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Swimming against the tide: supplier bridging roles in diffusing sustainability upstream and downstream in supply networks

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Swimming Against the Tide: Supplier Bridging Roles in Diffusing Sustainability Upstream and Downstream in Supply Networks

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ABSTRACT

Purpose

This paper investigates the bridging role of first-tier suppliers in diffusing sustainability in supply networks and how this role is facilitated by the procurement function.

Design/methodology/approach

The paper is based on an embedded case study of two supply networks of a coffee beans roasting company. The embedded cases focus on coffee beans and packaging supply networks.

Findings

The findings reveal less than expected involvement of the focal company and its procurement function in sustainability implementation with first-tier suppliers. Instead, sustainability diffuses upstream to lower-tier suppliers but also downstream – against the tide - as a result of the various bridging roles performed by first-tier suppliers.

Originality

This paper shows that sustainability diffusion to lower-tier suppliers is possible in the absence of focal company procurement involvement when bridging roles are undertaken by first-tier suppliers and their procurement functions are involved in the implementation process. These bridging roles facilitate sustainability diffusion both upstream and downstream.

Research limitations/implications

This paper provides two theoretical contributions. First, it contributes to the sustainable supply network management literature by providing rich insights on sustainability diffusion to lower-tier suppliers and the role of first-tier suppliers in this process. Second, the paper contributes to structural hole theory by revealing a typology of bridging roles that actors, such as suppliers, undertake in the sustainability context.

Practical implications

The paper provides managers with practical insights on how sustainability can be diffused in the supply network and the different roles that first-tier suppliers can play in this direction.

Keywords: supply network, sustainability diffusion, procurement, bridging role, first-tier suppliers

INTRODUCTION

While sustainability risks frequently stem from sub-tier suppliers (Wilhelm *et al.*, 2016; Villena and Gioia, 2018), a critical challenge for companies is to diffuse sustainability from the focal company through supply networks using individual supplier relationships as conduits (Meqdadi *et al.*, 2019). Sustainability diffusion (Tate *et al.*, 2013) refers to the process by which sustainability initiatives or practices are cascaded to and are adopted by supply network actors from one tier to the next (Villena, 2019). Companies can do this through different practices. Much attention has been paid to the use of codes of conduct and certifications (Wilhelm *et al.*, 2016) in the supplier selection process, while other research has focused on supplier monitoring through audits or self-assessment questionnaires (Villena, 2019) as well as developmental or collaborative approaches (Gimenez and Tachizawa, 2012).

Research has begun to examine various contingency factors, such as the role of information transparency and incentives (Wilhelm *et al.*, 2016) and the willingness of first-tier suppliers to transmit focal company sustainability practices (Meqdadi *et al.*, 2020). The effective diffusion of sustainability across supply networks requires the transmission or relay of sustainability requirements through individual buyer-supplier relationships from one tier to the next (Meqdadi

et al., 2019). Although previous research has pointed to the role of first-tier suppliers in facilitating or hindering sustainability diffusion into supply networks (Wilhelm *et al.*, 2016; Meqdadi *et al.*, 2020), there is limited evidence on how first-tier suppliers can act as relay points or bridges to cascade the sustainability practices of focal companies to lower-tier suppliers.

Research has also begun to investigate the facilitating role of the procurement function of companies in diffusing sustainability to suppliers. Hollos *et al.* (2012) and Yu *et al.* (2017) found that procurement involvement in sustainability can increase performance, and focusing on sustainability diffusion, Villena (2019) found procurement to be a missing link in transmitting or cascading sustainability across tiers. Aiming to elaborate on our current understanding of how procurement can facilitate the bridging role of first-tier suppliers in diffusing sustainability in supply networks, we seek to answer the following research questions:

- 1) *How does the supplier bridging role facilitate sustainability diffusion to lower-tier suppliers?*
- 2) *What is the role of focal company procurement functions in managing the bridging role of first-tier suppliers in diffusing sustainability in supply networks?*

The paper is based on an embedded case study of two supply networks of a coffee beans roasting company. The embedded cases focus on coffee beans and packaging supply networks and involves a focal coffee beans roasting company, coffee beans traders, packaging suppliers and non-governmental organisations (NGOs). The coffee beans industry is a very relevant industry to study sustainability diffusion in supply networks because it is a global commodity with production taking place in rural areas, often underdeveloped, and exported worldwide, with a number of sustainability challenges, involving e.g., working conditions and environmental impact of farming and packaging. Structural hole theory (Burt, 1992) was deployed to reveal the bridging roles of first-tier suppliers and the facilitating role of procurement in diffusing sustainability practices of the focal company into supply networks.

This paper contributes to sustainable supply network management by demonstrating the bridging role of first-tier suppliers in diffusing sustainability to lower-tier suppliers. In contrast to previous research that suggested the lack of procurement intervention in sustainability implementation with first-tier suppliers can halt sustainability diffusion to lower-tier suppliers, our findings demonstrate that sustainability can be augmented and diffused through the bridging role of first-tier suppliers and the involvement of their procurement functions in the implementation process with lower-tier suppliers. This paper contributes to structural hole theory by providing a typology of the various bridging roles that actors, such as suppliers, can undertake.

LITERATURE REVIEW

Practices for diffusing sustainability into supply networks

Sustainability diffusion occurs when the sustainability practices of the focal company are adopted and implemented by direct and indirect suppliers (Tate *et al.*, 2013; Saunders *et al.*, 2019). Diffusion can be described as the process of transferring, adopting and implementing sustainability initiatives or practices from one tier to the next (Meqdadi *et al.*, 2019). In identifying

relevant practices, we draw from the set of practices proposed by Akhavan and Beckmann (2017), focusing on those practices that specifically concern diffusing sustainability to supply networks.

Focal company sustainability requirements are often diffused as part of the sourcing process (Wilhelm *et al.*, 2016). Standards and certifications, such as ISO14000 and the EU Eco-Management and Audit Scheme (EMAS), are requested as part of the qualification process (Preuss, 2009). Moreover, suppliers can be asked to adhere to sustainability guidelines and codes of conduct (Wilhelm *et al.*, 2016; Tate *et al.*, 2012), and sustainability-focused KPIs can be incorporated into supplier selection processes and sustainability risk assessments carried out as part of the sourcing process (Foerstl *et al.*, 2010).

Supplier monitoring practices aim to assess or evaluate the sustainability compliance and performance of suppliers (Meqdadi *et al.*, 2020). Typical practices include supplier audits, use of self-assessment questionnaires, supplier self-reporting, supplier product testing and supplier or 'vendor' rating (Preuss, 2001). Although monitoring strategies are clearly widely used by companies to attempt to control supply chain sustainability risks (Meinlschmidt *et al.*, 2018), monitoring has significant shortcomings, including problems in ensuring reliable and accurate information (Gualandris *et al.*, 2015). Consider the scandal in December 2019 concerning a Chinese greetings card supplier factory used by UK retailer Tesco, where workers had written messages such as "forced to work against our will" in Tesco Christmas cards. Tesco referred to its comprehensive auditing system and an audit having been conducted only one month before the incident, but with no evidence of this issue (Siddique, 2019).

As an alternative to discontinuing relationships with failing (non-complying) suppliers, developmental practices aim to help suppliers address non-compliance issues. Sometimes described as supplier mentoring (Gimenez and Tachizawa, 2012; Meqdadi *et al.*, 2020), supplier development for sustainability involves supporting suppliers in the process by helping them to understand the relevance and need for sustainability implementation. Incentive schemes, training and profit sharing are used for this purpose combined with sanctions and penalties (e.g., threatening to discontinue or 'filter off' suppliers).

In addition to practices that concern sourcing, supplier monitoring and mentoring, we include joint development as an important way to diffuse sustainability in supply networks (Akhavan and Beckmann, 2017). Joint development projects aim to bring together complementary capabilities of the focal company and potential suppliers in order to co-develop, for example, new green product designs or packaging and joint green manufacturing and logistics projects (Pullman and Wikoff, 2017). The main objectives of joint sustainable product development are to minimise the use of non-renewable materials and increase the use of renewables, avoid the use of toxic and hazardous materials (Li *et al.*, 2016) and increase the use of recycled material and reduce waste (Tate *et al.*, 2012). Buyers and suppliers can jointly design product specifications to develop a more sustainable product (Saunders *et al.*, 2015).

The approaches outlined here have been widely researched, but our distinct focus is on how these diffuse within supply networks across multiple tiers. The following section presents the role of first-tier suppliers in sustainability diffusion, considering their bridging roles from a structural

hole theory perspective.

