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**ENHANCING SUSTAINABILITY THROUGH BUYER-SUPPLIER
COLLABORATIVE INNOVATION**

Examiners: Professor Katrina Lintukangas
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ABSTRACT

Lappeenranta-Lahti University of Technology (LUT)

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Enhancing sustainability through buyer-supplier collaborative innovation

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The purpose of this study is to examine the role of collaborative innovation in enhancing sustainability in the collaborating companies. The objective is to find out why buyers involve suppliers in their innovation, how suppliers can contribute to innovation, and what the role of the purchasing department as an enabler is in collaborative innovation. The study is conducted as a qualitative multi-case study in the context of Finnish food supply chains and sustainable packaging innovation. The data is collected from interviews with eight practitioners from six different companies representing both the buyer and the supplier side. The results show that companies can enhance their sustainability by focusing their innovations efforts on sustainability issues and by actively involving suppliers in the innovation activities. The suppliers represent an important access for buyers to complementary resources and knowledge, which serve as key motives for buying companies to involve them in innovation. The contributions by suppliers arise from their knowledge relating to the product, production, network, and industry. Moreover, the suppliers hold valuable information on potential future trends as well as current and emergent legislation in the industry. When such information and knowledge is shared in collaboration with the buyer, more sustainable products can be developed and commercialized. Furthermore, the results indicate that when the purchasing department gets to be involved in collaborative innovation, it can serve as an enabler by being an important link between the suppliers and the buyer company. The lack of purchasing involvement, in turn, can turn out to be a significant stumbling block for collaborative innovation projects.

TIIVISTELMÄ

Lappeenranta-Lahti University of Technology (LUT)

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Vastuullisuuden parantaminen ostajan ja toimittajan välisen yhteistyöinnon kautta

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Tämän tutkimuksen tarkoituksena on tutkia yhteistyöinnon roolia vastuullisuuden edistämässä yhteistyötä tekevissä yrityksissä. Tavoitteena on selvittää, miksi ostajayritykset ottavat toimittajia mukaan innovointitoimintaansa, miten toimittajat voivat antaa panoksensa innovointiin ja mikä on hankintaosaston rooli mahdollistajana yhteistyöhön perustuvassa innovoinnissa. Tutkimus on toteutettu kvalitatiivisena case-tutkimuksena Suomen elintarviketoimitusketjujen ja vastuullisten ruokapakkauksinnovaatioiden kontekstissa. Tutkimusdata on kerätty kahdeksasta haastattelusta kuuden eri yrityksen kanssa, jotka edustavat sekä ostaja- että toimittajapuolta. Tulokset osoittavat, että yritykset voivat parantaa vastuullisuuttaan keskittämällä innovaatiotoimintansa kestävyyskysymyksiin ja ottamalla toimittajat aktiivisesti mukaan innovaatiotoimintaan. Toimittajat edustavat ostajayrityksille merkittävää mahdollisuutta saada täydentäviä resursseja ja tietoa, jotka ovat keskeisiä motiiveja ostajayrityksille ottaa toimittajia mukaan innovointiin. Toimittajien panos syntyy heidän tietämyksestään liittyen tuotteeseen, tuotantoon, verkostoon sekä alaansa. Toimittajilla on lisäksi arvokasta tietoa mahdollisista tulevista trendeistä sekä nykyisestä ja kehittyvästä lainsäädännöstä alalla. Kun tällaista tietoa jaetaan yhteistyössä ostajayrityksen kanssa, kestävä kehitys tukevia tuotteita voidaan kehittää ja kaupallistaa. Tulokset osoittavat lisäksi, että hankintaosaston ollessa mukana yhteistyöinnoinnissa, se voi toimia edesauttajana olemalla tärkeä linkki toimittajien ja ostajayrityksen välillä. Hankinnan osallistumisen puute taas voi osoittautua merkittäväksi kompastuskiveksi innovaatioyhteistyöhankeissa.

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Vantaa, May 19th, 2021

Elsa Honkanen

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1 INTRODUCTION

Sustainability has become a trending topic in the business world and within the wider aspects of society as well, driven by stakeholders' increasing understanding and concern towards environmental and social issues (Carter & Easton, 2011). Thus, companies are now faced with tremendous pressure from customers, governments, company management, communities and non-governmental organisations (NGOs), to become more sustainable (Carter & Easton, 2011; Hassini, Surti & Searcy, 2012; Galpin & Whittington, 2012; Mota, Gomes, Carvalho & Barbosa-Povoa, 2015; Seuring, Sarkis, Müller & Purba, 2008) and to balance sustainability with competitiveness (Fritz & Schiefer, 2008). As companies have a responsibility to innovate and develop sustainable products (Chen, 2008; Albino, Balice & Dangelico, 2009), their role in contributing to sustainable development is central. The food industry in particular is greatly affected by the stakeholders' sustainability requirements (Rota, Reynolds & Zanasi, 2013). The European Commission lists the agri-food industry as one of the main priorities in the Sustainable Production and Consumption policies (European Commission, 2008), which seek to make consumption and production more sustainable for the sake of the environment and for increasing the competitiveness of businesses and the economic development and social well-being (Del Borghi, Gallo, Strazza & Del Borghi, 2014). The main sustainability concerns pertain to the food industry's contributions to the use of natural resources throughout the whole supply chain as well as food waste and loss, presenting detrimental impacts on the environment (León-Bravo, Caniato, Caridi & Johnsen, 2017; Del Borghi et al., 2014; FAO, 2019).

Scholars agree that packaging is one significant way to address the sustainability issues in the food industry (Guillard, Gaucel, Fornaciari, Angellier-Coussy, Buche & Gontard, 2018; Brody, Bugusu, Han, Koelsch Sand & McHugh, 2008). In fact, food packaging presents one of the highest environmental impacts within the food industry (Licciardello, 2017; Del Borghi et al., 2014), which is caused by packaging waste and the use of certain materials derived from non-renewable resources (Marsh & Bugusu, 2007; Guillard et al., 2018). Hence, a lot of dedication has been directed to reducing the environmental impact of packaging by addressing these issues of resources and waste (Licciardello, 2017). Packaging can also impact sustainability indirectly through its role in food waste and food loss reduction, and some innovations have been developed with this intention (Licciardello, 2017; Pauer, Wohner, Heinrich & Tacker, 2019).

The European Union has taken some legislative action regarding these packaging sustainability issues and introduced a directive (European Commission, 1994) and later, its two updated versions (European Commission, 2004 & European Commission, 2018) to manage packaging waste and to promote actions supporting the shift towards a circular economy.

