

TO CITE THIS PAPER: Silva, M. E., Pereira, M. M., & Boffelli, A. (2023). Bridging sustainability knowledge management and supply chain learning: evidence through buyer selection. *International Journal of Operations & Production Management*, 43 (6), pp. 947-983

LINK TO THE PUBLISHER VERSION:

<https://www.emerald.com/insight/content/doi/10.1108/IJOPM-01-2022-0047/full/html>

Bridging sustainability knowledge management and supply chain learning: evidence through buyer selection

Abstract

Purpose: To better understand the supplier's role in promoting supply chain sustainability (SCS), we investigated the learning process as it relates to sustainability knowledge. Through the lens of the knowledge-based view, we understand the shift of sustainability knowledge from rhetoric to common knowledge existent between suppliers and buyers.

Design/methodology/approach: A case study method was employed to study sustainability knowledge learning between a key global coffee supplier and its geographically dispersed buyers. The research was developed with data collected from 2019 through 2021. Interviews and secondary data were analyzed using both deductive and inductive approaches.

Findings: Results were organized to demonstrate how the supplier developed and transferred its own sustainability knowledge within supplier-buyer dyads. We uncovered that buyer selection was a vital strategy used to appropriate the value created to ensure SCS learning. Four learning stages were analyzed, and while the results indicated that all buyers acquired knowledge, they also showed that only four distributed it. Moreover, different levels of interpretation were identified, two of which were associated with a low level of understanding of the meaning of sustainability knowledge. In addition, the data provided little evidence of organizational memory. All links were guided by common sustainability knowledge learned through multiple learning loops between the supplier's knowledge management and buyers' SCS learning, thus boosting sustainability in the coffee supply chain.

Practical implications: A greater understanding of how sustainability knowledge is learned in supply chains helps managers develop better SCS strategies.

Originality: Unlike previous research, this paper illustrates that common sustainability knowledge is key to SCS implementation, which is made possible by carefully selecting buyers and by facilitating sustainability knowledge learning through two-way interactions.

Keywords: Supply chain sustainability, supply chain learning, sustainability knowledge, knowledge management, knowledge-based view, buyer selection

Article classification: Research paper

1. Introduction

The growing interest in supply chain sustainability (SCS) has created a momentum for scholars' and practitioners' efforts to share sustainability knowledge. For instance, Bateman et al. (2021) revealed an increase in firms' commitment to SCS on a global scale over time. Despite that, limited evidence exists to explain how suppliers, among multiple stakeholders, contribute to triggering the exchange of sustainability knowledge to enhance SCS learning (Cormack et al., 2021; Pereira et al., 2021; Jia et al., 2022). Recently, Johnsen et al. (2022) discovered that first-tier suppliers can diffuse sustainability practices in both upstream and downstream supply chains (SCs) and identified several bridging roles that suppliers play. However, a bridging role for translating sustainability knowledge into SCS learning remains overlooked. Such a perspective unveils a knowledge gap pertaining to the way suppliers generate sustainability knowledge along the SC (see Gong et al., 2018; Silvestre et al., 2020). To address this research gap, in this study we investigated how a global supplier developed its sustainability knowledge and, in turn, influenced the sustainability learning process of its buyers worldwide.

This paper defines sustainability knowledge as a strategic and specialized resource that firms use to execute sustainability-oriented policies and strategies. Since sustainability knowledge is diffused and influenced either by external pressures or, proactively, by internal needs (Carbone et al., 2012; Silva et al., 2021), we must clarify how it happens (Silvestre et al., 2020). We advocate that suppliers play a vital role in diffusing sustainability knowledge. Employing an integrated knowledge perspective (Barley et al., 2018), we applied the knowledge-based view (KBV) to study sustainability in SCs because this perspective considers how firms develop their knowledge as a strategic resource (Grant, 1996; Grant and Phene, 2022). The KBV perspective of sustainability knowledge management (KM) in SCs is underexplored (Roy, 2019); thus, new studies that extend beyond the firm level are needed (Chopra et al., 2021; Despeisse et al., 2012). Following this rationale, another gap emerges in

which the KBV becomes the key to elaborating theory on how sustainability KM alters SCS practices.

Knowledge acquisition and transfer are crucial to the successful management and integration of sustainability initiatives in global SCs (Busse et al., 2016; Koberg and Longoni, 2019). Moreover, KM is promoted in the context of SCs because it requires long-term and trust-based relationships (Marques et al., 2020; Schoenherr et al., 2014). In this paper, we acknowledge that suppliers' sustainability KM leads to SCS learning (Robinson et al., 2006; Roy, 2019; Sauer et al., 2022; Silvestre et al., 2020). This happens because SC members often seek information from one another; thus, suppliers serve as vital information sources for their buyers (Huber, 1991), mainly in terms of sustainability to manage global SCs. For instance, suppliers can cascade sustainability to buyers in a reverse way (Johnsen et al., 2022), which reinforces our argument regarding suppliers' sustainability KM.

Accordingly, we were especially interested in learning how and why a well-established global supply company developed and managed its sustainability knowledge and transferred it to its international buyers. In this context, SCS learning refers to understanding “sustainability-related knowledge, behaviors and values resulting from the experiences of SC actors in implementing sustainability initiatives” (Pereira et al., 2021, p. 716) and occurs in four stages: acquiring, distributing, interpreting, and storing these experiences (Huber, 1991). Therefore, to address the research gaps revealed, this study intend to bridge links between sustainability KM and SCS learning to reduce the constant lack of information on how sustainability is practiced. A supplier–buyer relationship perspective is taken, as we studied an export-oriented Brazilian coffee producer—a global supplier—and how (surprisingly) buyer selection was employed to manage sustainability knowledge learning. We justify conducting this study in Brazil because it is the world's largest (sustainable) coffee producing country, supplying around 32% of the total coffee consumed globally (International Coffee Organization, 2021). Based on previous arguments and understanding that firms rely on knowledge-generating resources (Martins et al., 2019), we proposed two research questions that were previously unanswered in the literature:

RQ1: How does a global supplier operationalize sustainability knowledge management in the (coffee) supply chain?

RQ2: How do geographically dispersed buyers learn sustainability knowledge?

To address these research questions, we conducted an in-depth case study and identified two contributions this research makes to the literature. First, to the best of our knowledge, this is the first paper to empirically identify buyer selection as a crucial component of SCS learning, as our findings indicated that buyer selection was key to sustainability knowledge learning. This reveals that, in addition to accumulating knowledge (Pereira et al., 2021; Jia et al., 2022), suppliers can use their power to influence global SCS, which moves beyond the often limited focus on suppliers' activities of extraction, production, and manufacturing (Liu et al., 2019). Secondly, we show how sustainability, as a specialized knowledge, reaches multiple SC members. Using the KBV, we empirically explored the learning loops to sustainability knowledge learning to enhance sustainability practices and performance (Roy, 2019; Silvestre, 2015). Such a perspective boosts a strategic position in the market for the supplier firm and, consequently, for the buyers, who frequently are better able to understand the sustainability knowledge than produce. This research provides reflections for scholars and practitioners on moving from a rhetoric approach to a more effective sustainability implementation.

2. Theoretical background

SCS refers to “specific managerial actions that are taken to make the SC more sustainable with an end goal of creating a truly sustainable chain” (Pagell and Wu, 2009, p. 38). Such actions are often focused on manufacturers, who share the responsibility of adopting sustainability with multiple actors, such as suppliers, consumers, and other partners in the SC (Tsoufas and Pappis, 2006). To this end, the literature assumes selecting the best supplier is critical to improved performance and competitive advantage, especially when related to sustainability concerns (Grimm et al., 2014). However, as argued by Ramanathan et al. (2021), a need exists to select different SC partners instead of simply focusing on supplier selection. As stated by these authors, selecting the right partners who have similar sustainability actions and interests is vital to strengthening collaborations and, consequently, environmental and economic performance. Adding to this debate, Kuppusamy et al. (2021) developed a decision-making model and found that, although buyer selection was not a typical initiative in SCs, it could increase profit control—that is, improve performance. Moreover, buyer selection appears relevant to managing SCs, mainly in terms of sustainability; however, little knowledge has been developed using this perspective. Thus, scholars need to further explore how to develop a shared

understanding of the relevant concepts, processes, and sustainability objectives across SC members (Busse et al., 2016).

By viewing sustainability KM as a managerial action taken to promote SCS among SC members, this section explores how sustainability knowledge contributes to sustainability implementation in SCs from a supplier perspective. First, we explain how the KBV supports the definition of sustainability knowledge as a strategic resource. Second, we show how SCS learning is relevant in terms of sustainability KM. Finally, we claim that companies can follow new pathways to ensure a clear transition to sustainability through KM.

2.1 Knowledge-based view and sustainability management

Grounded on the resource-based view contributions, the KBV emerged as a strategic management perspective employed to understand how companies use their intangible resources competitively (Blome et al., 2014; Eisenhardt and Santos, 2002; Hult et al., 2006). The KBV considers knowledge as the “input–output combinations achievable with all possible mixes and levels of activities known to the firm” (Nickerson and Zenger, 2004, p. 618). In this sense, companies should be aware of their knowledge related to “the nature of coordination within the firm, [the] organizational structure, the role of management and the allocation of decision-making rights” (Grant, 1996, p. 110). Knowledge is managed according to multiple social and technical processes in a specific organizational context (Barley et al., 2018); thus, in this research we focused on the supplier context to provide new insights for KM studies.

To apply the KBV to sustainability management, we needed to avoid a narrow analysis of knowledge creation or application and frame the firm’s knowledge resources (Roy, 2019). As presented by Grant (1996), such organizational resources should emerge through four key strategic foundations:

- *Production* refers to the “creation of new knowledge, the acquisition of existing knowledge, and [the] storage of knowledge” (Grant, 1996, p. 112).
- *Aggregation* denotes companies’ capacity to generate specific knowledge before efficiently transferring it.
- *Transferability* is the communication process of *knowing how* (i.e., tacit) and *knowing about* (i.e., explicit; see also Nonaka and Takeuchi, 2007).
- *Appropriability* refers to companies’ ability to retain the value created by the knowledge provided.

These foundations can clarify what knowledge emerges at the firm level, but they can also help understand how companies develop knowledge exchanges. Often, the KBV is applied to the firm level; however, we explored it using the supplier influence on the SC level, namely, by considering the supplier–buyer relationships (Schoenherr et al., 2014). In doing so, although recognizing that buyers and suppliers in global SCs generally do not have strong relationships (Marques et al., 2020), we understand that the usual relationships may differ with respect to sustainability. In this sense, Hall and Matos (2010) claimed that the existence of multiple knowledge levels among SC members can create power asymmetry, hinder inter-firm learning, and consequently, hamper SCS implementation. As such, the ability to exercise power will depend on the SC firms' willingness to diffuse sustainability (see Silva et al., 2021; Touboulic et al., 2014) because sustainability KM cannot be limited to buyers in SCs. Therefore, reflecting on the power matrix developed by Cox (2001), we note that under the power circumstances by which buyers are not able to dominate the relationships, suppliers can assume this position of influence in the SC.

Researchers have employed the KBV to explore various SCS perspectives. For example, Blome et al. (2014) used the KBV to study SC collaboration and its contribution to sustainability. Additionally, while Kong et al. (2020) used it to examine knowledge creation for green SCs, Roy (2019) argued theoretically that the KBV supported SCS learning and performance. To employ the KBV related to SCS, we needed to approach the specialized knowledge selected here as sustainability knowledge. Thus, we used sustainability knowledge as the unit of analysis because, more than including generic ideas, companies need to effectively develop and align with their sustainability expectations to implement SCS. Such knowledge is defined here as integrated once it is collective (team, group, organization), generating a trajectory of harmonized action (Barley et al., 2018). Departing from the approach taken by previous researchers, this study explored the use of sustainability KM through the lens of the KBV as supporting SCS learning.

2.2 Supply chain learning for sustainability knowledge management

In exploring the sustainability knowledge recognized through the lens of the KBV, KM shapes a set of complexities because it comprises integration, building, and reconfiguration of existing competences among SC members (Roy, 2019; Schoenherr et al., 2014). For instance,

the business environment of global SCs, such as the environment of sustainability initiatives implemented across multiple countries and specific industrial contexts, generates multiple opportunities for sustainability KM toward SCS learning (Roy, 2019). Hence, three mechanisms are essential for turning KM into practice (Loon, 2019): (1) a learning and knowledge creation culture, (2) an organizational knowledge architecture for adaptive and exaptive capacities, and (3) a “business model” for knowledge value capture. These mechanisms help firms better manage sustainability knowledge because the powerful SC partner responsible for developing the learning culture in terms of SCS must be identified when efforts move beyond mapping what knowledge was produced and shared in a specific SC.