Sustainability diffusion in supply networks and the supplier bridging role

The conceptualisation of sustainability diffusion assumes that it is transmitted by a cascading process (Villena, 2019) from one supplier to the next. In other words, suppliers at different tiers perform as conduits or bridges. The problem of how focal companies can diffuse most effectively across multiple tiers therefore puts first-tier suppliers in an immediately critical position.

The study of Mena and Schoenherr (2020) refers to the diffusion, or what they call “contagion”, of sustainability practices across multi-tier supply chains. They highlight the challenges that organisations face when trying to influence green practices beyond first-tier suppliers and show that collaborative practices may prove more effective than coercive practices. The current research argues that the success of sustainability diffusion in supply networks is contingent on several factors, including the willingness and proactiveness of first-tier suppliers to transmit the focal company’s sustainability practices beyond its borders (Meqdadi *et al.*, 2020). The study of Wilhelm *et al.* (2016) indicates that information transparency and the existence of incentives to first-tier suppliers facilitate sustainability implementation in second-tier suppliers. These authors emphasise that the possession of resources and the existence of regulatory and customer pressure on first-tier suppliers can facilitate the engagement of second-tier suppliers in sustainability. In addition, mentoring practices that aim to build first-tier supplier capabilities are important in sustainability diffusion (Meqdadi *et al.*, 2020).

It can be inferred from these studies that the role of first-tier suppliers is critical for sustainability diffusion to lower-tier suppliers, however, little research has investigated this. Diffusing sustainability to lower-tier suppliers is challenging to attain due to the complexity of supply networks and the large number of suppliers that reside in the second and third tiers. Hence, first-tier suppliers act as a primary linkage for transmitting sustainability practices of the focal company to lower-tier suppliers.

Supply network theory offers a rich perspective on how actors are embedded in a network structure, going beyond the dyadic tie structure towards multi-ties structure when analysing the actors’ interactions and revealing the supply network dynamics (Choi and Wu, 2009; Li and Choi, 2009; Mena *et al.*, 2013). In our study, understanding how sustainability practices are cascaded from one actor to another requires adopting a supply network perspective, for example, by focusing on the triadic ties structure within the studied supply network. In the same vein, structural holes theory (Burt, 1992; Ahuja, 2000) focuses on the bridging role that an actor holds in a triadic tie structure to span the gap between two disconnected actors. The bridging actor acts as a gatekeeper due to possession of valuable information needed by the two disconnected actors or to facilitate resource exchange between them (Tiwana, 2008; Choi and Wu, 2009). By maintaining the gap, the bridging actor aims to maintain its power over the two disconnected actors and accordingly takes the role of *tertius gaudens* (Burt, 1992).

The prior literature reported on other types of bridging roles, including *tertius iungens* (Obstfeld, 2005) where the bridging actor aims to close the gap between the two disconnected actors. This bridging role occurs in a cooperative rather than adversarial atmosphere. The *tertius iungens* role may decay as the two disconnected actors establish a direct connection or when the information possessed by the bridging actor has become redundant (Meqdadi *et al.*, 2020).

Saunders *et al.* (2015) develops a typology for the brokerage roles that network actors, such as suppliers and NGOs, can undertake for diffusing the sustainability practices of focal companies to lower-tier suppliers. These brokerage roles are *coordinator* (all the actors belong to the same group), *liaison* (all the actors belong to different groups), *consultant* (the broker does not belong to the group of the focal company and lower-tier supplier), *gatekeeper* (the broker and the lower-tier supplier belong to the same group) and *representative* (the focal company and broker belong to the same group).

Our study adopts structural hole theory to study in-depth the bridging role of first-tier suppliers and to reveal the impact of the procurement function on the bridging role. We expect that investigating both the bridging role of first-tier suppliers and the procurement function's impact on the bridging role can provide an explanatory power on how and why sustainability diffuses or does not diffuse to lower-tier suppliers.

The role of procurement in sustainability diffusion

The current research has emphasised the potential role of the procurement function within companies in the diffusion of sustainability to suppliers. For example, some papers have identified that procurement involvement in sustainability can increase performance (Hollos *et al.*, 2012; Yu *et al.*, 2017). Walker and Jones (2012) focused on the role of procurement in supporting and training key suppliers and building strong relationships with them. In an earlier study, Preuss (2009) examined how procurement can foster sustainability development by encouraging first-tier suppliers to work with small local businesses, contracting with voluntary organisations or replacing hazardous materials in product design.

Little research has looked at the involvement of procurement in joint development and co-creation with suppliers in the development of new greener product designs. Carter and Carter (1998) specifically focused on procurement involvement in internal innovation projects related to reduction, recycling, reuse and substitution of materials and, more recently, Picaud-Bello *et al.* (2019) explored how procurement can facilitate innovation within renewable energy technology through early procurement involvement.

These studies did not specifically focus on the diffusion of sustainability in the sense of extending sustainability beyond first-tier suppliers into wider supply networks. Villena (2019) is a rare study that has attempted to look into this issue by investigating how companies build sustainable supply networks by putting pressure on first-tier suppliers to cascade their sustainability requirements to lower-tier suppliers. She examined three interlinked procurement processes, including assessing, training and incentivising and found that there is often a lack of collaboration

internally between procurement and other departments as well as externally with other stakeholders that prevents the creation of sustainable supply networks. Her research, therefore, demonstrates how procurement plays a key role in the successful diffusion of sustainability in supply networks. Marshall *et al.* (2019) applies a power perspective to analyse the adoption of socially responsible procurement through, for example, supplier monitoring and training by first-tier and second-tier suppliers, concluding that where non-mediated power has a positive influence, mediated power use has no significant impact.

RESEARCH METHODOLOGY: EMBEDDED CASE STUDIES

Case study strategy and selection

Given the aim of investigating the diffusion of sustainability within supply networks, we deemed it important to gain rich insights from multiple supply network actors (Dubois and Gadde, 2002). We adopted a case study approach that is suitable for making direct observations across supply networks, collecting data from multiple network actors, and for investigating contextual factors of the phenomenon in their real-life context (Seuring, 2008). Our aim with the case studies was to elaborate supply network theory (Wu and Choi, 2009) and structural hole theory (Burt, 1992), and both theories informed the data collection. Thus, we followed an abductive process (Dubois and Gadde, 2002) characterized by systematic combining of theory and empirical data at different stages of the research process.

We decided to conduct our study in the food and drinks industry, which faces a range of environmental and social sustainability challenges (Cagliano *et al.*, 2016). Having approached and conducted initial exploratory interviews with several potential companies, we finally selected a company in the coffee sector with a strong commitment to sustainability. Specifically, we sought to focus on a company that applied a range of practices to implement sustainability within its supply network. As explained earlier, coffee is an appropriate industry for this investigation because of its global nature, where production takes place in rural areas and often in underdeveloped countries, and with many inherently difficult sustainability challenges, involving, for example, working conditions and the environmental impact of farming and packaging (Longoni and Luzzini, 2016). Such issues are typical of coffee supply networks, which are quite articulated, and therefore focal companies need to work closely with their suppliers in order to diffuse sustainability. We realised that supply networks of coffee beans differed widely from supply networks of coffee packaging including the sustainability challenges within these supply networks. This gave us an opportunity to conduct embedded cases within a single company, which would have the dual advantages of having two cases to compare whilst minimising contextual differences that could make comparisons problematic (Halinen & Törnroos, 2005).

We approached the focal company to select suppliers for interviews within the coffee beans and packing supply networks based on the following criteria: First, suppliers should be important to the operational performance of the focal company, as determined by the significance of the materials or services provided by the suppliers. Second, the supplier relationships should be more

than three years old to ensure that in-depth interactions and adaptations occur between the actors. Third, suppliers should extend sustainability practices to their own suppliers. After receiving a list of potential suppliers from the focal company, we ended up with two coffee traders for the coffee beans case and five packaging suppliers for the packing case. The focal company was also collaborating with NGOs to implement sustainability programmes in the supply network, hence we included these in the analysis.

In summary, our study contains two embedded case studies that take place within the context of a single focal company. The two embedded cases focus on the coffee bean and packaging supply networks. Figure 1 illustrates the structure of the supply networks and the involved actors in each of these.

[INSERT FIGURE 1 HERE]

Data collection and analysis

The unit of analysis in our study was the supply network of the focal company, which enabled us to examine the sustainability practices that were implemented by both the focal company and suppliers and capture their interactions over sustainability diffusion in the supply networks. Data collection involved semi-structured interviews with both the focal company and the suppliers that were key to the diffusion of sustainability. We interviewed several managers within the focal company, including with the chief purchasing officer, the head of purchasing process development, the purchasing process development specialist and the director of the coffee buying department. Furthermore, we interviewed the head of institutional relations and sustainability, the CSR specialist and CSR assistant.