The introduction of new regulations, the pressure from stakeholders, as well as rapid technological development call for the need to innovate more sustainable products (Melander 2017). Scholars have acknowledged the importance of viewing innovation as a collaborative effort. For example, Rosell and Lakemond (2012) state that innovation is not an internal company matter, rather, it is increasingly generated in external collaboration. Likewise, Krishnan, Yen, Agarwal, Arshinder and Bajada (2021) point out that innovation is increasingly viewed as a result of a collaborative process in supply chain relationships. Moreover, innovation is particularly important for supply chains in the context of sustainability (Klassen & Vereecke, 2012), and meeting sustainability requirements and goals requires collaboration (Léon-Bravo et al., 2017). This underlines the importance of incorporating aspects of supply chain management into innovation research. Supply chain managers are in a particularly favourable position to influence the sustainability performance of their company through packaging choices, for instance (Carter & Easton, 2011). Furthermore, the role of collaboration in the sustainability context is often highlighted by scholars (León-Bravo et al., 2017; Chen, Zhao, Tang, Price, Zhang & Zhu, 2017; Melander, 2017). By collaborating, companies can acquire resources and competences which, in turn, can ultimately generate competitive advantage. (Vachon & Klassen, 2008; Léon-Bravo et al., 2017) The access to external knowledge, among other benefits, enables the development of new products and their faster introduction to the market (Melander, 2017). Moreover, companies look for collaboration opportunities with external partners to ensure supply chain efficiency and responsiveness to dynamic market needs (Cao & Zhang, 2011). Hence, given that the food industry is very dynamic due to constant changes in customer demand (van der Vorst & Beulens, 2002; Wiengarten, Pagell & Fynes 2012; Trienekens, Wognum, Beulens & van der Vorst, 2012), external collaboration opportunities may be particularly important for food supply chain companies.

Researchers have also acknowledged that suppliers often represent great innovation potential (Apte & Sheth, 2017; Schiele, 2006). According to Apte and Sheth (2017), companies should see partnering with suppliers as a way to achieve innovation goals since suppliers can often

give improvement suggestions related to the products or even their own processes. In addition, Apte and Sheth (2017) state that by supplier engagement to addressing the various challenges a company faces, companies and suppliers can often together solve some of the innovation challenges. Most companies, however, fail to effectively involve their suppliers in innovation activities, thus leaving the pool of suppliers' innovation potential untapped. (Apte & Sheth, 2017) De Medeiros, Ribeiro and Cortimiglia (2014) studied the success factors for environmentally sustainable product innovation and identified that inter-functional collaboration is a critical success factor. The inter-functional collaboration encompasses the adoption of a systematic view of sustainable innovation, including the integration of both internal and external stakeholders, such as suppliers, in product development. In this regard, De Marchi (2012) claims that such integration involving suppliers is more important in environmentally sustainable innovations than in traditional ones. Finally, Lee and Kim (2011) discovered that strategic collaborative relationships could stimulate innovation, and supplier integration in green product innovation can bring environmental and commercial success.

Some researchers have studied the role of the purchasing department in buyer-supplier collaborative innovation. Studies provide insight on how purchasing can affect innovation performance and how purchasing capabilities can be leveraged to further advance innovation. For example, Schiele (2006) states that purchasing has an important role in identifying suppliers that can become innovative by collaborating with the buyer. Such role should be considered particularly within the supplier selection practices. The work by Luzzini, Amann, Caniato, Essig & Ronchi (2015), in turn, shows that supplier collaboration, strategic sourcing, and purchasing knowledge positively affect innovation performance. The authors appoint purchasing knowledge as a catalyst of buyer-supplier collaborative innovation and highlight the overall enabling role of the purchasing department in innovation. After all, it is the purchasing professionals who have the ability to adopt both strategic sourcing and supplier collaboration practices. According to Rosell and Lakemond (2012), purchasing plays an important role in "coordinating the efforts of the supplier" through various activities such as, supplier meeting initiation and supplier development. Thus, purchasing professionals act as important promoter for supplier relationships (Rosell & Lakemond, 2012). Based on these findings, further investigation into the role of the purchasing department may give valuable information on how to tap the innovation potential of suppliers to enable collaborative innovation.

Although research in the field of supplier collaboration in innovation and particularly in the context of new product development is rather extensive (Rosell & Lakemond, 2012), a few crucial gaps still exist in research. First, Lee and Kim (2011) point out that there is a lack of knowledge in literature about how and why companies integrate suppliers into sustainable product innovation, and this gap exists particularly in empirical research. Second, Rosell and Lakemond (2012) state that while it is widely recognized that suppliers contribute positively to innovation, there is obscurity on what these contributions to innovation actually are. Third, Krishnan et al. (2021) see a need to study how such collaboration leads to innovations and how these innovations can result in sustainability improvements. In addition, the comprehensive review of literature by Johnsen (2009) regarding supplier involvement in new product development – a facet of innovation, reveals that research is fragmented and empirical findings provide conflicting results. The majority of research is based on the perceptions of the buying company, thus, there is evidently a need to further examine the supplier perspective (Johnsen, 2009). Hence, this study attempts to address these aforementioned gaps and issues by jointly dealing with sustainability, collaboration and innovation in the food supply chain context while also examining the role of purchasing as a potential enabler of collaborative innovation. The topic is explored mainly from the buyer company's perspective, however, the supplier's perspective is also included. In brief, the aim is ultimately to discover how sustainability in companies can be enhanced through buyer-supplier collaborative innovation. Conducting empirical research sheds some light on the current state of collaborative innovation for sustainability in Finnish food supply chains and can give valuable insights on the practitioners' views on the issue.

1.1 Research questions and objectives

As stated, the objective of this study is to discover how food supply chain companies are able to enhance their sustainability by collaborating with a supply chain partner in innovation regarding food packaging. Hence, this study also aims to increase the understanding of sustainability, innovation, and collaboration along with the role of purchasing in the context of food packaging, thus addressing the research gap identified earlier. The main research question along with its sub-questions presented below will guide the study in reaching the objective.

Main research question:

How can buyer-supplier collaborative innovation enhance sustainability in companies?

Sub question 1:

Why do companies involve suppliers in their innovation activities?

Sub question 2:

How can suppliers contribute to innovation with their customers?

Sub question 3:

What is the role of the purchasing department in enabling collaborative innovation with suppliers?