Prior research on sustainability KM in SCs exists; however, it focuses on specific parts, such as knowledge sharing (Chopra et al., 2021). For instance, Villena et al. (2021) investigated knowledge-sharing routines for transferring environmental and social information to suppliers. Additionally, Robinson et al. (2006) developed a five-stage maturity roadmap model to analyze the relationship between KM and corporate sustainability, but the model was not limited to the firm level. Therefore, studies that demonstrate sustainability KM going beyond knowledge sharing are necessary because, despite the relevance of KM for sustainability (Hörisch et al., 2014; Lim et al., 2017; Martins et al., 2019), little is known about how to obtain sustainability knowledge beyond company boundaries (Klingenberg and Rothberg, 2020). This is the reason for mobilizing the SCS learning approach combined with KM.

Despite their relevance, SC learning studies related to sustainability implementation are still underrepresented in the literature (Gong et al., 2018; Silvestre et al., 2020). Cormack et al. (2021) demonstrated that SCS learning relies on a process-based approach, entailing multiple levels of SCS learning, which affects sustainability in SCs. Pereira et al. (2021) defined these levels of SCS learning and stated that sustainability knowledge is experienced on the *SC level* when it crosses the firm-level boundaries. The SCS learning levels relate to sustainability orientation and rely on SC capabilities developed by firms through intra- and inter-organizational relationships (Silvestre et al., 2020; Sauer et al., 2022).

Even more significant, few connections exist between SCS learning and KM to trigger sustainability practice and performance (Roy, 2019). We realize that SC learning sources, antecedents, and barriers are key to implementing sustainability (Gavronski et al., 2012; Yang et al., 2018). For example, cultural adaptation (Jia and Lamming, 2013) should be observed because it affects sustainability in multiple contexts and helps knowledge transcend from information to become practice (Yang et al., 2018). Leadership style also plays a vital role in

managing SC ambidexterity (Ojha et al., 2018), primarily within dynamic environments. Additionally, the bridging role of suppliers for sustainability knowledge diffusion becomes relevant to ensuring SCS learning (see Johnsen et al., 2022). Therefore, further reflections are needed on KM, mainly in the context of global SCs, where managing sustainability is more complex due to diverse characteristics, such as culture, size, language, bargaining power, and resources (Koberg and Longoni, 2019; Roy, 2019).

To implement SCS, “an entity learns if, through its processing of information, the range of its potential behavior is changed” (Huber, 1991, p. 89). Therefore, as SCs are composed of several entities/organizations, as Silvestre et al. (2020) claimed, a SC can “learn new knowledge, unlearn obsolete knowledge, and face resistance from different sources.” SCS learning expects changes on multiple levels (Knoppen et al., 2010) to ensure sustainability. This broader perspective becomes critical, especially regarding the role of suppliers, a SC member not often strongly considered in SCS learning studies (Pereira et al., 2021). For instance, Jia et al. (2022) elaborated on how suppliers learn sustainability through explorative, transformative, and exploitive learning to generate absorptive capacity. In addition, Johnsen et al. (2022) observed marginal action from a buyer’s procurement department in acknowledging the role of suppliers in diffusing sustainability practices. The learning source is vital to identifying suppliers’ contribution to SCS learning because buyers often are related to vicarious learning—acquiring second-hand experience, for example, by borrowing knowledge from suppliers—while, on the other hand, suppliers are associated with congenital learning; that is, they explore previous experiences of their owners or employees (Huber, 1991). Such a perspective demonstrates the power of considering suppliers as key players in SCS learning for global SCs that may assume the position of SC leaders (Roy, 2019).

Cormack et al. (2021) identified a set of models to explain SCS learning and proposed a theoretical framework related to four processes: setting up, operating, sustaining, and updating. Such a perspective is relevant to developing a broader understanding of SCS learning; however, as we were interested in each individual step of the learning, we selected Huber’s (1991) model because it demonstrates a clear learning process from acquisition to dissemination and, therefore, fit with our proposal to understand sustainability as an integrated and strategic knowledge (see Hult et al., 2006). The model chosen included four stages: knowledge acquisition, information distribution, information interpretation, and organizational memory. Based on Huber (1991), these stages can relate to SCS learning as follows:

- *Knowledge acquisition* refers to a multifaceted approach to learning at multiple levels (e.g., learning from experience and searching; Gong et al., 2018; Silvestre et al., 2020; Cormack et al., 2021).
- *Information distribution* is directly related to the way multiple levels of learning can be involved in sharing and disseminating specific knowledge (Marques et al., 2020; Schoenherr et al., 2014).
- *Information interpretation* includes the stage of learning in which the knowledge received is elucidated, which can include, for example, the use of cognitive maps, sense-making, and unlearning (Revilla and Knoppen, 2015; Silvestre et al., 2020).
- *Organizational memory* refers to a process through which knowledge is stored at multiple levels (e.g., information storage, informative systems), becoming familiar to daily SC operations (Hult et al., 2006).

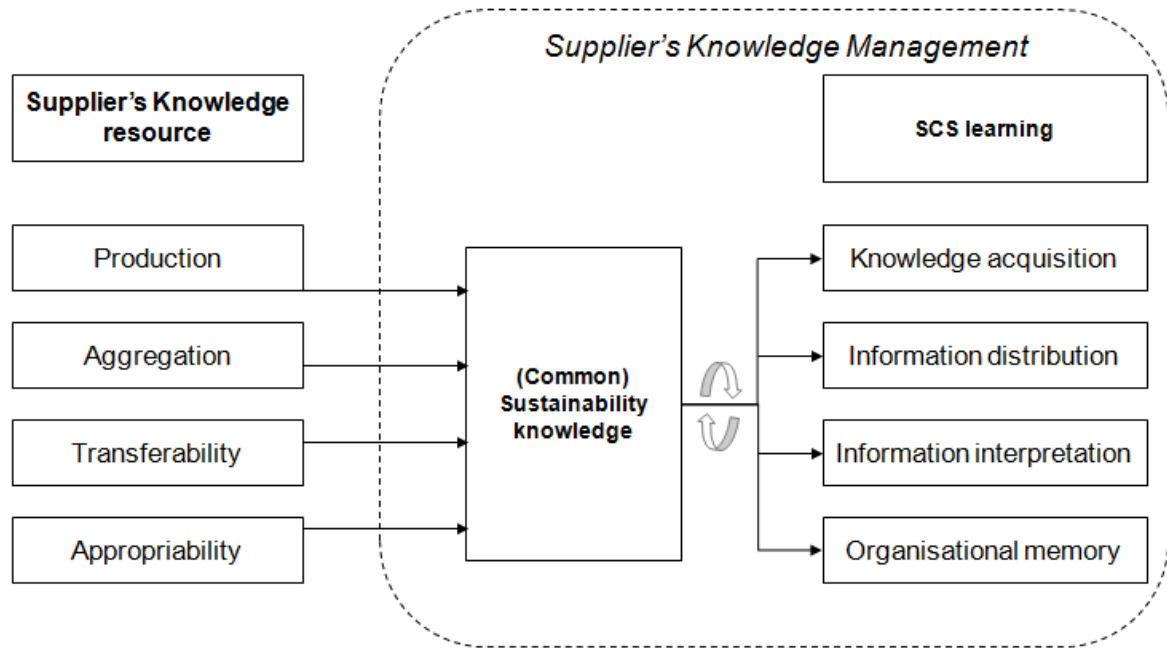
To the best of our knowledge, these stages were never systematically applied to SC (sustainability) research, demonstrating the importance of building theory through a multidisciplinary approach. Overlaps exist in using KBV foundations and SC learning stages; thus, we propose understanding their limits and complementarities to advance the literature. Using a supplier perspective, we need to understand how these SC members can influence SCS implementation, not only by applying what is requested by buyers but also by managing their own knowledge.

2.3 Developing common knowledge for sustainability: an analytical framework

To better present the research proposal of this study, we summarized our perspective by developing an integrative approach to sustainability KM and SCS learning. As depicted in Figure 1, the supplier's knowledge resource—represented by four KBV foundations (production, aggregation, transferability, and appropriability)—can generate (common) sustainability knowledge toward SCS learning (i.e., knowledge acquisition, information distribution, information interpretation, and organizational memory). To this end, the supplier's KM for sustainability helps to strengthen and align its vision, competences, and resources internally and to diffuse the knowledge to the next tier (Johnsen et al., 2022; Roy, 2019). This next tier can be any SC partner, including buyers (Ramanathan et al., 2021). Thus, this paper reflects two main research gaps: (1) the powerful role of suppliers as SC members in generating

(common) sustainability knowledge for SCS learning and (2) the use of the KBV to bridge sustainability KM and SCS learning with an emphasis on the SC level, especially in terms of the supplier–buyer perspective.

Figure 1: An integrative approach to sustainability KM and SCS learning



The literature shows a linear understanding of sustainability knowledge affecting SCS learning (Roy, 2019); however, as illustrated in Figure 1, learning loops related to SCS generate feedback among SC members (Silvestre, 2015). Despite that, the literature still lacks a comprehensive understanding of how these learning loops exist in reality (see Cormack et al., 2021). A few examples were identified mentioning learning loops in action. For instance, Silvestre et al. (2020) explored the SC trajectory concept and showed some initiatives related to SCS learning loops, and Sauer et al. (2022) investigated how these learning loops were linked to resilience for SCS. Therefore, as SCS learning occurs through a multilevel approach (Knoppen et al., 2010) and several studies on SCS learning exist, our distinct focus was on the way suppliers can manage sustainability knowledge as a strategic, intangible resource and trigger SCS learning as part of their strategic relationship with buyers.

3. Research method

An in-depth case study was employed to identify how a global supplier from an emerging country managed sustainability knowledge and the SCS learning of geographically dispersed buyers. We justify using the case study method due to its potential for elaborating theory (Eisenhardt and Graebner, 2007; Ketokivi and Choi, 2014; Yin, 2017). Moreover, the case study approach is particularly suitable in the case of exploratory investigations—here related to the role of the supplier in managing sustainability knowledge learning—when the variables are still unknown and the phenomenon is not yet understood (Voss et al., 2016). Generally, using a single case allows a greater depth of exploration and has proven to be decisive in the early stages of the theory development cycle (Voss et al., 2016). Single cases may also open the opportunity to research multiple contexts within the same case (Mukherjee et al., 2000). As such, the unit of analysis of this research was sustainability knowledge.

3.1 Case selection and research context

The case of a set of supplier–buyer dyads was selected to represent the phenomenon of a supplier’s management of sustainability knowledge along a SC. To this end, a key supply company was selected that we believed strongly represented the phenomenon under study, as it was considered to be transparently observable, which is fundamental in single case studies (Voss et al., 2016). This case was selected purposefully to ensure that it had the necessary characteristics. This specific case was selected also because it was found to be one of the rare known cases in which a supplier selects its buyers based on their sustainable features and shared visions. We intended to bring evidence and discussions on this strategic action to the academic and practice worlds to enable a positive transition toward this kind of reasoning by showing that it is possible and how it can be reached.

The selected company, a large Brazilian coffee producer, was an export-oriented supplier founded in 1995 and based in the Cerrado Mineiro Region. The mission of the company included both quality and sustainability objectives, as the company claimed to be striving to produce the best sustainable coffee and to contribute to creating a better world. The firm engaged in all activities involved in coffee production, ranging from farming through the sale of the packed green coffee. The major clients were either small roasters or coffee traders from around the world. The global reach of the case company enabled us to examine multiple supplier–buyer dyads—our level of analysis—by considering geographically dispersed buyers.

We selected multiple buyers, as the scope and challenge of sustainability differ across regions (Johnsen et al., 2022; Roy, 2019).

3.2. Data collection

Data were gathered through semi-structured interviews and secondary data sources from 2019 through 2021. First, we designed our research protocol, including the roles and number of people to be interviewed and the set of questions/areas to be addressed (provided as Supplementary File). More specifically, we developed two sets of questions—one for supplier-side respondents and one for the various buyers. The founder and the managers of the supply company were interviewed first; then, some employees were also interviewed to assess the effectiveness of the sustainability knowledge learning internally within the company (see Table 1). A total of 533 minutes of audio were produced through 11 interviews with supplier-side participants. In addition, international buyers from multiple countries—namely, Japan, United Kingdom (UK), United States (US), Israel, Canada, and Spain—were interviewed to assess the effectiveness of sustainability knowledge learning along the SC (Table 1); 7 buyer-side interviews produced 265 minutes of audio.