In turn, we interviewed suppliers to learn their views on the practices of the focal company, as well as the suppliers' own sustainability practices. Combined, the interviewed coffee traders CT1 and CT2 count 7,000 employees and trade €11 million bags of coffee each year, with revenues of \$10 billion. The five packaging suppliers interviewed, PACK1–5, included suppliers of, for example, paper and cardboard packaging, flexible plastic film, coffee capsules, plastics and aluminium. The size of these suppliers ranges from 40 to almost 2000 employees, but several of these are part of much larger groups; across one group, one of these suppliers counts 46,000 employees world-wide and almost €9 billion in revenues. Finally, we interviewed NGO1, which was established to improve the lives of children through better education, health care and economic opportunities. NGO1 works within the coffee industry by supporting the assessment and improvement of working conditions and, in particular, their impact on children's lives. For example, in coffee-producing countries like Vietnam, it is not unusual that families involve children for coffee harvesting, while in China, where coffee machines are produced, parents often leave children on their own for long time when they go to work far away from home.

We set out to select second-tier suppliers for the interviews. However, both the coffee traders and packaging suppliers indicated that this would not be possible due to confidentiality reasons.

Consequently, we adjusted our interview protocol to include questions to the focal company, coffee traders and packaging suppliers on the engagement of lower-tier suppliers in sustainability. In the same vein, after mapping the two supply networks of the focal company, it turned out that the coffee traders and packaging suppliers received requests from other customers to engage in sustainability. We relied on the reports of coffee traders and packaging suppliers and access to their customers' websites to gain a better understanding of the sustainability requirements conveyed to them by their customers.

The interview questions were open-ended and sent to the interviewees in advance to enable them to prepare the answers and supporting materials. The major themes of the interview questions were derived from supply network theory and structural hole theory. These included, for example, sustainability practices, ties structure, bridging role of first-tier suppliers, sustainability practices diffusion and the role of procurement in the diffusion process. Appendix 1 shows a sample of the interview questions. In total, we conducted 20 interviews that lasted between 30 and 120 minutes. All the interviews were recorded with the permission of the interviewees and then transcribed. We assured the interviewees that their names and identities would be disguised to encourage them to express their views openly. Table 1 provides details of the focal company and the involved supply network actors in our study.

The analysis process began by assigning a specific label or code to the data chunks to denote a specific meaning. The coding process was done manually and was considered a crucial step in our study to structure and order the data. This represented the first-cycle coding and resulted in several codes that were grouped into the second-cycle coding or categories (Miles and Huberman, 2014). The categories were then grouped to form aggregated dimensions that were conducive to answering our research questions (see Appendix 2). To enhance the reliability of the coding process and avoid researcher bias, two authors engaged in coding independently and the results were discussed to reach a unanimous agreement.

We relied on two main sources of information to enhance research quality (Voss *et al.*, 2002). The primary sources of information were the semi-structured interviews with diverse supply network actors that included the focal company, several suppliers and an NGO. We made sure that we interviewed several key informants in the supply network who provided different perspectives on the diffusion process. The second source of information was the archival data provided by the interviewees. For example, the focal company provided internal reports, presentation materials and videos documenting its sustainability practices with suppliers. Another source of information was the sustainability reports and the section dedicated to sustainability in the integrated annual reports of the different actors involved. Throughout the coding and analysis process, the authors had regular meetings in order to discuss the interpretations of the results. Based on our collected data, we also returned a report to the focal company with an overview of the suppliers on sustainability. Cross-case analysis was performed to highlight the similarities and differences between the two embedded case studies. This

resulted in revealing various bridging roles of suppliers in sustainability diffusion into supply network and role of procurement in facilitating them.

[INSERT TABLE 1 HERE]

CASE STUDY ANALYSIS

The analysis was divided into the two supply networks consisting of, respectively, coffee beans providers (hereafter called traders), who operate in dispersed geographical locations, such as South America, Asia and Africa, and European packaging suppliers. The sustainability scope and practices within these supply networks varied with the coffee beans supply network faced with both environmental and social challenges, whereas the environmental dimension appeared to be the dominant sustainability concern in the packaging supply network. Table 2 shows the main sustainability approaches and practices implemented by both the focal company and the traders and packaging suppliers in the focal company's supply networks.

Internal sustainability practices at the focal company

The focal company is a large Italian coffee roaster that sources coffee beans from several producing countries through traders. Coffee beans growers are usually very small, often family-based businesses; hence, traders are key partners in the sourcing process since they ensure the supply of coffee and the quality and consistency of the blend. Other supply network partners include packaging suppliers and machine suppliers.

The company markets coffee mostly in the retail segment, with a leading position in Italy and sales in 140 countries, with factories in several countries. Coffee is sold as ground coffee and in capsules; for the latter, the company also sells own-branded coffee machines. In addition, there are the business-to-business and vending segments, with the company offering a wide range of blends, recognised by consumers for its high quality, and covering different market segments, including organic products, Rainforest alliance and Utz-certified coffee. Its position as one of the most famous Italian coffee brands means that it is also well-positioned in other countries and continents.

The company's sustainability department is responsible for internal communication and knowledge sharing concerning internal and supplier CSR or sustainability. The sustainability department conducts training and welfare initiatives involving several internal departments, for example, on children's rights in collaboration with NGO1. Top management is committed to sustainability, with the CEO taking part in sustainability workshops.

There is a close collaboration between the purchasing and sustainability departments to jointly set targets, perform supplier mapping and develop questionnaires for qualification and monitoring. Together with the legal department, and also in response to requests from large international customers (mainly retailers), these two departments have developed a code of conduct that suppliers are requested to sign; however, some suppliers, particularly large ones,

already have their own, so the focal company needs to evaluate the congruence and equivalence of the two codes of conduct. Quality and R&D departments are involved in cross-functional collaboration for developing and assessing innovative solutions, particularly for packaging, to make it more environmentally friendly. Packaging, in particular coffee capsules, is crucial to protect the quality and consistency of the product, but the solutions available on the market are not environmentally friendly, and both public opinion and regulators are demanding better solutions.

Embedded case study one: Coffee bean supply network

Bridging role of traders in diffusing sustainability in the coffee bean supply network

The code of conduct was the principal sustainability practice that the focal company used with the traders. Both traders CT1 and CT2, in turn, developed their own codes of conduct for farmers, which are aligned with the one of the focal company. To ensure effective adoption of these by farmers, both traders conducted sustainability audits through their own staff and third parties, conveying the results back to the focal company. The audit results were used as evidence to the focal company that its code of conduct was conveyed to the farmers:

First step was the creation of codes of conduct, all our usual suppliers need to sign it, thus adhering to our request, and through annual local auditing we verify that these requests are being respected. The code of conduct is for all suppliers at origin, if we deal with an intermediary, the intermediary takes the responsibility. (CT2)

In addition, the focal company initiated sustainability development projects with traders that aimed to improve the social and environmental performance of the farmers. These development projects included providing education and training to farmers on issues such as agronomy and how to tackle the involvement of children in the coffee beans farms:

Depending on the aim there are different trainings, some are monthly, some are annual. We have a network of trained people that reach different locations, even the ones that are to be reached on the mountains, to train farmers how to use tools, data and so on. We do pilot projects in one origin and then export the project to other origins for operative and sustainability training. (CT2)

Other social and environmental practices were initiated by traders independently of the focal company. For example, CT1 provided advanced payments to farmers to assist them before harvest time. Both traders included sustainability as a criterion in farmer selection and evaluation, while certified coffee appeared as a stringent requirement by their customers (including the focal company) and both traders provided certified coffee beans through NGOs.

The focal company did not exert any direct sustainability activity with sub-tier suppliers, but relied instead on the first-tier suppliers to ensure that sustainability requirements were cascaded to them:

These actors [e.g., CT1, CT2] have a lot of expertise, sensitivity and knowledge of sustainability and CSR topics: firstly, because they work in the food industry and specifically on the raw materials; secondly, they're

the true link between the very final customer, global users and producers, and first raw material collectors.
(Coffee purchasing of the focal company)

Figure 2 (a) depicts the bridging roles of CT1 and CT2 (Bridge 1 and Bridge 2) that appeared identical in diffusing the sustainability practices of the focal company, including codes of conduct and social and environmental development projects to the farmers. The bridging role of CT1 and CT2 extended beyond simply diffusing the focal company's sustainability practices into the supply network towards diffusing their own sustainability practices to the farmers. CT1 and CT2 perceived implementing sustainability with the farmers as important for enhancing farmer loyalty, improving the coffee beans harvest volume and quality and mitigating supply network risks related to inappropriate agricultural practices. The coffee sector suffers from a host of social and environmental problems such as climate change, the migration of the young generation to cities, thereby abandoning their work on coffee farms and a reduction in the coffee bean varieties due to pest diseases. However, coffee bean customers' requests for sustainability were mainly focused on asking traders to sign their codes of conduct, participate in sustainability audits and supply certified coffee beans. Other factors influenced the CT1 and CT2 stances for diffusing sustainability practices to the farmers. These include responding to the focal company's and other customers' requests for sustainability, the founder principles, organisational culture and supply network risks reduction.