The sub-questions support the main research question by elaborating on its facets in more detail, and they will facilitate answering the main research question in the end. The first sub-question focuses on the buying company's motives of involving suppliers in their innovation activities. The second sub-question focuses on the suppliers' contributions to innovation and aims to identify what these contributions are based on both the buyer's and the supplier's views. Finally, the third sub-question aims to uncover the role of the buying company's purchasing department as a potential enabler of collaborative innovation. Examining the role of purchasing is important since purchasing professionals are in a favourable position to affect sustainability through choices regarding packaging (Carter & Easton, 2011), by identifying innovative suppliers (Schiele, 2006), and by adopting supplier collaboration practices (Luzzini et al., 2015), as discussed earlier.

1.2 Delimitations

It is accepted among scholars and in the academic literature that addressing the sustainability challenge requires the adoption of the triple bottom line philosophy (Elkington, 1998), which means balancing economic, social and environmental aspects of company performance (Pujari, 2006). The first delimitation of this study concerns this concept. This study focuses mainly on, yet does not necessarily limit to, the environmental aspect of sustainability. The reasons behind this focus arise from both the scope of this study and indications by prior studies that the effects of packaging primarily concern the environment. For instance, the social aspect of sustainability regarding packaging is commonly excluded in studies due to the difficulty to measure it in

relation to products (Svanes, Vold, Møller, Pettersen, Larsen & Hanssen, 2010). Hence, studying sustainable food packaging from the environmental sustainability perspective is best-suited.

The second delimitation comes from the selected level of analysis. This study considers the collaboration between a buyer and a supplier, thus putting the focus on dyads – the relationships between two actors (Miemczyk, Johnsen & Macquet, 2012). Hence, this study excludes the perspective of various other possible collaboration participants, even though some researchers have pointed out that collaborative innovation occurs in networks with multiple actors (e.g. Rosell & Lakemond, 2012). The reason for this dyadic approach is that firstly, it will allow to preserve some depth in this study which the scope may put under question, and second, it helps to address the aforementioned research gap regarding the lack of supplier perspectives.

Finally, since the empirical part is conducted as a case study focusing on Finnish food supply chain companies, the results represent only the views of the participating companies and interviewees. Hence, the results cannot be generalised to the entire food and packaging industries and other companies. Nevertheless, the insight provided by this study may help some managers and practitioners in both buying and supplying companies to reflect on their own collaborative innovation practices and find ways to improve its efficiency and success.

1.3 Conceptual framework

This study draws upon supply chain management and innovation literature. The conceptual framework of this study illustrates the link between theoretical standpoints and the topic of the research. Above all, it includes the key concepts and describes how they are connected to each other and the topic. The conceptual framework is presented below in Figure 1. Based on the aim of this study, the relationships between collaboration, innovation and sustainability and how they affect each other must be examined.

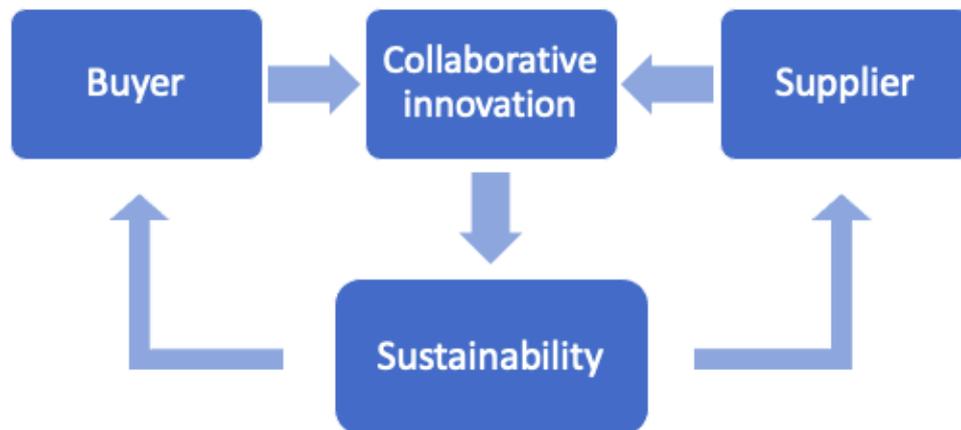


Figure 1. Conceptual framework

1.4 Defining key concepts

The key concepts of the study are concisely defined below before discussing them more deeply in the upcoming chapters. As the conceptual framework presented above shows, the key concepts of this study are sustainability, innovation and collaboration.

Sustainability

The origin of sustainability as a concept is often associated with the World Commission on Environment and Development (WCED) report in which sustainable development is defined as “development that meets the needs of the present without compromising the ability of future generations to meet their need” (Brundtland, Khalid, Agnelli, Al-Athel & Chidzero, 1987). However, these two concepts differ in the sense that sustainability is an equilibrium, whereas sustainable development represents the way to reach such equilibrium (Sarkis, Cordeiro & Vazquez Brust, 2010). A widely adopted three-dimensional approach to sustainability in the business world is the Triple Bottom Line (TBL) by Elkington (1998), which urges companies to adopt sustainability by finding the equilibrium within their economic, social, and environmental performance.

Innovation

The OECD's (2005) definition of an innovation is "the implementation of a new or significantly improved product or process", whereas the process of innovation in the organisational context refers to organisations transforming ideas into "new/improved products, service or processes, in order to advance, compete and differentiate themselves successfully in their marketplace" (Baregheh, Rowley & Sambrook, 2009, 1334). As such, the role of innovation is two-dimensional since it is "both a process and an outcome", as defined by Crossan and Apaydin (2009, 1155). From another perspective, innovation is also a means to change an organisation. It can be a reaction to changes in the external environment or a preventive measure to influence the environment. (Damanpour, 1996)

Collaboration

Collaboration is a type of relationship between organisations agreeing to invest and share resources, as well as exchange information, risks and rewards to achieve common goals (Ring & Van de Ven, 1994; Stank, Daugherty & Autry, 1999; Phillips, Lawrence & Hardy, 2000; Soosay, Hyland & Ferrer, 2008; Hogarth-Scott, 1999). A relationship based on collaboration creates value and a competitive advantage for both parties (Hogarth-Scott, 1999).