Table 1 –Interviews information

Interviewee	Role	Number of interviews	Total duration of interviews	Period of data collection
Supplier-side				
Director	Responsible for strategic management and sustainability and educational projects management.	4	210 minutes	2019-2021
Manager of Sustainability	Responsible for managing sustainability certification programs in the company and participating in decision-making related to sustainability in company routines.	1	30 minutes	February 2021
Manager of Processes and Technology	Responsible for processes and technology management and participating in decision-making related to sustainability in company routines.	1	60 minutes	February 2021
Founder	Founder of the company and primary source of the sustainability-oriented vision.	1	75 minutes	July 2021
Logistic analyst	Responsible for operationally managing company logistic processes.	1	27 minutes	September 2021
Post-harvest analyst	Responsible for coordinating the post-harvest processes.	1	46 minutes	September 2021
Manager of marketing and quality development	Responsible for spreading information and communicating about the company and their sustainability activities and coffee quality.	1	60 minutes	October 2021
Logistic coordinator	Responsible for planning and optimizing logistic operations.	1	25 minutes	October 2021
Buyer-side				
Trading manager	Japan	1	40 minutes	June 2021
Trading employee	Japan	1	25minutes	June 2021
Trading manager	UK	1	45 minutes	June 2021
Trading manager	US	1	30 minutes	July 2021
Founder	Israel	1	40 minutes	August 2021
Founder	Canada	1	45 minutes	August 2021
Supply chain manager	Spain	1	40 minutes	September 2021

All researchers participated in data collection during all interviews, which was vital to preventing biases from influencing the subsequent data interpretation. Moreover, all interviews were recorded and then transcribed verbatim to support the coding of the relevant information (Voss et al., 2016). All supplier-side interviews (except one with a director) were conducted in Portuguese, and the selected quotations were translated to English. All buyers' interviews were conducted in English.

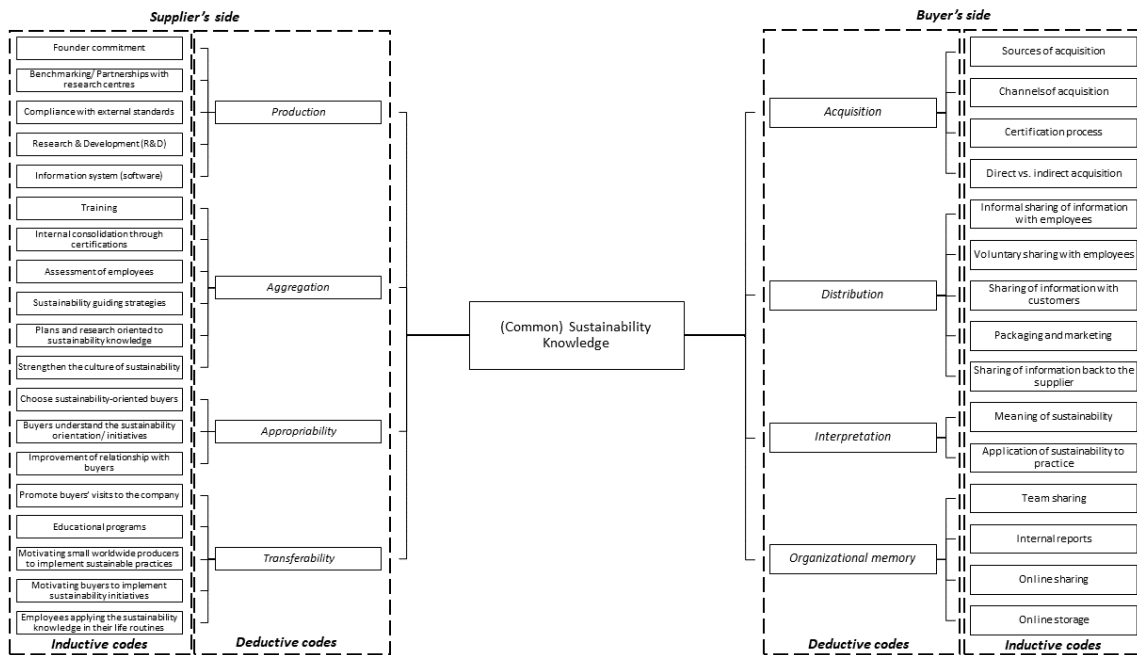
Secondary data were collected from multiple sources, such as newspapers, company websites, and internal documents (e.g., registers of sustainability implementation, internal newsletters). In particular, for what concerned the supplier, we collected 2 company sustainability reports, 6 internal documents provided by managers (i.e., presentations about sustainability training, certifications for employees, and a letter articulating the company's principles written by hand by the founder), and 11 news publications (from international and national news websites and websites focused on the coffee market and culture), in addition to the information provided on the company website and its three social media accounts. For the buyers we collected one sustainability report from the Japanese buyer and five news publications (i.e., two from the UK buyer, one from Canadian buyer, and two from the Spanish buyer), along with the information provided on each company's website and the information available through social media from two buyers (Spain and UK). The use of secondary sources together with interview data was relevant for triangulation purposes (Yin, 2017). In this context, both data collection techniques working together helped to reveal how intended actions were put into practice.

3.3 Data analysis

We examined the data gathered (i.e., transcriptions of the interviews and the secondary data) using a content analysis to assess sustainability KM and SCS learning by following Strauss and Corbin's (1990) method for developing a coding scheme. At first, we employed open coding to inductively identify the main categories (Figure 2). To this end, we assigned names to individual quotes and events and grouped them into categories and subcategories (Voss et al., 2016) using a back-and-forth strategy to start linking the categories with the related literature. This analysis (open coding) was relevant to ensure a clear comprehension of the sustainability knowledge, defined in this study as the unit of analysis. Therefore, to identify sustainability knowledge production, management, and learning, we performed analyses across

supplier–buyer dyads (axial coding). As depicted in Figure 2, following the approach proposed by Strauss and Corbin (1990), the second step was axial coding the initial categories into aggregate themes. To carry out this process, we used existing themes (i.e., deductive approach), following the literature. For the KBV foundations we used production, aggregation, transferability, and appropriability to define sustainability knowledge. In addition, the SCS learning stages (i.e., acquisition, distribution, interpretation, and organizational memory) were identified among the data analyzed. This was necessary because, according to Eisenhardt and Graebner’s (2007, p. 25) arguments, the data analysis should follow a “recursive cycling among the case data, emerging theory, and later, extant literature.”

Figure 2: Coding tree



We needed to add a deeper analysis for the interpretation stage of SCS learning, so we focused on how the meaning of sustainability was understood, which was analyzed according to high and low levels. Defining the meaning of this concept is a very subjective endeavor; thus, we concentrated on translating the meaning of sustainability through the existing engagement of buyers into the meaning of sustainability through suppliers’ initiatives. Thus, we accept that a buyer has a high degree of understanding of the meaning of sustainability when that buyer applies the sustainability knowledge in practice. In contrast, the level of understanding is low when the buyer simply captures the information without applying it properly. The completed

set of data gathered was analyzed by two researchers separately, who met several times to obtain overall agreement. When agreement could not be reached, the third researcher also joined the encoding procedure to find unanimity (Miles et al., 2020). Having confirmed agreement regarding the coded data, the research team then developed the case narrative and separated insights related to all supplier–buyer dyads.

3.4 Trustworthiness criteria

Our qualitative research used several trustworthiness criteria to guarantee quality research standards. Specifically, we applied the four trustworthiness criteria proposed by Lincoln and Guba (1985): credibility, transferability, dependability, and confirmability. First, credibility was pursued through several actions. For instance, we relied on multiple sources of evidence, including interviews and secondary data resources, to ensure triangulation. The interviews were conducted with multiple informants representing both supply and buyer companies to gather a variety of perspectives. In addition, we collected such documentation as internal records, news media publications, and information from the companies' websites and social media accounts. Credibility was also safeguarded by using a well-structured case study protocol (see Supplementary File for the three interview protocols developed) to ensure transparency in the study design, which also ensured replicability.

Secondly, transferability was achieved by describing the characteristics of the research context, by providing a detailed presentation of the findings, and by ensuring that findings were congruent with the literature (Eisenhardt and Graebner, 2007; Yin, 2017). Of course, statistical generalizability cannot be achieved from a single case study, especially from the peculiar case analyzed in this research. However, given the theory-building orientation of this study and the specific objectives it aimed to achieve, we believe this is not a concern, and we assert that transferability was guaranteed by the development of a research framework explicitly derived from the literature. Finally, to achieve dependability and confirmability (Lincoln and Guba, 1985), we ensured the involvement of multiple researchers in the interpretation of the interview transcripts and secondary data, as well as in the coding phase. We made sure to report the evidence collected back to the key informants, too; along those lines, one researcher was constantly in contact with the sustainability manager in the supply company.

4. Findings

This section provides the main findings of this research. First, section 4.1 shows details on how the case was studied, with close attention to the supplier–buyer dyads established. Second, we focus on answering the first research question by showing how the supply company operationalized its sustainability KM. Finally, we address the second research question with information on how buyers learned sustainability knowledge.

4.1 Case details: shedding light on supplier–buyer dyads

This case study centered on a key global coffee supplier and a set of supplier–buyer dyads involving international buyers geographically dispersed across continents. To analyze the case, first, we introduce the supply company, which was created to be sustainable. It began operations with a focus on producing specialty and sustainable coffee. According to the founder: *“When this company was born, Brazil was highly recognized for producing specialty coffee but not for sustainable coffee. So, it was an opportunity to make a difference.”* The same perspective was expressed by the company’s director: *“Our business was conceived in a model to be sustainable, producing high-quality coffee on a large scale with social and environmental responsibility.”* She also explained: *“My business can and must improve the planet. I need to improve our company day by day. Agriculture doesn’t have to be a villain on the planet.”* The company adopted four standards (i.e., B Corporation, ISO 14001, Rainforest Alliance, and UTZ) and was classified as large with 370 permanent employees and 120 temporary contracts annually. The coffee produced by this company has been exported to around 20 countries across all continents; buyers in six of those countries were investigated in this research.

According to all managers and employees interviewed, the supply company was a pioneer in implementing sustainability in the coffee environment, which distinguished it from similar companies in Brazil. Such a mission was not only novel for the market but also to all employees who needed to learn about sustainability. In the words of the post-harvest analyst: *“Twenty-two years ago, when I started to work here, I had never heard about sustainability. It was a novelty to me and my colleagues.”* Since the beginning, all managers’ decisions had been based on sustainability principles. This was reinforced during the interviews. For instance, the manager of processes and technology noted: *“We focus on sustainability in everything we do and [everything] we decide.”* Similarly, the director explained: *“Even to buy new equipment, for example, we evaluate all its sustainability issues. We do a super-serious study. In everything,*

we focus on knowledge about sustainability and improving accordingly in our area of expertise.”

To ensure that sustainability took place beyond the company’s boundaries as well as within, the supply company applied a specific buyer selection strategy. Unlike the frequent focus on buyers’ selection of suppliers, the supply company relied on its strategic sustainability orientation to select buyers, using as the main criteria for the selection the buyers’ sustainability values. This could be related, for instance, to buyers being certified. Thus, as indicated by the director: *“Since we started selling coffee to importers, our goal was to have certified importers, so we started looking for clients who had some type of certification. And this already made us start our portfolio of clients who have this within their vision, their strategy. [...] We aim for long-term relationships with our clients. They enable trust and sustainability.”* To this end, in the beginning, in the words of the director: *“We started to talk only with importers that were [sustainability] certified, so actually, I sat down with my colleague as we got the list of Rainforest Alliance coffee importers all over the world, and we started sending e-mails, presenting ourselves.”* Departing from the buyer selection focus, initiatives were developed to ensure continuity of the relationship. This decision echoes the suggestion from Ramanathan et al. (2021) to increase efforts to collaborate with buyers for sustainability.

The buyer selection strategy was, indeed, a strong target for the supply company since its foundation. According to the founder: *“We produce sustainable coffee. That’s why we have sought a business relationship with buyers who saw sustainability as a value and already had certification.”* Selecting buyers reflects the supply company’s commitment to sustainability, but it also opens the opportunity to develop other initiatives to reduce its negative impact on society because this strategy provides the company with *“the opportunity to build a sustainable chain, transforming the agriculture from the planet villain to the regenerator, and it has been in the entire chain”* (Director). The company’s target was to have *“a long-term relationship with our clients. It enables trust as well as sustainability”* (Director). In this context, all six international buyers investigated in this research were selected to become part of the supply company’s sales portfolio because they met these criteria.