Diffusing sustainability to lower-tier suppliers posed several challenges to traders. The supply networks of CT1 and CT2 are widely stretched across geographical locations and the farms are fragmented and vary significantly in size. This presented a dilemma to CT1 and CT2 regarding how to engage farmers in their sustainability practices. Therefore, they chose to do this in collaboration with local NGOs (NGOs2 and NGOs3) that operate in proximity to the farms. The tie structure, as shown in Figure 2 (a), takes the form of a closed-triadic structure, since the two traders also maintained direct ties with the farmers. Within this structure (closed triads 1 and 2), NGOs2 and NGOs3 took responsibility for ensuring the certification of coffee beans and sustainability audits of the farmers.

Figure 2 (a) shows another bridging role undertaken by NGO1 (Bridge 3), focusing on creating awareness among the farmers of social issues. The bridging role of NGO1 is another path that the focal company adopted to enhance sustainability with farmers. NGO1 utilised the focal company's code of conduct to convey clear messages to the farmers on social issues, such as child labour, worker rights and fair farmers' wages:

The chain in the collaboration... was the mutual interest of going beyond the philanthropic interest of the company to know more about the effect or business impact in the value chain. Usually, every company decides to do at least one assessment: it's easy, doesn't cost too much, and it's the entry point, but a lot of companies stop there, and we knew this at the beginning. So, in order to say that a company really [integrates children's rights and business principles], we know that we shouldn't push but accompany them in doing something concrete. (NGO1)

Role of procurement function of focal company in diffusing sustainability in coffee bean supply network

The case study findings revealed that sustainability implementation with the traders was mainly guided and monitored by the CSR department at the focal company and the role of its procurement department was marginal, as shown in Figure 2 (a). Although the focal company itself believed that the procurement department was important for facilitating sustainability diffusion in its supply network, the views of suppliers indicated that the CSR and R&D departments were seen as the two focal points for interacting over sustainability with suppliers:

Buyers are the true interface with external actors, so it's important that process information that we share is well understood by operative people, who, when dealing with suppliers, analyse different cases and know how to approach them. (Focal company business development specialist)

When we have sustainability projects, I need to turn to the people responsible for sustainability, which in the focal company is a separate function. (CT1)

The procurement departments of the traders took a contrasting stance compared to their peers at the focal company (Figure 2 (a)). Involvement of the local buyers was crucial for communicating the sustainability requirements and practices of CT1 and CT2 to the farmers and building close relationships with them:

Our local buyers create a very close relationship with farmers, which is an advantage for us because we achieve a strong feeling, not only with what happens in the country in general, but in each area of that country... We have a close relationship with the populations, our buyers might be invited to have lunch with the farmers, from whom we buy coffee... It's more a cooperation relationship than a relationship with a buyer that sets requirements per se. (CT1)

The procurement departments at CT1 and CT2 interacted closely with the local NGOs on implementing sustainability practices with the farmers, such as auditing and coffee beans certification.

Table 2 summarises the main findings related to the bridging roles of traders, NGO1 and procurement function in diffusing sustainability to lower-tier suppliers.

Embedded case study two: packaging supply network

Bridging role of suppliers in diffusing sustainability in the packaging supply network

The sustainability intervention of the focal company with the packaging suppliers ranged from requesting them to sign its code of conduct (PACK3), responding to self-assessment questionnaires on sustainability (PACK4), jointly developing recycled packaging (PACK2–3–4) or even not receiving any sustainability requirement (PACK1–5) as shown in Table 2. The findings indicate that the packaging suppliers implemented several sustainability practices internally and with their own suppliers independently of the focal company. For example, PACK4 engaged in CO₂ emission reduction with suppliers, submitted to sustainability auditing by EcoVadis as requested by some European food manufacturers, asked its own suppliers to sign its code of

conduct, included sustainability as a criterion in supplier selection and evaluation and provided training to sub-tier suppliers on improving their sustainability performance. Some development projects, such as improving packaging recycling, were also conducted in cooperation with sub-tier suppliers. Therefore, PACK4 largely acted independently of the focal company.

PACK3 was the only packaging supplier in this study who signed the code of conduct of the focal company and initiated a development project for packaging recycling with the focal company. The supplier was aware of the importance of sustainability to the focal company:

The focal company is very active in sustainability, and we feel the pressure [with regards to] sustainability. We have a strong relationship with them, and we don't need an actual request to adapt, it is sufficient to see what they are doing, which is their direction... moving together with them and you can understand what the customer is doing and what they need. (PACK3)

PACK3 also agreed to EcoVadis audits, as requested by other coffee roasting companies and engaged in CO₂ reduction activities. In addition, PACK3 engaged sub-tier suppliers in life-cycle analysis (LCA) reporting, asking them to sign its code of conduct and participate in sustainability auditing.

The focal company neither asked PACK2 to sign its code of conduct nor did they conduct any sustainability audits with PACK2. The only sustainability practice that occurred between the two parties was a joint sustainability project for improving recycled packaging. The supplier obtained certificates (ISO 14001 and Forest Stewardship Council (FSC)) and third-party auditing (Sedex) as requested by several European pharmaceutical, beverage and food customers. PACK2 conducted a range of sustainability practices with its own suppliers, including requesting suppliers to sign its code of conduct, engaging suppliers in CO₂ and waste reduction projects, requiring sustainability audits, and including sustainability as a criterion in supplier selection and evaluation.

PACK1 and PACK5 did not receive any sustainability requirements from the focal company but received information from the CSR department regarding concerns over recycling and waste reduction, and both suppliers worked on recycling initiatives, CO₂ reduction and auditing of suppliers. Having obtained FSC certification, PACK1 tried to push the focal company to adopt the FSC certificate and print the certificate logo on the packaging materials of roasted coffee:

We are pushing our customers like the focal company to implement the use of FSC packaging and to our suppliers that are the source of raw material to implement the chain of custody... We don't print the FSC logo on the focal company products, but our products are all FSC certified in any case.

The focal company justified its limited intervention with packaging suppliers by the fact that these already had advanced sustainability practices. Consequently, sustainability practices related to both the focal company and packaging suppliers diffused to lower-tier suppliers:

We went to other suppliers and discovered that they're carrying out very interesting activities in CSR, maybe less structured than ours, but that they're going in the same direction, and we didn't expect so much. This means that the "seed" is already present, probably the Western influence contributed to it, but in this way it's sufficient to water it without telling them too much. (Focal company CSR manager)

The engagement of the packaging suppliers in sustainability appeared to be influenced by several factors. Organisational culture and reputation enhancement were the two important factors for initiating sustainability practices internally and with sub-tier suppliers. Customer pressure influenced the packaging suppliers' engagement in sustainability, and this was embodied by the coffee roasting companies' and European food manufacturers' requests for PACK3 and PACK4, respectively, to participate in EcoVadis audits. The development of recycled packaging was a sustainability priority for all the packaging suppliers and was perceived as an approach to remain competitive, attracting customers who care about sustainability and to prepare to meet future regulations:

We feel like a thrust engine, and maybe that's why we started in advance with our initiatives. And it's good being in advance because it helps with our objective. Indeed, there's a risk of sustainability, the risk of being late. That's why PACK3 is attentive to sustainability. (PACK3)

The focal company's code of conduct, sustainability questionnaires and packaging recycling projects diffused to second-tier suppliers through the packaging suppliers. Therefore, the focal company benefited from the bridging role of the packaging suppliers (Figure 2 (b)) in diffusing further sustainability practices to lower-tier suppliers (similar to the bridging role of the traders) through the sustainability practices initiated by the packaging suppliers. These included, for example, sustainability auditing, the use of self-assessment questionnaires and inclusion of sustainability in supplier evaluation and selection. PACK4 and PACK2 conducted joint development projects with suppliers and provided support, such as training, to improve supplier sustainability. Certified raw material for packaging was essential for the packaging suppliers, as indicated by PACK5 and PACK1, who imposed such a requirement on their suppliers:

In many cases, the customer asks for certification only for the possibility of putting the label on the product, he/she has a limited vision of what it is. This is the 'as-is' situation, from my point of view. Then, some customers have a broader vision than others, but more or less it's like that. (PACK5)

The bridging roles of the packaging suppliers (Bridges 4–8) appeared similar to sustainability practices that mainly flowed from the packaging suppliers towards their own suppliers with minimal influence from the focal company. In the process of diffusing sustainability to sub-tier suppliers, the packaging suppliers emphasised open dialogue to enhance supplier awareness of sustainability to ensure that they understood the importance of abiding to sustainability requirements.