1.5 Research methodology and data collection plan

A qualitative research method, more specifically a case study, is the method of choice to conduct the empirical part of this study. In qualitative research, concepts are studied "in terms of their meaning and interpretation in specific contexts of inquiry" (Ketokivi & Choi, 2014). Primary empirical data is collected through interviews with food companies and packaging suppliers. The research methodology is chosen based on the research problem described above in the form of research questions. According to Halinen and Törnroos (2005), a case study permits the investigation of a current phenomenon, which can be hard to separate from its context, but necessary to study within the context to understand the dynamics involved in the setting. Similarly, Yin (2003) states that case studies can be used to examine a phenomenon in its real-life context. A major advantage of a case study is the fact that it can help to explain the complexities that occur in the real-life setting of the phenomenon which cannot not be achieved through other methods (Zainal, 2007). Moreover, given that the main research question is a "how" question requiring rich and profound empirical data, a case study combined with

interviews is a justified choice of method. Together, they enable more in-depth discussion and analysis of the phenomenon in question. (Kähkönen, 2014)

The empirical part of this study relies on interview data gathered from several companies and respondents making it a multiple-case study. This allows the comparison of the phenomenon across different situations and thereby find similarities and differences between the cases (Gustafsson, 2017). The flexibility of interviewing enables repeating questions, making clarifications and correcting possible misunderstandings. It also allows having a conversation with the interviewee. (Tuomi & Sarajärvi, 2018) The interviews are conducted with multiple participants. According to Dubois and Araujo (2007), having multiple respondents allows to capture diverse perceptions and meanings, which is particularly essential when investigating complex business relationships.

2 COLLABORATION AND SUSTAINABILITY IN SUPPLY CHAINS

Organisational research went through changes during the 1980s when the focus started to shift from the zero-sum game view of competitive advantage to vertical value-adding inter-organisational relationships (Kotabe, Martin & Domoto, 2003). In previous research, a company was typically regarded as separate from its customers or suppliers (Kotabe et al., 2003). However, competition at a single company level has become difficult due to drivers such as market internationalization, fast technological change and complexity, and the speed of innovation. This has further shifted the attention to the interactions between companies, which are also explored in many significant organisational theories, such as transaction cost economics (Williamson, 1979) and resource-based view (Wernerfelt, 1984), among other theories closely related to supply chain management. (Chapman & Corso, 2005). Moreover, companies continue to outsource non-core activities to external suppliers as an attempt to sustain competitiveness, resulting in increased dependence on suppliers and their capabilities (Krause & Ellram, 1997; Krause, Handfield & Scannell, 1998). According to Fearne, Duffy and Hughes (2001), this “core competence paradigm” is based on companies knowing what internal capabilities and resources they should own and control within the company as well as understanding that the key strategic make-or-buy –decision is always a supply chain management one.

As collaborating with suppliers gained popularity amongst companies during the 1990s, procurement was increasingly seen as an integral or even strategic function of a company (Tan, 2001; Tassabehji & Moorhouse, 2008). Previously, it was managed as a nonstrategic, transaction-focused cost centre as the supply side was overshadowed by the customer side of the company (Allred, Fawcett, Wallin & Magnan, 2011). In academic literature, the importance of collaboration and close buyer-supplier relationships in supply chain management is now well established and it is persistently emphasized by researchers (Lewis, 2002; Gunasekaran, Patel & Tirtiroglu, 2001; Spekman, Kamauff & Myhr, 1998; Lambert, Emmelhainz & Gardner, 1996). Plenty of theories take a different approach to explain how competitive advantage may be achieved through close inter-organisational relationships (Chapman & Corso, 2005), which also indicates that it is not the most forthright phenomenon. Hence, this chapter first explores how the concept of collaboration is explained in supply chain management literature. Second, collaboration is discussed in the context of sustainability. Supply chain management literature

has drawn attention to the need for collaboration between supply chain actors so as to succeed in the sustainability journey (Léon-Bravo et al., 2017). Food supply chains especially are facing growing pressure from different stakeholders to improve their products' sustainability for which creating sustainable supply chains should be considered as a way to achieve competitive advantage. For sustainable supply chains, collaboration is key. (Rota et al., 2013)

2.1 Collaboration in supply chains

In brief, collaboration is about companies working together and as a concept, it goes beyond commercial relationships (Doukidis, Matopoulos, Vlachopoulou, Manthou & Manos, 2007). Many writers mention elements such as common goals (Simatupang, Wright & Sridharan, 2004; Cao & Zhang, 2011), mutual benefits (Samaddar & Kadiyala, 2006; Cao & Zhang, 2011; Mohr & Spekman, 1994) and information sharing (Stank, Crum & Arango, 1999; Spekman et al., 1998) when discussing collaboration in supply chains. The central idea is that the goals in each company are more attainable by joining efforts as opposed to companies acting alone (Mohr & Spekman, 1994). The term supply chain collaboration (SCC) is sometimes used to describe collaboration in supply chains as its own concept. Barratt (2004) identified two types of supply chain collaborations: vertical and horizontal. Vertical collaboration includes both internal and external collaboration, where external means collaborating with suppliers and customers, and internal refers to collaboration across company functions. Horizontal collaboration includes collaboration with competitors and other non-competitor organisations. (Barratt, 2004) Thus, the term SCC can be very inclusive, so it is important to note that this thesis follows only the type of collaboration that is both vertical and external to the focal company, and more specifically, occurs between a buyer company and its direct supplier(s) (i.e. buyer-supplier collaboration).

Scholars typically conceptualize buyer-supplier relationships as existing on a continuum ranging from merely transactional ties to highly collaborative arrangements (Duffy & Fearné, 2004). According to transaction cost economics, collaboration is a form of hybrid governance that is in-between the two ends of the governance continuum of vertical integration and market exchange. As such, collaboration puts more emphasis on relational rather than transactional means of governance. (Cao & Zhang, 2012; Williamson, 1975; Nyaga, Whipple & Lynch, 2010). Likewise, Phillips et al. (2000, 2) define collaboration as a “cooperative relationship

among organisations that relies on neither market nor hierarchical mechanisms of control”. Transaction cost economics is, however, rather deficient in explaining collaborative relationships and their motives since the theory focuses merely on transactions and the efficiency-aspect of buyer-supplier relationships (Duffy & Fearne, 2004; Cao & Zhang, 2012). As the markets continue to shift from transactions to relationships (Christopher, 2017, 221), it is relevant to take on different approaches and examine the relationships more deeply.