- Japanese buyer: This buyer company, founded in 1889, represented, in its’ own words, *“the fourth biggest country to consume coffee.”* It had begun working with the supply company 15 years earlier, due to both engagement and interest in sustainability and quality. This buyer focused on green beans and recognized the importance of the

- supplier. The buyer trading manager acknowledged this importance, noting “*[The supplier] is not simply following the Rainforest Alliance, but it is always going beyond.*”
- UK buyer: This buyer company was founded in 1970, and according to the buyer trading manager: “*We were the first importer in the UK to bring in Fairtrade coffees, Rainforest [Alliance] coffees, and organic coffees.*” Therefore, the supply company made contact to establish a commercial relationship. Since then, they have had several exchanges, and as claimed by the trader, “*we just became B Corp. certified because of [the supplier] as well.*”
 - US buyer: This buyer company had 51 years in the market and had been selected as a buyer more than a decade prior. The buyer trader recounted: “*They approached us to be a partner here in the [United] States, and so as part of our specialty program, we encourage our roasters to try this amazing product; it is so special because of all the care and all the energy that’s put into making such an amazing coffee, you know, the sustainability perspective, the Rainforest Alliance, the ISO certifications.*”
 - Israeli buyer: This buyer company was founded in 2015 and was interested in green bean sourcing. As the founder explained, “*in 2018, we got a message from [director name] that she was coming to Israel. [...] Somehow, she heard about us and considered [us] a good micro roaster in Tel Aviv, and [in the same message she asked] if we would like to meet and know anything about [the supplier].*”
 - Canadian buyer: This buyer company that worked as a green coffee importer started its partnership with the supplier only a few years previous. The owner mentioned: “*They [the supply company] shared with me some of the things they’re doing on their side in terms of sustainability projects, like the trillion projects, the carbon credits that they’re now producing and looking to pass throughout the supply chain.*” The intention was to grow the relationship in the future due to their frequent, ongoing exchanges.
 - Spanish buyer: This buyer company had 46 years in the market and had joined the supply company’s portfolio years earlier. As mentioned by the buyer SC manager: “*They [the supply company] are probably our most out there supplier doing that, or just starting the discussion, for example, about the carbon neutral project or the B Corp. discussion.*”

This information shows that, indeed, the strategy to select buyers was based on sustainability values, validated by evidence not limited to certification but also including effective sustainability initiatives among these SC partners. Therefore, *“I believe that the entire chain is seeing, and more than that, the chain realized that it has to ensure that its supplier and all other links are sustainable and correct”* (Director). To ensure a sustainability orientation, the supply company considered that certifications materialized their own culture and principles. In this vein, certifications were relevant to training their employees: *“They [the certifications] guide us on what to do and how to guide each employee”* (Manager of Sustainability). The supply company did not stop at this strategy, as it also developed other initiatives, such as supporting small buyers’ survivability during the COVID-19 crisis. An online news article confirmed this position on supplier–buyer relationships taken by the company: *“This period [COVID-19 pandemic] has been difficult for small and medium-sized companies. Therefore, we decided to help them [buyers] align with our values.”*

Following these findings, we identified a strong management of the supply company’s sustainability, which was closely related to sustainability knowledge. To explain such a perspective in more detail, the next section addresses what constituted sustainability knowledge for the supply company.

4.2 KBV: revealing the common sustainability knowledge

To better identify sustainability KM from a supply company perspective, we were interested in understanding how sustainability knowledge had been created within the key supplier in focus and then spread through the SC. As sustainability knowledge refers to a strategic and specialized resource, it was defined as the unit of analysis for this research. Therefore, we adopted the KBV as our theoretical lens and investigated the four key foundations identified by Grant (1996). These four foundations were related to common sustainability knowledge and, consequently, to SCS learning. To this end, buyer selection was central to building common sustainability knowledge because several interactions between buyers and suppliers were required (see section 4.3). Our findings indicate that more than diffusing information about sustainability, the supply company facilitated direct engagement with sustainability knowledge internally and through the downstream SC. According to the interview data, the founder was responsible for the initial sustainability commitment because he had inspired the advancement and improvement of sustainability knowledge in the supply

company. From the supply company's beginning to the time of the interviews, the founder had pushed the team to share sustainability knowledge: "*The founder usually sends e-mails and reminds us during meetings about our responsibility to search for more sustainability knowledge and to make all decisions based on sustainability principles*" (Logistics Coordinator). Such a perspective is aligned with our literature review, as building common sustainability knowledge is relevant for supplier–buyer relationships' KM. Table 2 summarizes the main results concerning sustainability KM.

Table 2 – Supplier’s sustainability knowledge management

KBV foundations	Sustainability KM Source	Key quotations from interviews/information from documents	Buyers’ involvement
<i>Transferability</i>	Promote visiting of buyers to the company	<i>“Every time our customers want to understand our sustainability, we show them the farm. It demonstrates this. So we keep innovating over the years so that each year he sees our evolution in that direction. We focus on continuous improvement and so there must always be something.”</i> (Director)	Yes
	Educational Programs	<i>“We often give training to the youth of the local community. We disseminate information to them and our customers have participated in this a few times. We disseminate sustainability through education.”</i> (Director) A new class of the Rural Learning program in partnership with SENAR-MINAS started its activities in the month July. For eight months, ten young people will take the course in Agricultural mechanization with a focus on coffee growing. (Internal document, September 2021)	No
	Motivating small worldwide producers to sustainable practices	<i>“We have a project with small producers that operate in other countries. One of our aims is share our experience and sustainability knowledge with other companies. As a big company we invest in research to implement and share with other small ones. Our main goal is improving world sustainability.”</i> (Manager of marketing and quality development)	No
	Motivating buyers to sustainability initiatives	<i>“We usually create sustainability projects and propose the ideas to our customers to motivate them to participate. We even managed to get one of our customers in England to become B certified, and we also helped him sell that sustainable coffee.”</i> (Director) <i>“We have carbon credit and we will not sell this but we will give it as a gift to our buyers. It is a strategy to motivate them to reduce their emissions as well as participate with us in our initiatives and projects in this sense.”</i> (Manager of marketing and quality development) The program aimed to plant a tree for every kilogram of our roasted coffee and sold during social isolation [...] To participate in this project, roasters committed to reporting the amount of our coffee that was sold during the two-month campaign. The final sum was then converted into the number of trees that our company committed to planting. In total, 40 coffee roasters around the world participated in the program, including three from Brazil. (Online news, 22th September 2020)	Yes
Employees applying the sustainability knowledge in their life routines	<i>“It is clear to each one of us that the company is concerned with sustainability. The employees apply it outside of the company too. The principles begin to be applied in their daily lives and this is very interesting.”</i> (Manager of Processes and Technology) <i>“Since I started to work here, 22 years ago, I have learnt a lot about sustainability. First, I learnt about environmental aspects. I continue learning about it and on social and economic sustainability aspects. It is a triple line.”</i> (Post-harvest analyst)	No	

Aggregation	Training	<p>“Our employees are trained since they begin here at the company. We introduce them to the company’s principles and values and continue to reinforce them during the meetings.” (Sustainability Manager)</p> <p>“It is also very important to pass our sustainability values to temporary workers. I am very glad to see how they learn here and take these values to their lives and to their communities in other Brazil regions.” (Post-harvest analyst)</p> <p>Nature has no copy, preserve the original. Collaborate for the improvement of the environment and with the implementation of ISO 14001. Thank you. (Internal poster, 1998)</p>	No
	Certifications	<p>“Certification is also very important for working with the internal public, it reinforces what was given in the training. So, we pass on to the employee what the company is and its principles. If he doesn’t agree, there’s no point in staying with us. But, in general, they come to us because they really want to participate in it. Everyone knows what we believe and what we cherish: if it were easy, it wouldn’t be here. Being sustainable is not easy, it really takes work. A little while ago I gave a presentation on the company’s sustainability history to the workers and it was really cool. [...] We go through certifications’ audits constantly and we have learnt a lot through these audits.” (Manager of Processes and Technology)</p> <p>We are the 1st company coffee producer with certification B in the world. (Internal document, September 2021)</p>	No
	Assessment of employees	<p>“The learning about sustainability is assessed through internal audits. We constantly ask employees to check if they have learnt about sustainability, about the company’s values and values. [...] They are chosen at random and it is at this moment when it is assessed whether sustainability is really incorporated into the values and everything they do here at the company.” (Manager of Processes and Technology)</p> <p>“We know that our team learnt about sustainability when we hear their comments about some process or about some behaviour change in their daily lives. We breathe sustainability here. Also the temporary workers. We can notice their sustainable awareness improvement year after year.” (Post-harvest analyst)</p>	No
	Sustainability guiding strategies	<p>“It is natural that this focus on sustainability in everything we do and decide. The company’s founder always gives us a lot of information, he has a direct connection with us.” (Manager of Processes and Technology)</p> <p>“We use around 24 tons of packaging per year. As these packages are distributed all over the world, it is impossible for us collect and recycle them. That’s where EuReciclo comes in. As they connect cooperatives recycling companies across the country and through them we finance the recycling of 24 tons of packaging here in Brazil. The financial resources go directly to recycling cooperatives, improving the recyclers lives and valuing their work for society.” (Internal document, September 2021)</p>	No
	Plans and research oriented by sustainability knowledge	<p>“Everything that seeks answers and research in this company should focus on sustainability and improvements in this regard. We call it active sustainability, we can’t keep it the way it is, but we need to improve.” (Director)</p> <p>“All the things we think or plan here are linked to sustainability. The main question always is: how to do this sustainably?” (Manager of marketing and quality development)</p> <p>[...] their commitment to sustainability doesn’t just help them reduce their carbon footprint. Their dedication to sustainable agriculture improves soil health in the long term, which in turn helps to maximise coffee quality. (Online news, 2021)</p> <p>As a celebration of Earth Day, [studied company] launches today a new project to encourage young visionaries in the field of applied science: the [studied company]-IAC Awards for innovative studies in coffee sustainability and quality.</p>	No

		In partnership with the Agronomic Institute of Campinas we will recognize doctoral and master's projects, hoping to stimulate our young scientists to advance deeply in the agronomical research that is so fundamental for Brazil. (Online news, 2021)	
	Through strengthen the culture of sustainability	<p><i>"We believe and appreciate the fact that information about sustainability is instilled in people's heads so that they become aware and practice. That is, it is important to store this knowledge through the sharing and dissemination of the company's culture among employees. We highly value this."</i> (Director)</p> <p>We decided to contribute to the global goal planting until the year 2030 three million of trees. It is an amount equivalent on average to 2 thousand fields of football. Some of us have already had the opportunity of planting a tree or cultivating seeds here in the company and if you haven't had this experience yet, your turn will come soon. (Internal document, September 2021)</p>	No
Appropriability	Choose sustainability-oriented buyers	<i>"Since we started selling coffee, our goal has been to sell to companies that have certification. [...] We seek relationships with buyers who also have sustainability as a value and who are certified."</i> (Director)	Yes
	Buyers understand the sustainability orientation/initiatives	<p><i>"Our buyers understand the relevance of our certifications, but they also check out what we do and trust that we are in fact sustainable. And we also look for customers who have the same values."</i> (Director)</p> <p>It was a long way to conquer a space and be recognized as the best and most sustainable Brazilian farm in the world. We are currently present in several countries such as Canada, United States, Chile, Japan, Taiwan, South Korea, China, Australia, Switzerland, Israel, Dubai, Russia, Iceland, Denmark, England, Belgium, Spain, Romania, Greece, Portugal, Lithuania, Germany, Holland and many other places. (Internal document, September 2021)</p>	Yes
	Improvement of relationship with buyers	<i>"Our special coffees are sold to the clients of the third and fourth wave. They are not attached to certifications. They are the ones who evaluate the coffee and its attributes, production and so on. We try to have a closer relationship, of loyalty. We try to have a closer relationship so that we know their real needs and we can also help them."</i> (Director)	Yes
Production	Founder culture	<p><i>"We have frequent meetings with the company's founder. He is very close and motivates us to seek information constantly. It propagates knowledge about sustainability. He managed to make it a company's culture. We receive e-mails from him constantly with a lot of information about sustainability in our business. Always lots of news."</i> (Manager of Process and Technology)</p> <p><i>"He (the founder) is fundamental. He shows the company's vision, he is a strong variable in sustainability. We all followed his ideas. It is a concern in the governance of the company about how it will be without him."</i> (Director)</p>	No
	Benchmarking/Partnerships with research centres	<i>"There is no specific source of knowledge, it is a systemic search. Where we see something new, we bring it to the company. If we see or read something that may be interesting to the company, we seek to know more about it. Then we will talk to research institutes, with professionals specialized in the subject, in short, we seek to know more."</i> (Director)	No
	Certifications	<p><i>"The certification standards guide us a lot. They guide us on what to do and how to guide each employee."</i> (Sustainability Manager)</p> <p>The first sustainability certification [ISO 14001] was achieved in 1998. (Internal document, 1998)</p>	No
	R&D	<i>"Everyone in the company has to bring knowledge of sustainability. Based on our performance, experience, we have to bring novelty. Each one needs to realize and think about how to be more sustainable here. Each management area needs</i>	No

to think about its decisions while also improving sustainability. Thinking about the chain as a whole is also important. If I think about the roaster, for example, this is good for the entire chain. Even to buy new equipment, for example, we evaluate all its sustainability issues. We do a super-serious study. Each has a responsibility to bring knowledge of sustainability in their area of expertise.” (Director)

In the bloom of 2020, [studied company] started a project integrating coffee and bees. That's right, bees! Bees are essential to the survival of life in the planet and to preservation of biodiversity. New research shows that these insects can help to increase the productivity and quality of the coffee beverage. [...] The main goal is analyse how these bees presence impacts on coffee production. A delicious consequence of this integration of bees and coffee flowers is the production of a very differentiated honey. (Internal document, September 2021)

Information system (software)	<i>“The sustainability information is all stored in the software. From the requirements of the certifications, we started to store everything in an information system. The strategies are stored in documents, minutes of managers’ meetings, presentations. System B motivates the storage of information a lot and this ended up encouraging it a lot here in the company.” (Director)</i>	No
-------------------------------	---	----

As Table 2 depicts, according to supplier managers and employees, in addition to the founder's support, sustainability knowledge **production** was identified related to compliance with external standards, partnerships with research centers and institutions, research and development (R&D) activities, and information systems (software). The informants indicated that the founder supported managers and employees constantly in their efforts to better understand the components of sustainability knowledge and motivated the team to search for sustainability strategies and knowledge. Such a perspective was also clear during the interview with the founder. In terms of R&D, some of the supplier's internal documents evidenced that the company also encouraged excellence in academic research on sustainable agriculture and rewarded post-graduate researchers for such initiatives through partnerships with local universities. To ensure access to the information produced, the company stored its sustainability knowledge mainly using a specific software called SOGI (i.e., explicit knowledge) but also relied on workers' and founders' knowledge base (i.e., tacit knowledge). These findings were reported by multiple respondents, such as the logistics analyst: *"When we need to check data on how much we have reduced water use and increased waste management, this information is available on a specific software."* The production stage was not affected by any relationship with buyers, which shows the role of the supplier in producing its own sustainability knowledge.