The bridging role of the packaging suppliers also enabled diffusion of sustainability practices towards the focal company and other customers. The packaging suppliers aimed to push sustainability practices (e.g., the FSC certificate) and recycled packaging activities forward to the focal company, and the latter joined packaging recycling activities when saw it can obtain economic benefits. Hence, the bridging role of the packaging suppliers facilitated sustainability diffusion both upstream and downstream in the focal company's supply network. Table 2 summarises the main findings related to the bridging roles of packaging suppliers in diffusing sustainability to lower-tier suppliers.

Role of procurement function of focal company in diffusing sustainability in packaging supply network

Sustainability implementation with the packaging suppliers was mainly undertaken by the CSR and quality departments while the procurement department played a minimal role in this process. The procurement departments at the packaging suppliers (Figure 2 (b)) played an important role in implementing sustainability practices with the second-tier suppliers. An exception was the small supplier, PACK5, where the procurement function was composed of only two persons; therefore, sustainability was not within their scope of work:

In small factories like our, the purchasing department is even smaller than quality department because most of the purchases is signed directly by the owner like in our case. This does not mean that the owner is the purchasing department, but the purchasing function is simply made of two employees that prepare the documents but are not completely implied in the purchasing process. (PACK5)

The procurement departments transferred several sustainability practices to the lower-tier suppliers through sustainability auditing, CO₂ emission reduction, recycled packaging and supplier training (Table 2). In this regard the packaging suppliers:

The FSC project is managed at European level and we have a policy at European level that all our purchasing manager know very well that we must buy only from FSC certified suppliers, so any other possibility is excluded (PACK2)

Purchasing function deals with all suppliers to be able to certify its packaging according to the packaging LCA assessment. Also, they deal with the code of ethics because all suppliers must accept PACK3's code of ethics. Our purchasing function and our certification area do audit to suppliers and if they find issues, we pay attention to them. (PACK3)

Table 2 summarises the main findings related to the bridging roles of packaging suppliers and procurement function in diffusing sustainability to lower-tier suppliers.

[INSERT FIGURE 2 HERE]

[INSERT TABLE 2 HERE]

CROSS-CASE ANALYSIS

The findings revealed the sustainability practices of the focal company and suppliers that diffused into the two supply networks. The focal company paid more attention to the sustainability of the traders and coffee bean farmers since environmental and social issues may influence the focal company negatively. In contrast, the packaging suppliers were considered less risky from the focal company point of view and this justifies the low intervention of the focal company with the packaging suppliers compared to the traders. However, the focal company's influence on sustainability diffusion in its supply networks appeared limited and in both embedded cases the majority of the sustainability practices that diffused to lower-tier suppliers was owed either to the sustainability practices developed autonomously by the suppliers or in their response to other customers request for sustainability.

By comparing the findings in the two embedded cases, two contrasting roles of the procurement function emerge. The procurement function at the focal company showed low intervention with the traders and packaging suppliers over sustainability implementation where most of the interaction with suppliers took place by the CSR department. In contrast, the procurement function role of the traders and packaging suppliers (except PACK5) was pivotal in diffusing sustainability practices to lower-tier suppliers.

The findings of the embedded case studies indicated various bridging roles undertaken by traders and packaging suppliers. Due to supply network complexity in case study one, the traders' bridging role diffused more sustainability practices to the farmers compared to what the focal company requested or initiated. Hence, a sustainability bullwhip effect (Lee et al., 2014) occurred where the sustainability efforts and practices were augmented from the focal company toward the farmers via the traders. An interesting configuration in case study one was the complement of the traders bridging role with the closed triadic ties structure that involved local NGOs and farmers (Figure 2 (a)). These closed triads assisted the traders in diffusing sustainability practices to a large number of farmers. This hints at the benefit of complementing the bridging role of suppliers with other intermediary actors, such as NGOs who might also assume a bridging role, in case the triadic ties structure is open, to enhance sustainability diffusion in the supply networks.

The bridging role of the packaging suppliers facilitated diffusing the sustainability practices that were requested by the focal company, other customers or initiated by the suppliers themselves. This bridging role entitled the packaging suppliers in some instances to propose some of the sustainability practices, such as FSC certification, to the focal company and customers for adoption. Consequently, the bridging role of the packaging suppliers appeared to facilitate sustainability diffusion in the upstream and downstream parts of their supply networks which showed a different bridging role compared to the one of the traders.

The cross-case study analysis allowed us to differentiate the bridging roles performed by traders and packaging suppliers while showing consistency in the role of procurement within the focal company, traders and packaging suppliers. This enabled us to create a typology of the bridging roles that appeared in this case study that we will elaborate on in the discussion section.

DISCUSSION

Impact of the supplier bridging role on sustainability diffusion

This paper investigates the impact of the supplier bridging role in facilitating the diffusion of focal company sustainability practices to lower-tier suppliers and the role of procurement on the supplier bridging role. While we observed several sustainability practices implemented by suppliers, most of the practices were initiated and implemented by traders and packaging suppliers with limited focal company influence. Relatively few sustainability practices, including

codes of conduct, supplier questionnaires, recycled packaging and sustainability projects, were initiated and cascaded upstream by the focal company to the traders and packaging suppliers.

By examining the supply network ties structure, we can discern three bridging roles. The first is the role undertaken by the two traders, CT1 and CT2 in case study one, that were engaged in several sustainability practices with farmers. An important observation in this bridging role concerns the sustainability alignment between the focal company and the two traders, as these actors had shared concerns over sustainability issues, environmental and social, including child labour and poor working conditions on farms. However, due to supply network complexity, CT1 and CT2 engaged in a closed triadic tie structure (Choi and Wu, 2009; Mena *et al.*, 2013) involving local NGOs and farmers, enabling them to better monitor and control sustainability diffusion.

The second bridging role was undertaken by the packaging suppliers in case study two, where the engagement of the focal company with suppliers over sustainability was limited. On some occasions, engagement of the focal company with the packaging suppliers occurred when an economic benefit could be obtained, such as through recycling initiatives. In contrast to the bridging role of traders, sustainability alignment between the focal company and the packaging suppliers was low. The focal company's concern over sustainability with the packaging suppliers was subdued by the low sustainability risk posed by the European packaging suppliers. The packaging suppliers viewed environmental topics, including recycling and environmental certificates, as a priority and accordingly made efforts to diffuse the related sustainability practices to their suppliers. An interesting observation in this bridging role was the packaging suppliers' attempt to push environmental certificates and packaging recycling activities downstream in their supply networks to convince their customers to adopt these.

The third bridging role, observed in case study one, involved NGO1 conveying the focal company's code of conduct to the farmers and increasing their awareness of sensitive social issues, such as child labour and fair labour wages. In this case there was sustainability alignment between the focal company and NGO1, as they agreed on the importance of the social issues that needed to be conveyed to the farmers.

Thus, the three bridging roles in our study took place in a cooperative environment similar to *tertius iungens* (Obstfeld, 2005; Choi and Wu, 2009) rather than in the adversarial way as represented by *tertius gaudens* (Burt, 1992). Consequently, while the three bridging roles share a cooperation aspect, they reflect three types of bridges as shown in Figure 3. The first relates to the bridging role of the traders, where the intensity of sustainability practices increased from the focal company to the farmers through the traders. We call this bridging role the 'amplifier' bridging role, as sustainability practices diffusion to lower-tier suppliers were boosted by the traders. The second one is the 'two-way amplifier' bridging role, which resembles the bridging role undertaken by the traders in increasing sustainability practices among suppliers, but this bridging role also involves the flow of sustainability practices to the customers. The third type is a 'transmitter' bridging role, as played by NGO1, where there was no change in sustainability

practices intensity and the same number of sustainability practices or information were transmitted from the focal company to lower-tier suppliers through NGO1.

