pp. 839-865, doi: 10.1002/joom.1067.

Soundararajan, V. and Brammer, S. (2018), "Developing country sub-supplier responses to social sustainability requirements of intermediaries: exploring the influence of framing on fairness

perceptions and reciprocity", *Journal of Operations Management*, Vols 58-59 No. 1, pp. 42-58, doi: 10.1016/j.jom.2018.04.001.

Soundararajan, V. and Brown, J.A. (2016), "Voluntary governance mechanisms in global supply chains: beyond CSR to a stakeholder utility perspective", *Journal of Business Ethics*, Vol. 134 No. 1, pp. 83-102, doi: 10.1007/s10551-014-2418-y.

Soundararajan, V., Khan, Z. and Tarba, S.Y. (2018), "Beyond brokering: sourcing agents, boundary work and working conditions in global supply chains", *Human Relations*, Vol. 71 No. 4, pp. 481-509, doi: 10.1177/0018726716684200.

Tachizawa, E. and Yew Wong, C. (2014), "Towards a theory of multi-tier sustainable supply chains: a systematic literature review", *Supply Chain Management: International Journal*, Vol. 19 Nos 5/6, pp. 643-663, doi: 10.1108/SCM-02-2014-0070.

Thyssenkrupp (2024), "Oxyfuel makes the cement industry greener", available at: https://www.thyssenkrupp.com/en/stories/sustainability-and-climate-protection/oxyfuel-makes-the-cement-industry-greener

Um, K.-H. and Oh, J.-Y. (2020), "The interplay of governance mechanisms in supply chain collaboration and performance in buyer–supplier dyads: substitutes or complements", *International Journal of Operations and Production Management*, Vol. 40 No. 4, pp. 415-438, doi: 10.1108/IJOPM-07-2019-0507.

Vieira, L.C., Longo, M. and Mura, M. (2024), "Impact pathways: the hidden challenges of scope 3 emissions measurement and management", *International Journal of Operations and Production Management*, pp. 326-334, doi: 10.1108/IJOPM-01-2024-0049.

Villena, V.H. and Dhanorkar, S. (2020), "How institutional pressures and managerial incentives elicit carbon transparency in global supply chains", *Journal of Operations Management*, Vol. 66 No. 6, pp. 697-734, Article 6, doi: 10.1002/joom.1088.

Villena, V.H., Wilhelm, M. and Xiao, C. (2021), "Untangling drivers for supplier environmental and social responsibility: an investigation in philips Lighting's Chinese supply chain", *Journal of Operations Management*, Vol. 67 No. 4, pp. 476-510, doi: 10.1002/joom.1131.

Wieland, A. and Creutzig, F. (2025), "Taking academic ownership of the supply chain emissions discourse", *Journal of Supply Chain Management*, Vol. 61 No. 1, pp. 3-13, doi: 10.1111/jscm.12338.

WRI (2011), "Corporate value chain (scope 3) accounting and reporting standard", available at: https://ghgprotocol.org/standards/scope-3-standard

Yin, R.K. (2018), *Case Study Research: Design and Methods*, 6th ed., SAGE Publications, London.

Young, I.M. (2006), "Responsibility and global justice: a social connection model", *Social Philosophy and Policy*, Vol. 23 No. 1, pp. 102-130, doi: 10.1017/s0265052506060043.

Zhang, C., Viswanathan, S. and Henke, J.W. (2011), "The boundary spanning capabilities of purchasing agents in buyer–supplier trust development", *Journal of Operations Management*, Vol. 29 No. 4, pp. 318-328, doi: 10.1016/j.jom.2010.07.001.

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