Concerning sustainability knowledge **aggregation**, as shown in Table 2, several sources of sustainability knowledge were observed in the supply company, including employee training and assessment, internal consolidation through certifications, sustainability guiding strategies, plans and research oriented by sustainability knowledge, and a strengthened internal culture of sustainability. At this point, the director acknowledged the relevance of certifications: *"Certifications materialize our sustainability values. They facilitate training, and it is great to explain sustainability to our team."* Thus, the aggregation of sustainability knowledge relies on knowledge production but also covers internal consolidation of certification information, which triggers strengthening of the culture of sustainability and the application of aggregated knowledge in strategies and practices. Similar to the production stage, buyers were not involved in this KBV foundation. As can be observed in Table 2, both foundations focused strongly on how the supply company evolved internally in terms of generating its own sustainability knowledge before transferring it.

In the next foundation, sustainability knowledge **transferability**, a two-way interaction was identified due to the close connections with buyers. For example, the supplier encouraged buyers to visit its farms frequently to transfer knowledge in terms of sustainability and to ensure

long-term relationships (Table 2). However, the two-way interaction extended beyond these visits. For instance, the UK buyer posted information about the supplier on its website, indicating the value of this relationship. Apart from this connection with buyers, the company also enhanced transferability by promoting sustainability practices to other producers (in partnership with buyers), stimulating employees to apply a sustainable mindset in their everyday lives, and offering educational programs that targeted the local community. For example, educational programs were conducted for the local community to make children and teenagers aware of social and environmental issues and the importance of coffee professions. This initiative received support from different buyers, such as the buyer from Japan. Additionally, as part of the knowledge transfer, the supply company representatives publicized these actions on social media to share their experiences, inspire others, and spread sustainability knowledge. *“We usually post about our projects on social media. Beyond showing the project’s activities, we believe it is a strategy to share sustainability knowledge”* (Manager of Marketing and Quality Development). The transfer of knowledge was not limited to information but also included initiatives. For example, the UK and Canadian buyers became B Corp. certified after knowing the supplier.

The final foundation, sustainability knowledge **appropriability**, refers to the ability of a company to retain the value created (Grant, 1996). This foundation was fully linked to buyers and also created a two-way interaction. Such a link refers to the ability of the supply company to select its buyers (Table 2). By choosing only sustainability-oriented buyers, the supplier guaranteed the retention of its values and stimulated SCS, as confirmed by the director: *“Since we started selling coffee, our goal has been to sell to companies that have certification. [...] We seek relationships with buyers who also have sustainability as a value and who are certified.”* This practice, rather than restricting the potential market for the company, ensures that buyers perfectly understand the supply company’s sustainability orientation and initiatives and assign the appropriate value to the company’s products. The secondary data analysis uncovered that most of the studied buyers had strong interest in sustainability, which indicates alignment of their values with those of the key supplier. This can improve relationships and strategies with the buyers toward SCS. In Table 2, these two foundations relate to SCS learning (see also section 4.3), as it facilitates a common sustainability knowledge.

Our findings revealed that the common sustainability knowledge that existed across the studied supplier–buyer dyads related to common language, shared meaning, and sustainability practice (see Grant, 1996). To facilitate sustainability KM, a common language had been built

primarily within the supplier–buyer relationship that was related to the use of a common language (English or Spanish, depending on the buyer) but also to explicit content due to meetings, informative e-mail exchanges, social media posts, and buyers’ visits to the supplier’s farms. Moreover, the supplier shared its interpretation of the meaning of sustainability through its buyers not only during visits but also by participating in international conferences and events about sustainability in the coffee industry. For instance, some buyers participated in projects with small coffee producers worldwide promoted by the supplier. Last, we found that, over the long term, the sustainability practice started to become a fact. For example, some buyers adopted the B Corp. certification program inspired by the supplier’s adoption, as already mentioned, and they were involved in sustainability projects and in a SC carbon footprint reduction strategy, as mentioned by the buyer from the UK: “*Now they are talking about carbon credits. [...] We’re trying to reduce our carbon footprint at the moment. So, there are ongoing talks.*”

These elements of common sustainability knowledge emerged through production and aggregation, as well as through a diffusion process related to transferability and, mainly, appropriability. Such a diffusion of sustainability knowledge occurred because the supplier looked for buyers to become further engaged in some initiatives, despite sometimes meeting certain resistance to real engagement. For example, the supply company developed social projects and usually asked buyers to be involved with them or to suggest others to invite to participate. From their side, buyers were generally engaged; however, some buyers were more interested in their own business and trusted what was done by the supplying company. These findings suggest that the existence of sustainability KM leads to common knowledge that relies on knowledge sharing, trust, and learning behaviors (see Yang et al., 2018). Thus, the supplier was identified as an example for its buyers in managing sustainability knowledge and initiatives that demonstrated a clear mobilization of this intangible strategic resource. An analysis of the buyers’ SCS learning was necessary to recognize how such an inter-organizational dynamic transpired.

4.3 The effects of common sustainability knowledge on buyers’ sustainability learning

Based on the previous explanation of how common sustainability knowledge emerged and was managed by the supply company, we needed to identify the buyers' learning processes to address the second research question. To this end, we used the four learning stages proposed by Huber (1991)—acquisition, distribution, interpretation, and organizational memory. We purposively selected buyers geographically dispersed across multiple countries (see Johnsen et al., 2022) because the sustainability scope and challenges are not the same for all buyers. Thus, our supplier–buyer dyads sample was characterized by different perceptions of sustainability (for example, the Japanese buyer shared that few customers were interested in sustainability issues) and the related challenges and improvement opportunities. Table 3 summarizes the main evidence of buyers' sustainability learning stages that emerged from their interviews.

Table 3 – Buyers’ sustainability learning stages

	Acquisition	Distribution	Interpretation	Organizational memory
Involvement of the key supplier	Yes (Buyer Japan, Buyer UK, Buyer US, Buyer Israel, Buyer Canada, Buyer Spain)	Yes (Buyer Spain)	Yes (Buyer UK, Buyer Israel)	No
	The knowledge about sustainability is mainly acquired by the key supplier, through multiple channels.	Informal sharing of information, professional activities (e.g., meetings and emails). Sharing of information with interested customers (not many in Japan)	Good interpretation of sustainability, scarce application	Not developed
Buyer Japan	<p>Key quotes:</p> <p><i>“I think the supplier is my teacher of thinking about sustainability...until I started to be in charge of the coffee business, I have never thought about sustainability for the environment actually”</i> (Trading manager);</p> <p><i>“The supplier has a mini channel to provide information, they also send direct email message to us. They also use a lot the Instagram and Facebook channels”</i> (Trading manager);</p> <p><i>“We have the opportunity to make meetings once or like a month...so we can always be updated about their latest activities”</i> (Trading employee).</p>	<p>Key quotes:</p> <p><i>“We can always exchange the information that is available internally to our coffee chain... I can always share the information with my boss and he is also teaching the communication department or other department managers”</i> (Trading manager);</p> <p><i>“...this kind of message is not often timely”</i> (Trading manager);</p> <p><i>“Not all the countries have the chance or opportunity to exchange ideas with other divisions even inside the same company”</i> (Trading manager);</p> <p><i>“It’s not easy for us to share the same information with all the employees”</i> (Trading manager);</p> <p><i>“I’m learning a lot from the meetings and the email exchanges”</i> (Trading employee)</p>	<p>Key quotes:</p> <p><i>“Sustainable is consistent and stable for the longer future...and only consistent demand can support the sustainable production of coffee beans”</i> (Trading manager);</p> <p><i>“When we say the word sustainable, it can be easily connected to the kind of charity to help the poor people in other developing countries”</i> (Trading manager);</p> <p><i>“We always take much care, not just to have coffee producers, but we also have to help coffee consumers in our consuming country...it’s necessary for us to educate the country as well”</i> (Trading manager).</p>	<p>Key quotes: <i>“We don’t have the kind of public storage for information”</i> (Trading manager)</p>
Buyer UK	Sustainability knowledge is acquired from research organizations, information exchange with the farmers and especially with the key supplier through farm visits and other channels.	Sharing of information with the customers; educational seminars within the company; internal reports after farm visits	Great interpretation and application (B Corp.) of sustainability	Team sharing; Internal reports

Key quotes:

“There’re new companies like world coffee research that produce a lot of good documentation about sustainability” (Trading manager);

“We have a lot of sustainable farms that we work with already. So, a lot of sustainability knowledge actually comes from the farmers” (Trading manager);

“With the key supplier we have a partners exchange every two years where different importers from around the world meet up at their farm...once we learn what they’re up to, then we report this back to our company” (Trading manager)

Key quotes:

“Every year the key supplier send its offer with pricing and how many bags were produced, then they give us feedback on how the crops have gone this year. What have been the challenges and the positive aspects. Then, in a way, we do a similar thing for our customers and promote the key supplier” (Trading manager);

“The key supplier was part of an educational seminar we do every year where we invite our producers and customers to do panel discussions” (Trading manager);

“We will promote the sustainability practices that farms do and why we believe it’s a good farm to work with, or what were our findings from recent visits” (Trading manager)

Key quotes:

“I think sustainability is, well, if you put it down to prices, providing a fair price on a consistent basis to the farmers. And for us, it’s also looking after the livelihoods of employees. And also protecting the land that coffee is grown on. I think you need to consider everything as a whole, but it’s very hard ” (Trading manager);

“They are talking about carbon credits at the moment, and we are trying to reduce our carbon footprint too” (Trading manager);

“We just became B Corp certified, as the key supplier, and we’re the first UK importer to be that as well. We became B Corp following the inspiration from the key supplier” (Trading manager)

Key quotes:

“I’m sure the other members of the team would carry it on... we tried to share a lot, when we come back from a visit for example” (Trading manager);

“We write a lot of reports... every two weeks we write reports to our customers so that the knowledge can be shared” (Trading manager)

Sustainability knowledge is acquired from webinars, reports and suppliers. The key supplier is sharing a lot of knowledge through multiple channels.

Sharing of information about sustainability with customers

Good interpretation of sustainability, scarce application

Not developed

Key quotes:

“There are always webinars and reports from our other suppliers, what they are doing, some of the formulas they’re working with” (Trading manager);

“I think the key supplier is at the forefront of sustainability. A lot of the major knowledge I have has come from the key supplier, what it has done and what it is continuing to do” (Trading manager);

Key quotes:

“I’ve been to the farm and I’m able to share the commitment that they have to coffee and to the land to my customers because of that” (Trading manager);

“One of our very good client has done an experimental pilot through the key supplier” (Trading manager);

“Our partner from Costa Rica visited the key supplier’s farm, it was a great experience for them, they learned a lot” (Trading manager);

Key quotes:

“I’d like to think that we’re making a difference by purchasing this type of products coming from farms that work closely with the people, the social aspect, and the environmental aspect” (Trading manager);

“We try to work with a lot of producers... we’ve grown what we’ve done over the years with their products” (Trading manager)

Key quotes:

“I save everything, but if I can’t find something, all I have to do is to email them” (Trading manager)

Buyer US

“The key supplier is always putting together presentation and sending reports” (Trading manager);
“We had a zoom meeting where they presented updates on the production this year and some of the studies and work they’ve been doing” (Trading manager)

“The customers now require a lot of organic, Fairtrade and Rainforest alliance certified coffees” (Trading manager)

Sustainability knowledge is acquired through education and self-learning. The key supplier is the major source of approachable knowledge.