[INSERT FIGURE 3 HERE]

Procurement influence on bridging role of suppliers in sustainability diffusion

The role of the procurement function in sustainability diffusion to lower-tier suppliers was examined at the focal company and the suppliers. We observed how sustainability practices of the focal company were cascaded to suppliers through the CSR department, while the role of the procurement function in this process was marginal. The focal company's procurement function appeared to be disengaged from interacting with suppliers over sustainability, although it was beginning to become more involved. In contrast, the procurement functions at CT1 and CT2 played a crucial role in facilitating sustainability diffusion to the farmers through direct interaction with the farmers or via local NGOs. Likewise, the packaging suppliers relied on their procurement functions (except PACK5) to cascade their sustainability practices to lower-tier suppliers. Where procurement was to some extent a missing link in diffusing sustainability from the focal company, it was very much present at first tier suppliers (Villena, 2019).

Another observation concerns the type of sustainability practices that were adopted by the focal company, traders and packaging suppliers and the intervention of the procurement function in these. Was the intervention of the procurement function necessary for implementing the sustainability approaches with the next upstream actor? The focal company engaged in several sustainability practices with traders and packaging suppliers: code of conduct, coffee bean certificates, sustainability questionnaires, sustainability development projects and recycled packaging. Implementation of these practices was handled by other departments, such as the CSR department for code of conduct, sustainability questionnaire and joint development (with the traders), while the R&D department was in charge of recycling packaging projects with the packaging suppliers. Similar sustainability practices appeared to take place at the traders and packaging suppliers but with more intensity in terms of scale (thousands of farmers) and scope (various social and environmental issues), although a key difference was the supplier education and training implemented by both the traders and packaging suppliers. This practice required intense interaction between the procurement functions at the traders and packaging suppliers and the second-tier suppliers through supplier mentoring activities (Gimenez and Tachizawa, 2012; Meqdadi *et al.*, 2020). Hence, the intervention of the procurement function was deemed important for sustainability implementation in the supply networks.

THEORETICAL CONTRIBUTION

Our study aims to provide explanatory power on how sustainability diffuses into supply networks by examining the bridging role of suppliers and the involvement of the procurement function in the supplier bridging role. The supplier bridging role was critical for diffusing sustainability practices of the focal company to lower-tier suppliers. Hence, our study complements several

other studies that emphasise the role of direct suppliers in fostering or hindering sustainability diffusion in supply networks (Gimenez and Tachizawa, 2012; Wilhelm *et al.*, 2016; Meqdadi *et al.*, 2020). Our study contributes to sustainable supply network theory by illustrating the bridging role of first-tier suppliers in diffusing sustainability to lower-tier suppliers. We revealed three types of bridging roles: amplifier, two-way amplifier and transmitter. Therefore, our study provides an in-depth explanation of the role of the first-tier suppliers in sustainability diffusion into supply networks.

While the two bridging types of amplifiers and transmitters provide an explanation of how sustainability can be cascaded upstream within supply networks, the two-way amplifier bridging role demonstrates how sustainability can also be cascaded in a reverse way from suppliers to customers. The reverse cascading resembles salmons swimming up against the tide, where suppliers can initiate and diffuse sustainability practices downstream in supply networks. Figure 4 illustrates sustainability diffusion in supply networks with consideration of the three bridging roles undertaken by suppliers and the procurement function's involvement in the diffusion process.

[INSERT FIGURE 4 HERE]

In the same vein, our study contributes to structural hole theory by expanding the bridging concept by providing three typologies of bridging roles. The previous literature researched the bridging roles played by actors to maintain or reduce the gap between two disconnected actors within the contexts of innovation and knowledge management (Burt, 1992; Choi and Wu, 2009; Obstfeld, 2005; Tiwana, 2008). Our study is one of the few studies that deployed structural hole theory and the bridging concept within a sustainable supply network context. An exception is noted in the study of Saunders *et al.* (2019), which proposed a typology based on the structural embeddedness of supply network actors. Our study proposes an alternative typology based on sustainability intensity and the direction of the flow of practices in supply networks.

The previous literature pointed to the importance of collaborating with NGOs to foster sustainability diffusion in supply networks (Rodriguez *et al.*, 2016). Our study supports this argument and demonstrates that in complex sustainability issues that span various geographical locations with a fragmented supply base, collaborating with local NGOs facilitates diffusing sustainability to lower-tier suppliers. Our study shows two types of structural embeddedness for involving NGOs in sustainability: through a transmitter bridging role and closed-triad, where the focal actor has more control and visibility on the NGOs' intervention with lower-tier suppliers.

The previous literature argues that the lack of procurement function engagement at the focal company in sustainability implementation with suppliers may halt sustainability diffusion to lower-tier suppliers (Wilhelm *et al.*, 2016; Villena, 2019). Our study demonstrates that diffusion is possible through the bridging role of first-tier suppliers, which cascade sustainability practices to second-tier suppliers. However, the intervention of supplier procurement functions with lower-tier suppliers facilitated sustainability diffusion in the supply network.

MANAGERIAL IMPLICATIONS

Our study gives insights and recommendations to companies aiming to build sustainable supply networks by diffusing sustainability practices to lower-tier suppliers. Our study reveals three types of bridging roles that first-tier suppliers or other actors, such as NGOs, can undertake to cascade sustainability to second-tier suppliers. Each type offers different cascading effects and knowing the supplier bridging role type can enable companies to gain a better view of the possibilities and limitations for diffusing sustainability into their supply networks. Equally important, companies can augment sustainability diffusion by partnering with suppliers that possess the characteristics of amplifier bridging. The cascading effect can be multiplied from the focal company towards lower-tier suppliers. Likewise, companies that partner with suppliers of the two-way amplifier bridging type may benefit from adopting suppliers' sustainability innovation and enhance their sustainability and economic performances.

The role of the procurement function in sustainability diffusion is central, especially when sustainability practices require close interactions with suppliers, such as supplier sustainability development. Intervention of the procurement function can induce real benefits for companies in terms of sustainability innovation capturing and sustainability orientation alignment among supply network actors. The procurement function needs to work in close relationship with other functions, e.g., with R&D for joint development projects with suppliers, thus acting as a broker or facilitator of the collaboration. Finally, tackling complex sustainability problems requires collaboration with various supply network actors. Seeking the collaboration of NGOs can be fruitful for companies to diffuse sustainability in supply bases that are geographically stretched and require special sustainability knowledge. NGOs can act as bridges for sustainability practices transfer to suppliers and an important consideration for companies is to deploy NGOs' bridging role to be more than just a transmitter of sustainability practices towards building sustainability capabilities at suppliers.

CONCLUSION

This study focuses on sustainability diffusion in supply networks by investigating the bridging role of first-tier suppliers in facilitating the diffusion process and the impact of the procurement function on the bridging role. We revealed three types of supplier bridging roles and their outcomes on sustainability diffusion in supply networks. Our study contributes to the sustainable supply network theory by elucidating the bridging role of first-tier suppliers in sustainability diffusion to lower-tier suppliers. This study contributes to structural hole theory by revealing various bridging roles that actors, such as suppliers, can undertake within a sustainability context.

Our study has limitations that we address to provide research opportunities for sustainable supply network scholars to pursue. Our study is based on an embedded case study with two sub-cases conducted within the coffee sector, which limits the empirical generalisability of our findings to other industries. Conducting multiple case studies within different sectors might

reveal more insights into the role of first-tier suppliers in diffusing sustainability to lower-tier suppliers.

Our study provides an interesting example of how sustainability can be reversely cascaded in the supply network from supplier to customer: swimming up against the tide. More focused research can consider how sustainability practices diffuse from lower-tier suppliers towards first-tier suppliers and customers and how this differs from sustainability diffusion from customers to suppliers. Within this research avenue, factors such as sustainability maturity, sustainability orientation and power differences among supply network actors can yield further insights on how sustainability is enhanced in supply networks. The role of the procurement function in this reverse sustainability cascading is indeterminate in terms of diffusing sustainability within the organisation and in reverse to the next customers.