Drawing from the relational view of the firm, Dyer and Singh (1998) argue that companies can develop relationships that lead to sustained competitive advantage, and they suggest that collaboration that is more relational rather than transactional or market-based creates more competitive advantage. The authors identify four potential sources of inter-organisational competitive advantage: 1. relation-specific assets, 2. knowledge-sharing routines, 3. complementary resources/capabilities, and 4. effective governance. In a similar vein, Gold, Seuring and Beske (2010) describe how sources of competitive advantage can be found in inter-firm resources and capabilities which emerge from collaboration in the supply chain. These resources and capabilities can generate competitive advantage because they are difficult to imitate by competitors due to their social complexity, causal ambiguity, and growth over the years. Collaboration is even more important for supply chains wanting to achieve sustainability in terms of economic, environmental and social performance (Gold et al. 2010).

According to Spekman et al. (1998), collaboration is the final step in a transition from open market negotiations, through co-operation and co-ordination, to collaboration (Figure 2). The first step, open market negotiations, is characterized by price-based discussions and adversarial relationships, whereas collaboration requires supply chain integration, joint planning and technology sharing. In-between the two ends, co-operation is characterized by fewer suppliers and longer-term contracts, and co-ordination requires more information exchange which would allow, for example, JIT systems. (Spekman et al. 1998)



Figure 2. Transition from open market negotiations to collaboration (Spekman et al., 1998)

Before going deeper into collaborative relationships, it is necessary to explain how they are distinctive. In the continuum of buyer-supplier relationships, the comparison is often made with so called traditional buyer-supplier –relationships. Traditional refers to transaction-oriented relationships (Wilson & Vlosky, 1997). Market exchange in TCE (Williamson, 1975), open market negotiation (Spekman et al., 1998), and commercial relationship (Doukidis et al., 2007) are a few examples mentioned above describing the same type of transaction-oriented relationship. The traditional relationship concept is used in this thesis as a reference point when discussing collaborative relationships. In supply chain management literature, inter-firm relationships where relational ties are emphasized are typically referred to as partnerships, alliances, or collaborative relationships (Nyaga et al., 2010). The key characteristics describing traditional and collaborative relationships gathered from various sources are summarized in Table 1. As shown in the table, for most of these characteristics, there is an opposite on the other side, thereby creating a strong contrast between the two relationship types.

Table 1. Traditional vs. collaborative buyer-supplier –relationships (Duffy & Fearne, 2004; Spekman, 1988; Mohr & Spekman, 1994; Spekman et al., 1998; Nyaga et al., 2010)

Traditional relationships	Collaborative relationships
<ul style="list-style-type: none"> • short-term focus • low interdependence • price-based buying decisions • proprietary information • opportunistic behaviour • win-lose orientation • relationship-specific investments avoided • conflicting goals • exploitation of power • a large number of suppliers • separate activities • adversarial attitude • act for own interest only • little co-ordination of work process • limited communication restricted between sales and purchasing 	<ul style="list-style-type: none"> • long-term focus • high interdependence • information sharing • mutual trust • act for mutual benefit • win-win orientation • commitment • more relationship specific investments • joint problem-solving and decision making • compatible goals • higher level of integration • fewer selected suppliers • inter-company teams • co-ordination of work processes • balanced power relationship • open communication

These characteristics of collaborative relationships are often associated with the success of such relationships. In such a case, the characteristics would be called success factors, and several studies focus specifically on identifying them. For example, Mohr and Spekman (1994) identified commitment, coordination, trust, communication quality, information sharing, participation, joint problem solving as the most significant characteristics that predict success from the buying company's viewpoint. Naturally, the lack of these characteristics in collaborative buyer-supplier relationships would predict failure or inefficiency, as suggested by Ellram (1995). For example, the lack of trust was found to be a significant factor by both buyers and suppliers leading to an inefficient partnership, while poor communication was the largest contributor to failure in a study by Ellram (1995).

The Japanese model of close supplier relationships has brought a lot of success to Japanese companies, especially in the automotive industry. As the opposite of the traditional arm's-length relationships, the Japanese-style partnerships result in superior performance through extensive information sharing, coordination of interdependent tasks, relationship-specific investments, and the use of trust as a governance mechanism for the relationship. (Dyer, Cho & Chu, 1998) These are in line with the discussion above about the characteristics and success factors of collaborative relationships. However, it is important to point out that collaborative relationships should not be established between every supplier and buyer. They require plenty of resources which are a scarce commodity in any company (Dyer et al., 1998). Thus, developing such relationships with suppliers can be justified only when the relationship benefits outweigh the costs. Relationship costs can be, for example, costs related to ordering, goods handling, communication, and administrative systems. (Gadde & Snehota, 2000) Barratt (2004) also underlines the importance of only focusing “on a small number of close relationships rather than trying to collaborate with everyone” due to the resource intensity of collaboration.

Dyer et al. (1998) suggest strategic segmentation of suppliers into strategic partners and durable arm's length suppliers to optimize purchasing effectiveness and to allocate different levels of resources to these categories. Resources should mainly be allocated to strategic partners who are described as suppliers that provide high-value inputs and play an important role in differentiating the buyer's final product. The authors state that the buyer company should maintain communication at a high level with these suppliers, offer managerial assistance, exchange personnel, make relation-specific investments, and maximise efforts in ensuring that such suppliers have world-class capabilities. Fewer resources should be allocated to the arm's-length suppliers as they supply non-strategic inputs which do not contribute to the differential advantage of the buyer's final product. For this supplier category, the buyer should aim to minimize total purchasing costs. (Dyer et al. 1998) Likewise, Spekman et al. (1998) state that arm's-length relationships are acceptable and even necessary in some situations. However, relationships that are both strategically important and complex should be treated collaboratively. Complexity can be financial or commercial, and in the case of the latter, it may pertain to joint production processes or shared development, for example. The complexity also indicates interdependence between the partners. Cox (2004), in turn, talks about appropriateness in the context of business relationship management. The author argues that

while scholars typically advocate for collaborative relationship approaches as best practice, buyers rarely have either the competence or resources to successfully and effectively implement such approaches. For example, a collaborative relationship where the created value is shared equally – a reciprocal relationship, would only be appropriate in an interdependence power situation in which neither the buyer nor the supplier is in a dominant position over the other. (Cox, 2004)

2.1.1 Collaboration benefits and motives

The motives behind collaboration can be linked to its potential benefits. The benefits of collaborative relationships have been well documented in the supply chain management literature. Collaborative relationships are a way to build efficient and responsive supply chains in order to deliver exceptional value to customers (Doukidis, Matopoulos, Vlachopoulou, Manthou & Manos, 2007). Moreover, by successfully serving the needs and interests of consumers, collaboration partners are more likely to gain competitive advantage in the marketplace (Duffy & Fearn, 2004), which Mohr and Spekman (1994) name as the primary motive for establishing collaborative relationships. Allred et al. (2011) found that collaboration can become a dynamic capability in a company. Dynamic capabilities are the company's ability to "integrate, build, and reconfigure internal and external competences to address rapidly changing environments" to improve competitiveness (Teece, Pisano & Shuen, 1997, 516). In this regard, collaboration as a dynamic capability can be a source of competitive advantage (Allred et al., 2011).