Sharing of information with customers and employees

Great interpretation of sustainability, scarce application

Not developed

Key quotes:

“Sustainability is learnt from education almost, and also by reading materials about it” (Founder);

“Knowledge is almost autodidact, by reading academic articles, newspapers, google and youtube” (Founder);

“For our staff, we do much more marketing; each origin trip we take a video camera and we take many videos and edit them later. So they can see with their eyes...we make very educational videos, we screen them to the wall and we educate them” (Founder);

“The key supplier present information at least twice a year with a summary of the year, the crop season etc.; it is quite informative, it has enough details but also enough graphics to make it fun to look at” (Founder);

“The key supplier is my only source of approachable knowledge specifically about sustainability” (Founder)

Key quotes:

“[The reports] is also something I share with the clientele of green coffee in order to educate the masses” (Founder);

“There was a specific page from the sustainability report that I got from the key supplier that I shared with our clients and our workers to educate them, so that they learn what they are part of” (Founder);

“For my green coffee buyers, the only piece of knowledge that I passed to them was from the key supplier because I don’t have time to generate it myself. I hope in a few years I will have the time to generate our own knowledge to give our customers” (Founder)

Key quotes: *“Sustainability means that we can take actions in order to sustain the goodness that is going on now. Then there is a more philosophical meaning that has to do with me also being a father. I cannot change the world but I can affect the very small thing I do in my life. If I do coffee, it will be a fair coffee. I want to be fair to my customers, I want to be fair to the world and to the people who produced it” (Founder);*

“I care more about quality than about quantity” (Founder)

Key quotes:

“Many basis of knowledge that we have, not only sustainability, have not yet made any physical or digital library, because I don’t have time”

Buyer Israel

<p>Sustainability knowledge is acquired thanks to the B Corp certification process. The key supplier was a relevant source of information about B Corp and sustainability through company visits and conference calls.</p>	<p>Sharing of information with customers through packaging and product listing. Internal sharing through emails and memos</p>	<p>Great interpretation and application (B Corp.) of sustainability</p>	<p>Online sharing and emails</p>	
<p>Buyer Canada</p>	<p>Key quotes: <i>"I've had the opportunity to visit the key supplier twice now. I was there for five days and stayed directly in the farm to see from start to finish on the full production of coffee"</i> (Founder); <i>"We had many calls in sort of a shared knowledge basis...I've notes in front of me from a meeting we had right before their B Corp."</i> (Founder); <i>"They shared with me some of the things they're doing on their side in terms of sustainability projects"</i> (Founder); <i>"We are moving in the direction of everything falling into the category of renewable, like could be composted, recycled and upcycled in some way"</i> (Founder); <i>"I think B Corp. provides a really brilliant structure to advance the company in many different ways, sustainability, governance and community being among those. That has been a very educational tool in terms of learning about sustainability"</i> (Founder)</p>	<p>Key quotes: <i>"Part of the information shared by the key supplier will make it on to product listings just to share that knowledge with either the consumers or the roasters"</i> (Founder); <i>"With the employees, we have internal communications, we do a Friday email to recap the stuff happened during the week. Then we have memos on Wednesdays about sustainability"</i> (Founder)</p>	<p>Key quotes: <i>"Sustainability to me is the ability for something to be there in the long term and the preservation techniques"</i> (Founder); <i>"We also get to support a culture that we're not generally familiar with, and sort of support the growth and development of coffee in that nation, even if on a small basis"</i> (Founder); <i>"The roasting business has been working on becoming a B Corp. for three years now"</i> (Founder)</p>	<p>Key quotes: <i>"How do I store information? At the moment, it's pen and paper in my notebook. From there, depending on the content, part of it will be written in some copy online and potentially make it on to product listings"</i> (Founder)</p>
<p>Buyer Spain</p>	<p>Sustainability knowledge is acquired from the key supplier mainly, but also from other suppliers and the customers.</p>	<p>Sharing of information with customers. Internal sharing through presentations and documents. Loop back to supplier.</p>	<p>Great interpretation of sustainability, scarce application</p>	<p>Online storage and sharing</p>

Key quotes:

"I think we have learned a lot from the key supplier on the environmental side. I think they are always launching different projects, for example the carbon neutral project or the B Corp." (Supply Chain Manager);

"I would say they are probably one of the best suppliers in sharing this information and making this information" (Supply Chain Manager);
"We do receive more information about the environmental side that the social side from them, although we did interviews with them and they mentioned a lot of activities in the social side, also through their social media" (Supply Chain Manager);
"They send us good reports, emails, they do a few talks every year and they call us for a videocall to present their project and to be sure we have all the information to tell the clients" (Supply Chain Manager);
"Other suppliers too share about their small projects, especially on the social side" (Supply Chain Manager);
"We also hear from clients asking for specific certifications or actions, depending on their countries of origin...clients are also quite a big part of knowledge" (Supply Chain Manager)

Key quotes:

"We share projects with the customers. We have a weekly mailing list, where we share different type of projects from the different origins with our customers" (Supply Chain Manager);
"Other suppliers will come with very specific requests as materials or actions to improve their community" (Supply Chain Manager);
"We also discuss the customer requests with our suppliers, and the key supplier in particular" (Supply Chain Manager);
"We started this year to do internal seminars calling everyone presenting their type of actions, we try to do it for each specific origin" (Supply Chain Manager)

Key quotes:

"I don't think personally that there exists anything 100% sustainable, we can talk about micro acts of responsibility, where we just acknowledge what our role is in the industry and we do small actions to overcome certain things that end up being exploitation of land or resources. I think the company is quite focused in other things like social responsibility or economic responsibility towards the farms that we work with" (Supply Chain Manager)

Key quotes:

"We save everything. It's very basic, it is a folder in a drive that we call the library where we actually save things that are coffee related and the presentations are saved there as well" (Supply Chain Manager);
"We have learned to develop manuals for everything" (Supply Chain Manager);
"We usually attend all the conversations in teams, but there are some details that could possibly get lost" (Supply Chain Manager);
"Doing things online has made conversations and knowledge exchange more horizontal, anyone could possibly participate" (Supply Chain Manager)

The results presented in Table 3 indicate that the buyers appeared to be at different stages of SCS learning. Concerning the first SCS learning stage, acquisition, all buyers had developed sources from which to acquire sustainability knowledge. The Japanese buyer was the only one who reported relying solely on the supply company in focus (identified as the key supplier in Table 3) as a source of this knowledge. All other buyers found and developed other sources over the years, such as research organizations (UK buyer), webinars and reports (US buyer), education and self-learning (Israel buyer), and the B Corp. certification process (Canada buyer), as well as from other suppliers and customers (Spain buyer). This evidence demonstrates that no one source serves as the universal authority on knowledge about sustainability; each actor should keep an open mind regarding what sources may be suitable. All buyers interviewed used different channels of acquisition but recognized the key supplier as a major source of inspiration and sustainability knowledge, which indicates the supplier company had proactively shared knowledge with all of them, thus leading to a common language, as discussed in the previous section.

For the second SCS learning stage (distribution), we observed that knowledge was shared in two directions: (1) internally to the buyer's company, directed toward employees, and (2) externally, directed toward customers and other suppliers. While the external distribution process was very often well-developed, mainly to justify the product price and convey the quality and sustainability messages, the internal sharing was often limited to informal, poorly structured communications. Best practices were shared by the buyers from the UK, Canada, Japan, and Spain, all of whom organized internal presentations and seminars to educate their employees on sustainability. Buyers from the UK and Spain had also managed to educate customers and other suppliers. Interestingly, the buyer from Spain also distributed the knowledge acquired from its customers back to the key supplier to find innovative solutions to address its customers' specific requests. This SCS learning stage is closely related to acquisition because the source of knowledge affects how the knowledge is disseminated. For example, buyers from the US and Israel were focused only on passing the information along without using the knowledge acquired to further engage customers and employees. The buyer from Israel shared a creative way to leverage the positive initiatives put into action by the key supplier, such as the farm visits: the company filmed every visit to the farm and used the film to produce educational videos for employees and customers.

As observed in Table 3, the interpretation stage of SCS learning was identified based on the level of understanding of the meaning of sustainability. We defined a high level of

understanding for those buyers (i.e., Japan, UK, Canada, and Spain) able to receive the knowledge and engage with several of the supplier's initiatives, as opposed to the low level of understanding that refers to buyers (i.e., US and Israel) that lacked such an engagement. Of course, all buyers understood what sustainability meant because they were all sustainability oriented before entering the partnership with the supply company, but according to our analysis, each moved forward with the application of what they had learned from the supplier at its own pace. For example, the buyers from Canada and the UK, which our data suggested were among the countries with the highest sensibility toward sustainability, actively put what they had learned fully into practice (Table 3). Similarly, the buyers from Spain and Japan were also recognized as having a high level of understanding of the meaning of sustainability due to the number of actions supported. Similar to the way they navigated the distribution stage, the US and Israel were not able to go beyond passing the information forward to other SC members. Additionally, based on the interviews, we found that organizational memory was formalized and stored, although not always in a structured and formal manner, only by the buyers from Spain, Canada, and the UK. These findings indicate that the supplier had a significant role in its buyers' acquisition of sustainability knowledge.

All buyers recognized the relevance of the supply company to their SCS learning, mainly in the acquisition and distribution stages, which reflects how the supplier managed its own sustainability knowledge. In the interpretation stage, we could identify the relevance of sustainability requirements and certifications based on how they put sustainability in practice, even though the levels of understanding and engagement differed among the buyers. However, there is much to be developed in terms of organizational memory within this relationship. From a supply company's point of view, multiple ways exist to represent its learning (e.g., training, internal documents), verified, for example, by internal documents from the company's beginning (e.g., internal newsletter). Such a perspective can be shared with buyers by storing and sharing the knowledge built. Using documents is a clear way of engagement with sustainability beyond a narrow focus on simple diffusion.

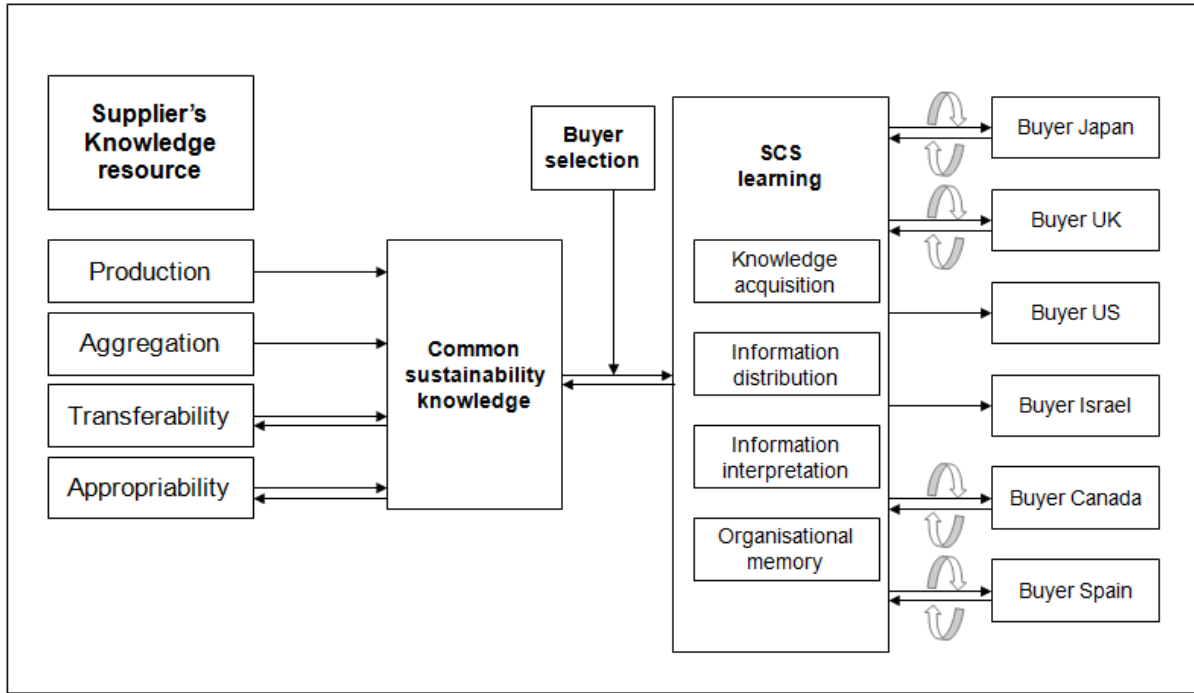
These results contribute to answering the second research question and understanding that sustainability knowledge can be shared from any part of the SC. We noted that geographically dispersed buyers were at different stages of learning that might be related to their context characteristics. For instance, the Japan buyer mentioned that Japanese customers had low levels of interest in sustainability, which is shown in our analysis as high dependence on supplier's knowledge, despite the existence of exchanges. The company from Israel was the only buyer

that represented a coffee shop instead of acting as a trader, which meant less time to build sustainability knowledge (see Table 3). The US buyer represented a market strongly focused on price, which was reflected in a low level of understanding of the meaning of sustainability knowledge. Finally, UK, Canada, and Spain were more connected with the supplier in terms of valuing the sustainability knowledge within the supplier–buyer relationship. This illustrates how the key supplier in focus appeared to strategically manage its sustainability knowledge, both internally and at the SC level, but also how this management affected its buyers’ sustainability learning.