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[INSERT **Appendix 1** HERE]

[INSERT **Appendix 2** HERE]

List of Figures

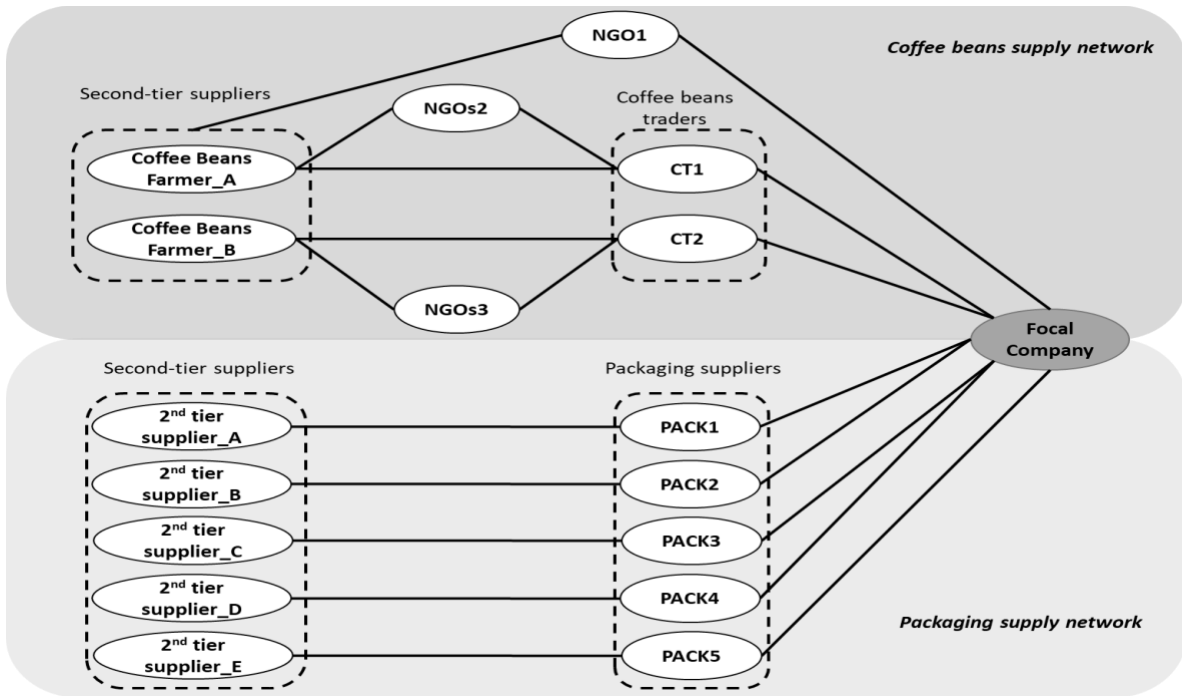


Figure 1. Structure of the focal company supply network

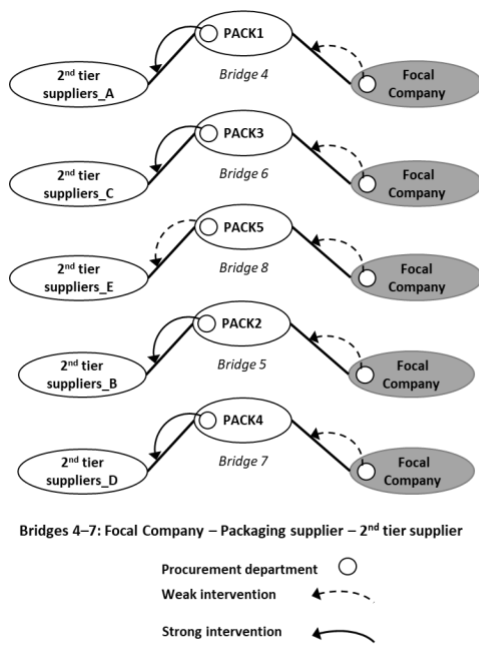
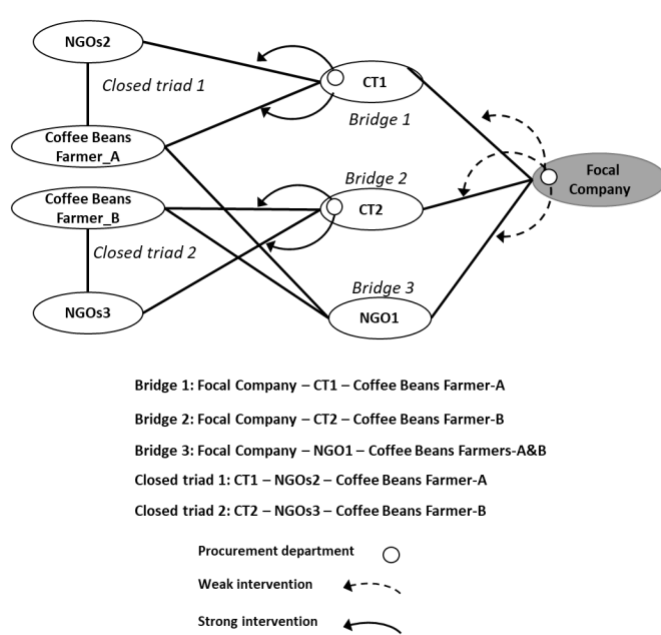


Figure 2 (b). Bridging role of packaging suppliers in diffusing sustainability in packaging supply network



Bridge 1: Focal Company – CT1 – Coffee Beans Farmer-A
 Bridge 2: Focal Company – CT2 – Coffee Beans Farmer-B
 Bridge 3: Focal Company – NGO1 – Coffee Beans Farmers-A&B
 Closed triad 1: CT1 – NGOs2 – Coffee Beans Farmer-A
 Closed triad 2: CT2 – NGOs3 – Coffee Beans Farmer-B

Procurement department ○
 Weak intervention ← - - -
 Strong intervention ← ———

Figure 2 (a). Bridging role of traders, NGO1 and packaging suppliers in diffusing sustainability in coffee beans supply network

Figure 2. Bridging role of traders, NGO1 and packaging suppliers in diffusing sustainability in the supply network

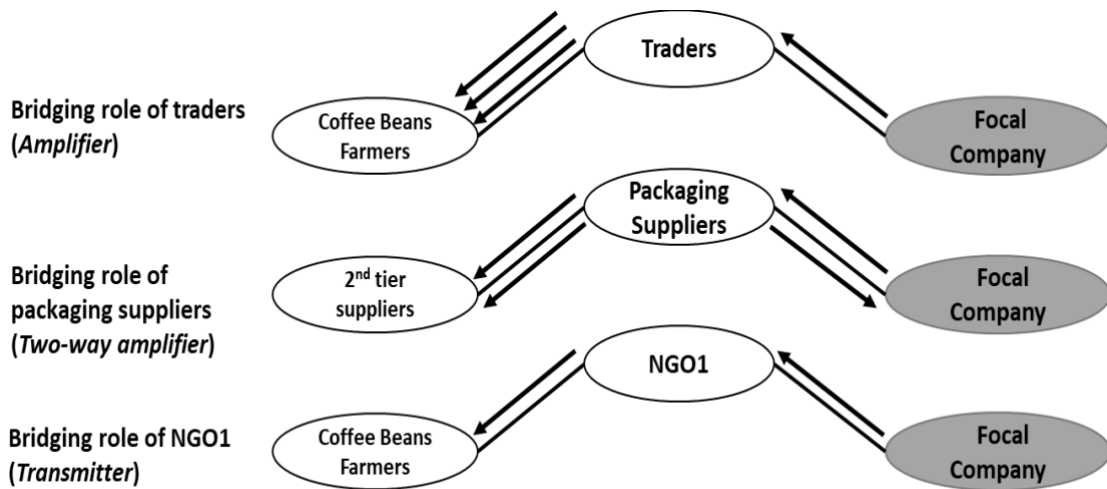


Figure 3. Bridging roles of suppliers and NGO1 in diffusing sustainability in the supply network (The number of arrows reflects the intensity of the sustainability practices)

Amplifier bridging role:

- Supplier cascades customers' sustainability practices and its own sustainability practices to lower tier suppliers resulting in increasing sustainability practices flow from one tier to another
- Requires supplier to possess sustainability capabilities to initiate practices to be cascaded to lower-tier suppliers
- Procurement function intervenes in sustainability practices cascading to lower-tier suppliers

Two-way amplifier bridging role:

- Supplier cascades sustainability practices in downstream and upstream of supply networks
- Requires supplier to possess sustainability capabilities to embark on two-way bridging role
- Procurement function intervenes in sustainability practices cascading to lower-tier suppliers

Transmitting bridging role:

- This role can be taken by supplier or NGO
- The scope of cascaded sustainability practice is determined by the customer
- May not require the intervention of procurement function as it concerns sustainability practices with little interaction

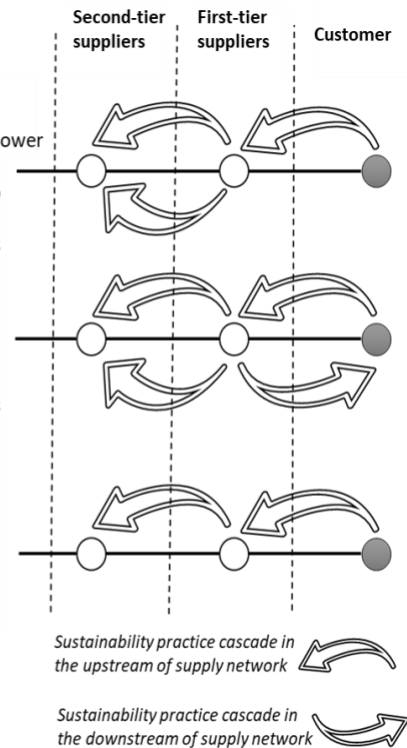


Figure 4. Bridging roles of first-tier suppliers in sustainability diffusion to lower-tier suppliers