Cao and Zhang (2011) studied the impact of supply chain collaboration on collaborative advantage and firm performance and found positive effects on both. Instead of investigating competitive advantage, the authors focused on the concept of collaborative advantage which draws from the relational view of the firm. It can be understood as joint competitive advantage emphasising joint value creation in dyadic relationships. (Cao & Zhang, 2011) While collaborative advantage emerges from relational rent, a mutual benefit that accrues to both partners through combination, exchange, and co-development of idiosyncratic resources, competitive advantage is more about appropriating relational rent and turning mutual benefits into private ones (Dyer & Singh, 1998; Lavie, 2006). The extended resource-based view suggests that forming a collaborative relationship leads to each partner giving a subset of its

resources to the collaboration with the expectation of generating mutual benefits from the shared resources of both companies (Lavie, 2006; Cao & Zhang, 2011).

The extension of the resource-based view is closely related to the knowledge aspect of collaboration. Due to collaboration partners ability to combine complementary resources and capabilities (Lavie, 2006), the integration, transfer, and creation of knowledge throughout the supply chain can generate a greater competitive advantage than what a single company could achieve itself, according to Blome et al. (2014). In fact, Hult, Ketchen and Slater (2004) suggest that the main benefits of collaboration in supply chains come from knowledge exchange and inter-organisational learning. Moreover, the knowledge development process is a significant antecedent to efficiency in supply chains (Hult et al., 2004).

Past research has been particularly interested in the performance effects of collaborative relationships. Corsten and Felde (2005) studied the effects of supplier collaboration on the buying company's performance and found that collaboration positively impacts the performance by enhancing the innovative capability and financial results of the company. Duffy and Fearn (2004) found positive performance effects on the supplier side which has received less attention. Similarly, collaboration along with commitment was found to enhance buyer-supplier performance by Artz and Norman (1999). A positive correlation between supply chain integration, which collaboration is an element of, and company performance was found in the study by Leuschner, Rogers and Charvet (2013). While there is clearly sound evidence for the positive performance effects, Vereecke and Muylle (2006) provide contradicting results. In their empirical study, they found that supply chain collaboration with customers and suppliers has only a minor and sometimes insignificant impact on performance. Focusing on innovation, the study conducted by Patrucco, Luzzini & Ronchi (2017) shows that supplier collaboration together with purchasing absorptive capacity positively influences innovation performance. Similar results regarding innovation performance are provided by Luzzini et al. (2015).

A study by McKinsey (Gutierrez, Kothari, Mazuera & Schoenherr, 2020) showed that companies that collaborated regularly with their suppliers were able to achieve benefits, such as higher growth, lower operating costs, and greater profitability than their industry peers. Furthermore, closer relationships between buyers and suppliers can help create significant value and improve supply chain resilience, (Gutierrez et al., 2020). This is aligned with the findings

by Scholten and Schilder (2015) regarding supply chain resilience. The authors conclude that specific collaboration activities – information sharing, collaborative communication, mutually created knowledge, and joint relationship efforts, increase supply chain resilience. The value aspect has also been acknowledged by scholars. In fact, both Sahay (2003) and Horvath (2001) refer to collaboration as the key to value creation. Likewise, buyer-supplier collaboration, as well as resources and capabilities, are highlighted by Kähkönen and Lintukangas (2012) as a critical part of the value creation process which, in turn, influences the firm performance and competitive advantage. The value created by the collaboration benefits all parties (Horvath, 2001).

The findings by Cao and Zhang (2011) indicate that both collaboration and collaborative advantage improve the financial performance of the company. Likewise, Paulraj et al. (2008) state that collaboration can bring greater economic benefits to the collaborating partners than traditional competitive situations can through access to unique and valuable resources. Furthermore, the authors highlight the role of inter-organisational communication as a relational skill that produces strategic advantage for the collaborating companies. This skill, in turn, can positively influence the bottom lines of the supply chain partners. (Paulraj et al., 2008)

Other commonly cited benefits of collaborative relationships in the academic literature include increased efficiency and effectiveness (Min, Roath, Daughery, Genchev, Chen & Arndt, 2005), knowledge creation (Inkpen, 1996), improved product quality (Handfield, Ragatz; Petersen & Monczka, 1999; Hoegl & Wagner, 2005), cost reductions (Handfield et al., 1999; Min et al., 2005), and innovation capacity and capability enhancements (Corsten & Felde, 2005; Luzzini et al., 2015; Soosay et al., 2008). Table 2 below provides an overview of the most significant benefits of collaboration as suggested by the studies discussed above.

Table 2. The benefits of collaboration

Benefit	Reference to literature
Performance enhancements	Corsten & Felde (2005); Duffy & Fearne (2004); Artz & Norman (1999); Cao & Zhang (2011); Leuschner et al. (2013)
Competitive or collaborative advantage	Duffy & Fearne (2004); Cao & Zhang (2011); Lavie (2006)
Knowledge sharing and creation	Hult et al. (2004); Blome et al. (2014); Inkpen (1996)
Value creation	Gutierrez et al. (2020); Horvath (2001); Sahay (2003)
Supply chain efficiency	Min et al. (2005); Hult et al. (2004)
Innovation	Luzzini et al. (2015); Patrucco et al. (2017); Corsten & Felde 2005; Soosay et al. (2008)
Supply chain resilience	Gutierrez et al. (2020); Scholten & Schilder (2015)
Quality improvements	Gutierrez et al. (2020); Hoegl & Wagner (2005); Handfield et al. (1999)
Cost reductions	Gutierrez et al. (2020); Min et al. (2005); Handfield et al. (1999)

Clearly, the benefits of collaboration are quite extensive and well-acknowledged. Based on these findings in the literature, there is a lot of interrelation among the numerous benefits since one benefit can play a role in the realization of another. However, they all link back to the competitive advantage of the company. In fact, the ultimate desired outcome of collaboration is to enhance competitive advantage (Chen et al., 2017). Recently, a body of research has started to explore collaboration and its benefits in the context of sustainability, as pointed out in the extensive literature review by Chen et al. (2017). While research has predominantly considered the performance outcomes of collaboration in terms of financial or economic impacts in the past, there is currently an emerging trend expanding this focus in research to also include the

environmental impact (Chen et al., 2017). Collaboration for sustainability is discussed in more detail in the next sub-chapter.