5. Discussion

Our findings provide significant theoretical contributions to bridge sustainability KM and SCS learning, based on insights from a global supplier and its geographically dispersed buyers. Grounded in the KBV (Grant, 1996), we argue that suppliers’ sustainability knowledge, defined as an intangible strategic resource, is responsible for this bridging due to suppliers’ role in cascading it downstream along the SC (Johnsen et al., 2022). Through theory elaboration, we respond to several calls for further research on the role of suppliers in SCS learning (Gong et al., 2018; Jia et al., 2022; Pereira et al., 2021; Silvestre et al., 2020). By studying supplier–buyer dyads, a context overlooked in the literature, we were able to extend the literature in two ways: (1) acknowledging buyer selection as a key strategic action to manage sustainability knowledge and (2) showing evidence of how SCS learning occurs via learning loops. Figure 3 illustrates our main results, plotting the main findings to our initial integrated analytical framework.

Figure 3: An empirical framework to bridge sustainability KM and SCS learning



We found in our research that suppliers can play a crucial role in developing and spreading sustainability knowledge along the SC, despite differences between buyers' contexts—mostly in developed countries—and the supplier's—in an emerging country (Liu et al., 2019). One interpretation for that relates to the origin of the integrated knowledge in focus (Barley et al., 2018) because the sustainability knowledge is located on the supplier side in global (food) SCs (Busse et al., 2016; Koberg and Longoni, 2019; Li et al., 2018; Pereira et al., 2021). As identified in section 4.2, the supplier works as a coordinator of knowledge, which is expected by the KBV (Grant, 1996). Notably, focal companies should not be the only leaders responsible for that role (Gong et al., 2018; Roy, 2019), as alternatives exist (Pereira et al., 2021). In addition, according to Huber (1991), the source of knowledge interferes in learning. We showed 19 sustainability knowledge sources ratifying this intangible resource as centrally related to the supplier's initiatives. Hence, aligned with the findings reported by Johnsen et al. (2022), we demonstrated suppliers' relevance to the dissemination of sustainability knowledge.

Among these sustainability knowledge sources, we identified choosing sustainability-oriented buyers, which is related to the appropriability of value creation. Our first theoretical contribution, as shown in Figure 3, refers, then, to the influence of buyer selection on sustainability knowledge learning. This is the first paper to empirically identify the existence of buyer selection as key to ensuring the link between sustainability KM and SCS learning, which responds to existing calls (e.g., Kuppusamy et al., 2021; Ramanathan et al., 2021). This

may be because, even if a buyer may look for improved sustainability performance from the supplier, the supplier can look for more than business from the buyer. The literature overlooks the possibility of the power dominance of several suppliers in SCs (Cox, 2001), more often limiting attention to their extraction, production, and manufacturing activities (Liu et al., 2019). Therefore, our results show that more than simply accumulating knowledge (Pereira et al., 2021; Jia et al., 2022), a supply company can push sustainability orientation forward in SCs (Roy, 2019). This argument led to our first proposition:

Proposition 1: Supply chain sustainability learning will accelerate if suppliers are able to select their buyers to manage sustainability knowledge in supply chains.

From a supplier–buyer perspective, our results demonstrate that, regardless of the existence of different stages of sustainability knowledge creation on the supplier side, as shown in Figure 3, appropriability and transferability rely on a constant and close interaction with buyers in a two-way movement related to the common sustainability knowledge. Beyond these findings for sustainability KM, two-way interactions were also identified within SCS learning, representing our second theoretical contribution. As depicted in Figure 3, four buyers (Japan, UK, Canada, and Spain) were able to engage in two-way interactions with the supplier’s sustainability knowledge, mainly through the distribution and interpretation stages of learning. The literature suggests that SCS learning occurs via feedback loops (Silvestre, 2015; Silvestre et al., 2020; Cormack et al., 2021); however, the results of this study add new insights, as we empirically illustrated that within supplier–buyer dyads. We revealed that common sustainability knowledge emerged from these learning loops because, although the supplier was able to build sustainability knowledge internally, frequent interactions with buyers were vital to increasing a non-linear SCS learning process (Cormack et al., 2021; Sauer et al., 2022).

As presented in section 4.3, buyers started to engage with specific sustainability initiatives due to close exchanges, which corroborates the findings from Jia et al. (2022). For example, the UK and Canada buyers started to develop a B Corp. certification program after working with the supplier in focus. Such a perspective demonstrates that sustainability knowledge at the SC level cannot rely only on existing knowledge from the firm level (through information diffusion); engagement among SC members is needed, which ensures effective dissemination (Johnsen et al., 2022; Silva et al., 2021). Therefore, we provide this contribution because, to the best of our knowledge, this is the first paper to document evidence on the process

by which sustainability knowledge was managed and systematically connected with SCS learning. As of the date of this writing, the literature status quo had not clarified the components of sustainability knowledge and how to acquire it (Klingenberg and Rothberg, 2020), which was addressed in this research. Hence, bridging sustainability KM and SCS learning was possible because either knowledge transference or interpretation were interconnected toward retaining value creation for sustainability. Following these results, we propose the following:

Proposition 2: Common sustainability knowledge will strongly appear within supplier–buyer dyads when two-way learning loops emerge among supply chain members.

Our findings show that frequent, ongoing interactions lead to better sustainability KM and SCS learning, even though buyers are geographically dispersed. A greater focus on sustainability KM and SCS learning enables new sustainability initiatives and improves the SC reputation, mainly in a complex global context (Roy, 2019). This happens because firms are not self-sufficient and should exchange resources—in our case, sustainability knowledge as an intangible resource—to achieve organizational outcomes (Touboulic et al., 2014). Therefore, the studied case revealed the relevance of a supplier to SCS since the supplier clearly promoted sustainability knowledge along the SC.

6. Conclusions

This paper investigated links between sustainability KM and SCS learning using a global supplier perspective, which is overlooked in the literature (Jia et al., 2022; Pereira et al., 2021). While learning has evolved as a key concept to understanding SCS implementation, we added two relevant contributions to the literature. First, we revealed that buyer selection appeared central to sustainability knowledge learning and, consequently, to SCS management. In this research, we showed that suppliers can have sufficient power to reverse the logic within supplier–buyer dyads. Second, we provided empirical evidence of two-way learning loops for SCS. Previous studies have addressed these loops superficially, but our research better demonstrates how the common sustainability knowledge as a resource is managed and learned within supplier–buyer dyads. Our case study is among the first to empirically explain sustainability KM using data from multiple countries and to develop links with SCS learning. Our research proposes a clear manner of combining sustainability KM and SCS learning by

means of the KBV. Therefore, we answered both research questions and suggest further studies on the subject.

6.1 Practical contributions

Despite the existing calls to rethink approaches to collaborating with SC members to improve sustainability practice and performance (e.g., Ramanathan et al., 2021; Roy, 2019; Sauer et al., 2022), managers still have a strong (and narrow) focus on selecting and understanding their suppliers' initiatives. This is a shared behavior in the market to increase business performance and competitive advantage (Grimm et al., 2014). However, in this research we identified that a greater understanding of the benefits of buyer selection and development toward SCS may broaden companies' perspectives. Therefore, managers from the supplier side interested in sustainability can also define specific sustainability criteria to select only those buyers that will ensure continuity of their initiatives. For instance, we found in our research the exchange concerning B Corp. certification. Thus, similar actions can be taken by other companies, not limited to the food industry.

In addition, we showed in this research sustainability knowledge as an intangible strategic resource that suppliers can consider to support the buyer selection previously mentioned. Following the KBV foundations, managers can identify whether they possess this knowledge or even point to their weaknesses to ensure that they can look for a competitive advantage based on sustainability initiatives. This is not limited to supplier companies; it applies to any company from multiple industries that can increase their concern with the knowledge created and transferred within their SC relationships. This knowledge constantly evolves, which seems to be even more true in terms of sustainability. Therefore, SCS learning and management is key to ensuring maintenance of certain market advantages.

Consequently, the strength of sustainability knowledge transfer and learning among SC partners will enhance sustainability practices in global SCs. Hence, managers should understand their position in the SC and in the learning process to ensure that the sustainability knowledge is alive. For instance, during the research we acknowledged the relevance of sustainability certification programs, as the supplier studied demonstrated how to learn and distribute sustainability knowledge through them. In this sense, global SC managers that rely on certification to ensure sustainability in their processes should consider the existence of elements beyond explicit requirements.

Finally, our findings also helped to reflect on policy implications related to the importance of incentivizing certification programs at both the firm and the SC level. As presented in section 4.2 (see Table 2), certification was identified as a key source of sustainability knowledge. Thus, policy makers may use such programs for benchmarking when developing regulations as they consider the reality of suppliers. Additionally, they can stimulate best practices in different industries according to these programs. We understand that local laws may already address several issues linked to certification requirements; however, this may not be the case for all countries.

6.2 Limitations and future research

As does all research, the current study presents some limitations. The first refers to the understanding that a single case study does not provide generalizable findings; nevertheless, we believe that the specificity of the case examined supports our theory-building efforts. Also, a limitation exists in the impossibility of gathering explicit explanations in a few interviews, since our unit of analysis (i.e., sustainability knowledge) is an intangible resource. However, we believe that the use of the KBV lens helped us to grasp and clarify what this resource entails. Last, we recognize as a limitation that some buyers' perspectives were based on a single interview, despite our effort to collect more interview data. This causes a single-source bias, but we collected secondary data to complement the information, when possible.

Future research may involve a larger sample from different settings, although we strongly suggest addressing multiple actors along the same SC to identify the dynamics involved in the effective dissemination of sustainability knowledge. A better understanding on how sustainability knowledge is distributed in a local SC supplier's context would be relevant as well as identify if a global supplier interferes in how the local supplier manages sustainability knowledge among SC actors. To this end, the use of the KBV should be adopted by future scholars to increase our understanding in terms of sustainability knowledge production, transferability, aggregation, and appropriability. Until now, few studies have been interested in this approach. In addition, SCS learning studies need multiple perspectives that, for example, focus on each stage. As identified in this research, companies lack interest in learning how to store knowledge. Therefore, studying the organizational memory for sustainability knowledge is an interesting research topic. In this research we showed that the key role played by the supplier was crucial for the sustainability KM of the buyers' SCS learning. Further studies need

to focus on other SC members (e.g., third parties) who can improve SCS. We also recommend further research on buyer selection, which affects SCS and can strengthen and create closer SC relationships. Finally, we revealed clear elements to show differences between sustainability knowledge diffusion and dissemination, by means of the levels of the interpretation stage of learning, which deserves further attention.

Acknowledgements

We would like to thank the anonymous reviewers and the editorial team for the constructive recommendations. In addition, we thank the participants of the EurOMA Publishing Workshop 2021, especially the working team headed by Prof. Juliana Hsuan, for the valuable comments and insights shared during both sessions.

References

- Barley, W.C., Treem, J.W. and Kuhn, T. (2018), "Valuing multiple trajectories of knowledge: A critical review and agenda for knowledge management research", *Academy of Management Annals*, Vol. 12 No.1, pp.278-317.
- Bateman, A., Betts, K., Cottrill, K., Pang, J. and Suhas Deshpande, A. (2021), *State of Supply Chain Sustainability 2021*, Mass, Cambridge.
- Blome, C., Paulraj, A. and Schuetz, K. (2014), "Supply chain collaboration and sustainability: a profile deviation analysis", *International Journal of Operations & Production Management*, Vol. 34 No.5, pp.639-663.
- Busse, C., Schleper, M.C., Niu, M. and Wagner, S.M. (2016), "Supplier development for sustainability: contextual barriers in global supply chains", *International Journal of Physical Distribution and Logistics Management*, Vol. 46, No.5, pp.442-468.
- Carbone, V., Moatti, V. and Wood, C.H. (2012), "Diffusion of sustainable supply chain management: Toward a conceptual framework", *Supply Chain Forum: An International Journal*, Vol. 13, pp.26-39.
- Chopra, M., Saini, N., Kumar, S., Varma, A., Mangla, S.K. and Lim, W.M. (2021), "Past, present, and future of knowledge management for business sustainability", *Journal of Cleaner Production*, Vol. 328, pp.129592.

- Cormack, A., Thomé, A.M.T. and Silvestre, B. (2021), “An integrative conceptual framework for supply chain sustainability learning: A process-based approach”, *Journal of Cleaner Production*, Vol. 320, pp.128675.
- Cox, A. (2001), “Managing with power: strategies for improving value appropriation from supply relationships”, *Journal of Supply Chain Management*, Vol. 37 No.2, pp.42-47.
- Despeisse, M., Mbaye, F., Ball, P.D. and Levers, A. (2012), “The emergence of sustainable manufacturing practices”, *Production Planning & Control*, Vol. 23 No.5, pp.354-376.
- Eisenhardt, K.M. and Graebner, M.E. (2007), “Theory building from cases: Opportunities and challenges”, *Academy of Management Journal*, Vol. 50, No.1, pp.25–32.
- Eisenhardt, K.M. and Santos, F.M. (2002), *Knowledge-based view: A new theory of strategy*. Handbook of strategy and management, pp.139-164.
- Gavronski, I., Klassen, R.D., Vachon, S. and Nascimento, L.F.M. (2012), “A learning and knowledge approach to sustainable operations”, *International Journal of Production Economics*, Vol. 140, No.1, pp.183-192.
- Gong, Y., Jia, F., Brown, S. and Koh, L. (2018), “Supply chain learning of sustainability in multi-tier supply chains: a resource orchestration perspective”, *International Journal of Operations & Production Management*, Vol. 38, No.4, pp.1061-1090.
- Grant, R.M. (1996), “Toward a knowledge-based theory of the firm”, *Strategic management journal*, Vol. 17, No.2, pp.109-122.
- Grant, R. and Phene, A. (2022), “The knowledge based view and global strategy: Past impact and future potential”, *Global Strategy Journal*, Vol. 12 No.1, pp.3-30.
- Grimm, J.H., Hofstetter, J.S. and Sarkis, J. (2014), “Critical factors for sub-supplier management: A sustainable food supply chains perspective”, *International Journal of Production Economics*, Vol. 152, pp.159-173.
- Hall, J. and Matos, S. (2010), “Incorporating impoverished communities in sustainable supply chains”, *International Journal of Physical Distribution & Logistics Management*, Vol. 40 No.1/2, pp.124-147.
- Hörisch, J., Johnson, M.P. and Schaltegger, S. (2014), “Implementation of sustainability management and company size: A knowledge-based view”, *Business Strategy and the Environment*, Vol. 24, No.8, pp.765-779.