List of Tables

Table 1. Focal company and supply network actors' interviews

Supply network actor	Actor type	Number of employees	Number of interviews	Interviewee title
Focal company	Coffee roasting	3800 (group)	7	Chief Purchasing Officer
				Coffee Buying Director
				Chief Institutional Relations & Sustainability Officer
				Head of Business Materials & Service Purchasing
				Environmental Sustainability & lifecycle assessment (LCA) Specialist
				Business Development Processes Specialist
				CSR Assistant
<i>Embedded case study one: coffee bean supply network</i>				
CT1	Coffee trader	41200 (group)	1	General Manager
CT2	Coffee trader	5500 (group)	1	Sustainability Manager
NGO1	Non-Governmental Organisation	24000	1	Private sector and SDGs Manager
<i>Embedded case study two: packaging supply network</i>				
PACK1	Packaging - Paper	46000 (group)	2	General Manager
				Innovation & Product Development
PACK2	Packaging - Paper	249 (group)	2	Plant Director & Manager
				Quality Manager
PACK3	Packaging - Flexible film	1800	3	General Manager
				R&D and Quality Control Manager
				Product Manager
PACK4	Packaging - Flexible film	700	2	Chief Financial Officer
				Sales & Marketing Manager
PACK5	Packaging - Co-packer	50	1	Quality Insurance Manager

Table 2. Diffusion of sustainability practices of the focal company and suppliers to sub-tier suppliers

Sustainability at the focal company				
<ul style="list-style-type: none"> ▪ Sustainability communication and knowledge sharing ▪ Sustainability training and awareness for internal departments ▪ Departmental collaboration to achieve sustainability targets 		<ul style="list-style-type: none"> ▪ Procurement department role: <ul style="list-style-type: none"> - Jointly with the CSR department: - Sets supplier monitoring (questionnaire) - Develops code of conduct ▪ Low engagement with suppliers over sustainability implementation 		
Sustainability practices of the focal company and other customers at the suppliers	Supplier	Sustainability practices conducting with second-tier suppliers	Scope of bridging role of first-tier suppliers in diffusing sustainability to lower-tier suppliers	Role of procurement function in sustainability diffusion (focal company and suppliers)
<i>Embedded case study one: coffee bean supply network</i>				
By the focal company: <ul style="list-style-type: none"> ▪ Code of conduct ▪ Certified coffee beans ▪ Joint sustainability projects: <ul style="list-style-type: none"> - Agribusiness practices, such as improving watering methods for farmers in Vietnam - Involvement of child labour on the coffee bean farms ▪ Certified coffee beans By other customers: certified coffee beans	CT1 & CT2	<ul style="list-style-type: none"> ▪ Code of conduct of the focal company ▪ Teaching farmers agronomy principles ▪ Farmers' education on child labour issues on the farms ▪ Certified coffee beans by NGOs ▪ Sustainability is a criterion in farmers' evaluation and selection ▪ Annual sustainability auditing by CT1 and CT2 ▪ Sustainability auditing by a third party ▪ Advance payments to help farmers buy various needs (machines, tools, etc.) 	<ul style="list-style-type: none"> ▪ Strong sustainability alignment with the focal company ▪ Building close relationships with farmers ▪ Implementing sustainability at farmers by local procurement staff ▪ Involving local NGOs in sustainability initiatives implementation and providing certified coffee beans 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has a limited role as the CSR department takes the lead in sustainability implementation with suppliers ▪ Procurement at CT1 and CT2 take the responsibility of implementing sustainability at farmers
NGO1	<ul style="list-style-type: none"> ▪ Strong sustainability alignment with the focal company ▪ Collaborating projects with the focal company on social issues, such as child labour ▪ Identifying the supply chain risks related to social issues, such as child labour, workers' rights and wages, etc. ▪ Revising the focal company's code of conduct 			
<i>Embedded case study two: packaging supply network</i>				

<p>By the focal company: communication on sustainability issues (recycled packaging and waste reduction)</p> <p>By other customers: Third-party auditing (Sedex and EcoVadis)</p>	PACK1	<ul style="list-style-type: none"> ▪ FSC certificate ▪ CO₂ reduction ▪ Recycled packaging 	<ul style="list-style-type: none"> ▪ Limited sustainability engagement with the focal company ▪ Centralised sustainability function for sustainability policy formulation and implementation with suppliers 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has no role in sustainability implementation with PACK1 ▪ Procurement at PACK1 has a principal role in implementing sustainability with second-tier suppliers
<p>By the focal company: recycled packaging materials</p> <p>By other customers:</p> <ul style="list-style-type: none"> ▪ Third-party auditing by Sedex ▪ Certificates (ISO14001, FSC) 	PACK2	<ul style="list-style-type: none"> ▪ Recycling packaging projects ▪ Code of Conduct of PACK2 ▪ Sustainability as criterion in supplier selection ▪ Sustainability auditing ▪ CO₂ reduction ▪ Certificates: ISO14001 and FSC 	<ul style="list-style-type: none"> ▪ Sustainability engagement with the focal company ▪ Centralised CSR function for sustainability policy formulation 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has no role in sustainability implementation with PACK2 ▪ Procurement at PACK2 has a principal role in implementing sustainability with second-tier suppliers
<p>By the focal company:</p> <ul style="list-style-type: none"> ▪ Code of conduct ▪ Recycled packaging materials <p>By other customers: third-party auditing by EcoVadis</p>	PACK3	<ul style="list-style-type: none"> ▪ Code of conduct of the focal company ▪ Packaging of recycling materials ▪ Sustainability auditing ▪ Supplier support to complete LCA analysis ▪ CO₂ reduction 	<ul style="list-style-type: none"> ▪ Sustainability engagement with the focal company ▪ Centralised sustainability function for sustainability policy formulation 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has no role in sustainability implementation with PACK3 ▪ Procurement at PACK3 has a principal role in implementing sustainability with second-tier
<p>By the focal company:</p> <ul style="list-style-type: none"> ▪ Sustainability questionnaire ▪ Recycled packaging project <p>By other customers: third-party auditing by EcoVadis</p>	PACK4	<ul style="list-style-type: none"> ▪ Recycled packaging materials ▪ Sustainability questionnaire ▪ Code of conduct of PACK4 ▪ Sustainability is a criterion in supplier evaluation and selection ▪ Sustainability auditing by PACK4 ▪ Training sub-tier suppliers on sustainability ▪ Gas emission reduction 	<ul style="list-style-type: none"> ▪ Sustainability engagement with the focal company ▪ Centralised entity for sustainability monitoring and implementation 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has no role in sustainability implementation with PACK4 ▪ Procurement at PACK4 is involved in implementing sustainability with second tier suppliers
<p>By the focal company: communication on sustainability issues (recycled packaging and waste reduction)</p> <p>By other customers: Certificates (UTZ & Rainforest)</p>	PACK5	<ul style="list-style-type: none"> ▪ Supplier auditing ▪ CO₂ reduction ▪ Recycled packaging 	<ul style="list-style-type: none"> ▪ Limited sustainability engagement with the focal company ▪ Sustainability requirements are conveyed to second tier suppliers by the general manager 	<ul style="list-style-type: none"> ▪ Procurement at the focal company has no role in sustainability implementation with PACK5 ▪ Procurement at PACK5 has no role in sustainability practices implementation at suppliers

Appendix. 1: Interview Guide

Focal company questions

- A1. What is the main motivation for your company's engagement in sustainability?
- A2. How is sustainability managed within your company?
- A3. What is the extent of your procurement function's involvement in sustainability (internally and with suppliers)?
- A4. What are the sustainability risks that you are facing within your supply network?
- A5. Can you map your supply network and main actors involved in your sustainability practices?
- A6. Which function is responsible for implementing sustainability with suppliers? What is the role of procurement in this function?
- A7. How do you take sustainability into consideration in supplier selection process?
- A8. How do you monitor your suppliers in terms of their compliance to sustainability? (e.g., auditing and questionnaires)
- A9. How do you monitor sub-tier suppliers for sustainability compliance?
- A10. Do you have any practice in place for supplier development with the focus on sustainability?
- A11. Do you have any joint project (e.g., new product or process) together with your suppliers that aim to address sustainability?
- A12. Can you elaborate on the role of this NGO in sustainability implementation with suppliers?
- A13. Can you address the other customer sustainability requirements?

Appendix. 2: Data Coding