2.2 Sustainability in supply chains

While supply chains are required to perform strongly economically, companies are simultaneously held responsible for the environmental and social performance of their suppliers and partners. As mentioned, these pressures stem from both internal and external sources, including company management, governments, communities, and NGOs. (Seuring et al., 2008) Ageron, Gunasekaran and Spalanzani (2012) argue that it is compulsory for companies to integrate sustainability issues into their supply chain management. The framework of sustainable supply chain management (SCCM) emerged as a concept for applying sustainability aspects into supply chains (Carter & Easton, 2011). It refers to “the strategic, transparent integration and achievement of an organization’s social, environmental, and economic goals in the systemic coordination of key inter-organisational business processes for improving the long-term economic performance of the individual company and its supply chains”, as defined by Carter and Rogers (2008). According to Seuring et al. (2008), members of sustainable supply chains must meet environmental and social criteria to remain within the supply chain, while competitiveness is expected to be maintained through meeting customer needs and related economic criteria. Some scholars use the term greening of supply chains which Ageron et al. (2012, 171) define as “a broad strategy to manage materials flow along value chains through different phases like sourcing, production and distribution so that the environment can be protected thanks to safeguarding natural resources and reducing global warming and carbon footprint”.

2.2.1 Collaboration for sustainability

The growing attention to SCCM has led to the widespread adoption of sustainable practices. Many companies have turned to supply chain collaboration as a way to tackle the increasing stakeholder sustainability requirements. (Blome, Paulraj & Schuetz, 2014) Supply chain collaboration has become a strategic issue for companies wishing to attain sustainability targets, according to Chen et al. (2017). Some scholars refer to collaboration in the sustainability context as environmental collaboration (Vachon & Klassen, 2006; Chin, Tat & Sulaiman, 2015;

Grekova, Calantone, Bremmers, Trienekens & Omta, 2016), and it pertains to supply chain partners leveraging each other's resources and exploiting opportunities in learning and knowledge exchange to enhance environmental sustainability (Grekova et al., 2016).

The sustainability issues are affecting purchasing managers as they are being asked to incorporate environmental issues into their decisions (Handfield, Walton, Sroufe & Melnyk, 2002). This includes, for instance, taking environmental criteria into account when evaluating suppliers. The purchasing managers are ultimately responsible for assessing and selecting suppliers who can contribute to their company's environmental strategy. The authors also highlight strategic collaboration with suppliers to investigate mutually beneficial outcomes of greening purchasing process. (Handfield et al., 2002)

Scholars have studied the effects of environmental collaboration using different outcome variables, such as performance measures. Past research provides solid evidence for collaboration's positive effect on cost, operational, manufacturing, as well as environmental performance (Hollo, Blome & Foerstl, 2012; Vachon & Klassen, 2006; 2008). Moreover, it can enhance the environmental capabilities of the supplier. These capabilities (i.e. assets, technologies, and skills) enable a company to react to the numerous sustainability requirements of its stakeholders in a timely and decisive manner. (Lee & Klassen, 2008) Collaboration can be used not only to improve the overall efficiency of the supply chain but also to meet organisational and environmental targets. Furthermore, companies pursue performance improvements through collaboration to alter customer perception and influence their market position to ultimately attain competitive advantage. (Blome et al., 2014) The presumption that collaboration partners are more likely to gain competitive advantage when successfully meeting the needs of the customers (Duffy & Fearn, 2004), can hereby be applied to the sustainability context as well. The collaborative activities are often based on a high level of knowledge sharing regarding sustainable products and processes. As such, environmental collaboration is less focused on the immediate outcomes of environmental efforts but rather deals more with the development of environmentally-sound products and processes. (Vachon & Klassen, 2006)

The knowledge-sharing aspect of collaboration plays an important role in the sustainability context. Collaboration with external partners enables companies to benefit from the sustainability knowledge of their partners, allowing them to transfer certain practices to their

own production practices. Moreover, it is important for collaborating companies to gain knowledge about the other company's sustainability targets because it allows them to make informed decisions about the investment in relationship-specific assets for sustainability and sustainable production. (Blome et al., 2014) Similarly, Vachon and Klassen (2006) describe how it becomes less risky to invest resources in environmental practices as companies gain a better understanding of each other as a result of close collaboration.

2.2.2 Sustainability in food supply chains and food packaging

While several companies are supporting the development of sustainable supply chains, some still limit themselves to meeting merely the legal requirements rather than extending sustainability throughout the chain. One main cause for this is the perception of incompatibility between supply chain efficiency and sustainability. However, scholars have shown the potential effect of adopting environmental, economic, and social sustainability in supply chains on efficiency, since it saves resources, reduces waste, and creates competitive advantage (Carter & Rogers, 2008; Seuring & Müller, 2008; García-Arca, Garrido & Prado-Prado, 2017). Accordingly, García-Arca et al. (2017) emphasise that efficiency and sustainability are not incompatible. In this regard, packaging as an overarching element can support the implementation of sustainable strategies in supply chains. Additionally, packaging is a strategic component and a source of innovation itself and thus, can contribute to competitiveness as well (Hellström & Nilsson, 2011; García-Arca et al., 2017)

The fundamental role of food packaging is to contain and protect the food product from environmental influences as it travels through the supply chain to the hands of the consumer. It extends the product's shelf life by conserving both quality and safety. (Verghese, Lewis, Lockrey & Williams, 2015; Han, 2014; Brody et al., 2008) Other functions of packaging include communication and marketing, for example. Packaging contains mandatory information about the product, such as ingredients and source, and thereby serves as the link between consumers and the food processor. Packaging can also be used for marketing purposes at the point of purchase. (Brody et al., 2008) From the marketing perspective, packaging's role is important since it is the buyer's first encounter with the product (Kotler & Keller, 2016, 412). In this regard, packaging has an important role also in product differentiation. However, beyond

the protective and differentiating role of packaging, it should also be designed to reduce the overall negative environmental impact. (García-Arca et al., 2017).