- Huber, G.P. (1991), "Organizational learning: The contributing processes and the literature", *Organization Science*, Vol. 2, No.1, pp.88-115.
- Hult, G.T.M., Ketchen Jr, D.J., Cavusgil, S.T. and Calantone, R.J. (2006), "Knowledge as a strategic resource in supply chains", *Journal of Operations Management*, Vol. 24, No.5, pp.458-475.
- International Coffee Organization (2021), *Crop year production by country*. Available at: <https://www.ico.org/prices/po-production.pdf>. Accessed on: 10 Jan 2022.
- Jia, F. and Lamming, R. (2013), "Cultural adaptation in Chinese-Western supply chain partnerships: Dyadic learning in an international context", *International Journal of Operations & Production Management*, Vol. 33, No.5, pp.528-561.
- Jia, M., Hendry, L.C. and Stevenson, M. (2022), "Supplier absorptive capacity: learning via boundary objects in sustainability-oriented supplier development initiatives", *International Journal of Operations & Production Management*, Vol. 42 No.8, pp.1173-1199.
- 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 & Production Management*, Vol. 49 No.10, pp.1605-1629.
- Ketokivi, M. and Choi, T. (2014), "Renaissance of case research as a scientific method", *Journal of Operations Management*, Vol. 32, No.5, pp.232-240.
- Klingenberg, B. and Rothberg, H.N. (2020), "The status quo of knowledge management and sustainability knowledge", *Electronic Journal of Knowledge Management*, Vol. 18, No.2, pp.136-148.
- Knoppen, D., Christiaanse, E. and Huysman, M. (2010), "Supply chain relationships: Exploring the linkage between inter-organisational adaptation and learning", *Journal of Purchasing and Supply Management*, Vol. 16, No.3, pp.195-205.
- Koberg, E. and Longoni, A. (2019), "A systematic review of sustainable supply chain management in global supply chains", *Journal of Cleaner Production*, Vol. 207, pp.1084-1098.
- Kong, T., Feng, T., Huang, Y. and Cai, J. (2020), "How to convert green supply chain integration efforts into green innovation: A perspective of knowledge-based view", *Sustainable Development*, Vol. 28, No.5, pp.1106-1121.

- Kuppusamy, S., Magazine, M.J. and Rao, U. (2021), “Buyer selection and service pricing in an electric fleet supply chain”, *European Journal of Operational Research*, Vol. 295 No.2, pp.534-546.
- Li, Q., Xue, Q., Truong, Y. and Xiong, J. (2018), “MNCs’ industrial linkages and environmental spillovers in emerging economies: The case of China”, *International Journal of Production Economics*, Vol 196, pp.346-355.
- Lim, M.K., Tseng, M.L., Tan, K.H. and Bui, T.D. (2017), “Knowledge management in sustainable supply chain management: Improving performance through an interpretive structural modelling approach”, *Journal of Cleaner Production*, Vol. 162, pp.806-816.
- Lincoln, Y. and Guba, E.G. (1985), *Naturalistic Inquiry*, Sage Publications, Los Angeles, CA.
- Liu, L., Zhang, M. and Ye, W. (2019), “The adoption of sustainable practices: A supplier's perspective”, *Journal of Environmental Management*, Vol. 232, pp.692-701.
- Loon, M. (2019), “Knowledge management practice system: Theorising from an international meta-standard”, *Journal of Business Research*, Vol. 94, pp.432-441.
- Marques, L., Yan, T. and Matthews, L. (2020), “Knowledge diffusion in a global supply network: A network of practice view”, *Journal of Supply Chain Management*, Vol. 56 No.1, pp.33-53.
- Martins, V.W.B., Rampasso, I.S., Anholon, R., Quelhas, O.L.G. and Leal Filho, W. (2019), “Knowledge management in the context of sustainability: Literature review and opportunities for future research”, *Journal of Cleaner Production*, Vol. 229, pp.489-500.
- Miles, M.B., Huberman, A.M. and Saldaña, J. (2020), *Qualitative data analysis: A methods sourcebook*. (4th ed.). Sage Publications, Los Angeles, CA.
- Mukherjee, A., Mitchell, W. and Talbot, F.B. (2000), “The impact of new manufacturing technologies and strategically flexible production”, *Journal of Operations Management* Vol. 18, No.2, pp.139-168.
- Nickerson, J.A. and Zenger, T.R. (2004), “A Knowledge-Based Theory of the Firm—The Problem-Solving Perspective”, *Organization Science*, Vol. 15 No.6, pp.617-632.
- Nonaka, I. and Takeuchi, H. (2007), “The knowledge-creating company”, *Harvard business review*, Vol. 85 No.7/8, pp.162-171.

- Ojha, D., Acharya, C. and Cooper, D. (2018), “Transformational leadership and supply chain ambidexterity: Mediating role of supply chain organizational learning and moderating role of uncertainty”, *International Journal of Production Economics*, Vol. 197, pp.215-231.
- Pagell, M. and Wu, Z. (2009), “Building a more complete theory of sustainable supply chain management using case studies of 10 exemplars”, *Journal of Supply Chain Management*, Vol. 45, No.2, pp.37-56.
- Pereira, M.M.O., Silva, M.E. and Hendry, L.C. (2021), “Supply Chain Sustainability Learning: the COVID-19 impact on emerging economy suppliers”, *Supply Chain Management: an International Journal*, Vol. 26, No.6, pp.715-736
- Ramanathan, U., Mazzola, E., Mohan, U., Bruccoleri, M., Awasthi, A. and Garza-Reyes, J.A. (2021), “How selection of collaborating partners impact on the green performance of global businesses? An empirical study of green sustainability”, *Production Planning & Control*, Vol. 32, No.14, pp.1207-1222.
- Revilla, E. and Knoppen, D. (2015), “Building knowledge integration in buyer-supplier relationships: The critical role of strategic supply management and trust”, *International Journal of Operations & Production Management*, Vol. 35 No.10, pp.1408-1436.
- Robinson, H.S., Anumba, C.J., Carrillo, P.M. and Al-Ghassani, A.M. (2006), “STEPS: a knowledge management maturity roadmap for corporate sustainability”, *Business Process Management Journal*, Vol. 12, No.6, pp.793-808.
- Roy, V. (2019), “Decoding the elemental arcs of superior performance in sustainable supply chains: A knowledge-based view”, *Management Decision*, Vol. 57, No.9, pp.2570-2592.
- Sauer, P.C., Silva, M.E. and Schleper, M.C. (2022), “Supply chains’ sustainability trajectories and resilience: a learning perspective in turbulent environments”, *International Journal of Operations & Production Management*, Vol. 48 No.8, 1109-1145.
- Schoenherr, T., Griffith, D.A. and Chandra, A. (2014), “Knowledge management in supply chains: The role of explicit and tacit knowledge”, *Journal of Business Logistics*, Vol. 35, No.2, pp.21-135.
- Silva, M.E., Dias, G.P. and Gold, S. (2021), “Exploring the roles of lead organisations in spreading sustainability standards throughout food supply chains in an emerging economy”, *The International Journal of Logistics Management*, Vol. 32, No.3, pp.1030-1049.

- Silvestre, B.S. (2015), “Sustainable supply chain management in emerging economies: Environmental turbulence, institutional voids and sustainability trajectories”, *International Journal of Production Economics*, Vol. 167, pp.156-169.
- Silvestre, B.S., Silva, M.E., Cormack, A. and Thome, A.M.T. (2020), “Supply chain sustainability trajectories: learning through sustainability initiatives”, *International Journal of Operations & Production Management*, Vol. 40, No.9, pp.1301-1337.
- Strauss, A. and Corbin, J. (1990). *Basics of Qualitative Research: Grounded Theory Procedures and Techniques*. Sage Publications, Newbury Park, CA.
- Touboulic, A., Chicksand, D. and Walker, H. (2014), “Managing imbalanced supply chain relationships for sustainability: A power perspective”, *Decision Sciences*, Vol. 45 No.4, pp.577-619.
- Tsoulfas, G.T. and Pappis, C.P. (2006), “Environmental principles applicable to supply chains design and operation”, *Journal of Cleaner Production*, Vol. 14, No.18, pp.1593-1602.
- Villena, V.H., Wilhelm, M. and Xiao, C.Y. (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.
- Voss, C., Johnson, M. and Godsell, J. (2016), Case research. In: *Research methods for operations management* (pp. 181-213). Routledge.
- Yang, Y., Jia, F. and Xu, Z. (2018), “Towards an integrated conceptual model of supply chain learning: an extended resource-based view”, *Supply Chain Management: An International Journal*, Vol. 24, pp.189-214.
- Yin, R.K. (2017), *Case Study Research – Design and Methods*, 6th edition, Sage publications.

Table A1 – Questions of the interview protocols

<p>Interview protocol for the key supplier</p> <p>PERSONAL PROFILE Can we start with a brief introduction about you? (including experience and role) What does sustainability mean for you?</p> <p>COMPANY INFORMATION Size of the company (sales and number of employees) Core business: Corporate values: Number of suppliers and geographic footprint (% of local vs. global): Number of customers and geographic footprint (% of local vs. global): Type of customers: B2B, B2C, Intermediary etc.</p> <p>SUPPLIER/CUSTOMERS SELECTION Do you select your suppliers based on what elements? Do you select your customers/buyers based on what elements?</p> <p>CUSTOMER/BUYERS DEVELOPMENT What are the drivers/barriers to disseminate sustainability knowledge towards your buyers/customers? What initiatives did you have with buyers in terms of sustainability? (both at the local and at the global level) Were they successful or unsuccessful?</p> <p>KNOWLEDGE MANAGEMENT How was sustainability knowledge produced? Which sources were used to acquire sustainability knowledge? Any benchmark from other companies? Are buyers trained on sustainability? Do any buyers resist to implement what they learned? How knowledge is transferred to new employees? Is it key to learn about sustainability to improve your business? How do your company assess buyer learning? Do your company learn from buyers?</p>

How sustainability knowledge is storage?
Do you invest in R&D targeting sustainability?
What if a key employee leaves?
How is sustainability communication with buyers managed?

Interview protocol for the key supplier founder

Brief introduction about you and your company
What is sustainability for you?
How did sustainability come about at your company?
Do you believe that there is a culture of sustainability in the company?
Is there any type of training (on sustainability) at your company and for other stakeholders (buyers, local community, etc.)?
How is communication on sustainability at your company?
How does the company know that the employee has learned about sustainability? Is there any rating/feedback?
How is knowledge about sustainability stored/registered? (Memory)
If you stop participating in the company, for example, what happens to the knowledge (and culture) about sustainability you have?
How do you see the dissemination of knowledge about sust. for buyers?
Has any buyer stopped negotiating with you for not agreeing with the same values as your company?

Interview protocol for the buyers

PERSONAL PROFILE

Can we start with a brief introduction about you? (including experience and role)
What does sustainability mean for you?

COMPANY INFORMATION

Could you provide information about the company (e.g. size, number of employees, core business)?
How do you define your supply geographic footprint (% of local vs. global)?
What criteria do you consider when selecting a supplier?

SUPPLIER SELECTION AND DEVELOPMENT

What are the drivers and the barriers to disseminate sustainability knowledge towards your key supplier?
What initiatives did you have with the key supplier in terms of sustainability?
Focusing on a specific initiative that is currently in place, could you explain the benefits generated from the key suppliers in your perspective?

SUPPLY CHAIN SUSTAINABILITY LEARNING

(A) Sustainability Knowledge acquisition

What are the sources used to acquire sustainability knowledge?

Does the key supplier influence your knowledge about sustainability?

(B) Sustainability information distribution

How does the key supplier disseminate sustainability information?

(C) Sustainability information interpretation

Have you learned about sustainability from the key supplier? How do you transfer that inside your company to your employees?

(D) Sustainability organisational memory

How do you storage sustainability knowledge in your company?

How is the communication with the key supplier for sustainability? Is it different with other suppliers? Do you have any online platform?