Brody et al. (2008) identified three key areas of change regarding food packaging. The first one is sustainable food packaging, which relates to the abovementioned notions by García-Arca et al., (2017). The Sustainable Packaging Coalition (SPC) provides a widely accepted criteria for food packaging that need to be met for it to be sustainable. These are listed below in Table 3, which also describes the different strategies and opportunities for development offered by the SPC regarding each criterion.

Table 3. Criteria, opportunities, and strategies for sustainable packaging (based on Sustainable Packaging Coalition, 2011)

Sustainable packaging	
Criterion:	Opportunities & strategies:
1. It is beneficial, safe and healthy for individuals and communities throughout its life cycle	- effective waste management
2. It meets market criteria for performance and cost	- improved package design, resource optimization, informed material selection, design for recovery, and source reduction - collaboration across the packaging supply chain - innovative new packaging materials from renewable sources and advances in recycling systems
3. It is sourced, manufactured, transported, and recycled using renewable energy	- minimizing the use of fossil fuels and optimizing energy efficiency - the direct use or indirect purchase of renewable energy, carbon credits, or tradable renewable allowances (TRECS) - optimized distribution and better fuel efficiency, the use of alternative fuels, hybrid vehicles, and innovative technologies
4. It optimizes the use of renewable or recycled source materials	- optimizing the use of bio-based and recycled materials - sourcing from sustainably managed and certified sources
5. It is manufactured using clean production technologies and best practices	- eco-efficient strategies (e.g. voluntary emission reduction programs and switching to cleaner technologies)
6. It is made from materials healthy throughout the life cycle	- careful selection and specification of the safest materials available - tracking legislation, material bans, and substances of concern - increasing transparency regarding packaging materials
7. It is physically designed to optimize materials and energy	- sustainable design strategies and the development of sustainable design guidelines - standardization and communication of sustainable design strategies and their adoption by the packaging industry
8. It is effectively recovered and utilized in biological and/or industrial closed-loop cycles	- Biological Recovery (Managed Composting) - Technical Recovery (Recycling) - Energy Recovery (Waste to Energy)

Legislation, retailers, and companies are leading the sustainability initiatives through the choices regarding packaging material and design. The source of a packaging material has been identified as the central factor influencing the final sustainability of the packaging. This has led

to companies and environmental coalitions to collaborate to decrease the effect of packaging materials on global sources. For example, paper companies as part of the forest industry need to verify the sources of wood – a material used in packaging. The second key area is the use of packaging supplier relationships for competitive advantage. Suppliers are adding value in relationships within the packaging development value chain extending from raw material generation, conversion, production, distribution, retail, finally to consumer and disposal. Investing in supplier relationships provides opportunities for focus, innovation, and technology transfer for competitive advantage. This view is supported by the literature on collaboration discussed earlier which widely demonstrates the undeniable value-adding potential of inter-firm relationships. The third key area of change in food packaging is the evolution of food service packaging. Because the part which food service plays in consumer spending continues to grow, the importance of packaging naturally increases as well since it ensures food safety and provides convenience to consumers. On-the-go food consumption is an example of convenience affecting the food service packaging industry. It has resulted in packaging containing a larger variety of foods, for instance. (Brody et al., 2008)

Based on the work by Brody et al. (2008), these key areas of change will further highlight the role of food packaging in food supply chains especially in terms of sustainability innovations, supplier relationships, and changing consumer needs. Indeed, there are numerous factors to consider when developing innovative packaging solutions as the market is very dynamic. The challenge with food packaging is the food perishability aspect as well as the strict food safety requirements, which also makes managing food supply chains very unique (Zecca & Rastorgueva, 2014). Therefore, food companies have to strike a balance with food packaging in a way that it fulfils its protective and functional role while simultaneously being sustainable. From a supply chain management point of view, external collaboration is key to tackle such challenges (García-Arca et al., 2017).

3 COLLABORATIVE INNOVATION

Innovations are a fundamental source of competitive advantage which defines the economic success of an organisation (Urbancova, 2013). Companies' capabilities to innovate have become crucial in the present global, turbulent, and increasingly competitive environment, and only by innovating can companies survive. In fact, the capability to continuously innovate is even considered a main source of sustainable advantage by scholars. (Fawcett, Jones & Fawcett, 2012; Wheelwright & Clark, 1992; Urbancova, 2013) Furthermore, innovation is increasingly viewed as a result of a collaborative process (Krishan, Yen, Agarwal, Arshinder & Bajada, 2020). It is nearly impossible for a single company to manage the knowledge that is required for product innovation entirely internally (Corso, Martini, Paolucci & Pellegrini, 2001), and it is not even likely for a single company to possess all the necessary knowledge. Thus, only inter-firm collaboration can lead to innovation. This has resulted in the emergence of complex and dynamic knowledge-creating networks which suppliers are a part of. (Rosell & Lakemond, 2012) This idea is further emphasized by the open innovation paradigm (Chesbrough, 2003), which promotes collaborative innovation as a way to enable innovation by leveraging external resources (Patrucco et al., 2017).

Fawcett et al. (2012) even call innovation a team sport, in which great innovators like Procter & Gamble, Honda, and Walmart have been particularly successful by relying considerably on their supply chain partners to enable their innovation advantage. These companies look for partners with unique complementary capabilities with whom they then establish unique collaborative relationships that produce unparalleled innovations. Trust is an essential element in building and maintaining such collaborative relationships. For the authors, it is at the heart of the capability for collaborative innovation. (Fawcett et al., 2012)

Furthermore, the aforementioned Japanese model which includes a high-level of supplier involvement in the innovation and product development processes of the focal company (Bonaccorsi & Lipparini, 1994), has been credited as a crucial factor in explaining the Japanese advantage (Clark, 1989). Suppliers are systematically integrated into the production and design processes, and these innovative ties are crucial in achieving benefits such as shorter development cycles and improved products. Major suppliers may even offer the entire development process, including planning, design, and manufacturing. Suppliers are involved

early in the process which is characterized by a high degree of responsibility and extensive communication flow. Early supplier involvement in the innovation process is a major aspect contributing to the performance of a company. (Bonaccorsi & Lipparini, 1994)

Among the possible sources of innovation external to the focal company, suppliers are considered one of the most valuable, according to extant literature. The role of suppliers in innovation can take on different forms, including supplier involvement, supplier development, and supplier integration. (Luzzini et al., 2015; Johnsen, 2009; Wagner & Hoegl, 2006) According to Schiele (2006), the external origins of innovation stem from co-development with suppliers either through new product development (NPD) or continuous innovation in which improvements are made to existing products or processes. This is depicted below in Figure 3.

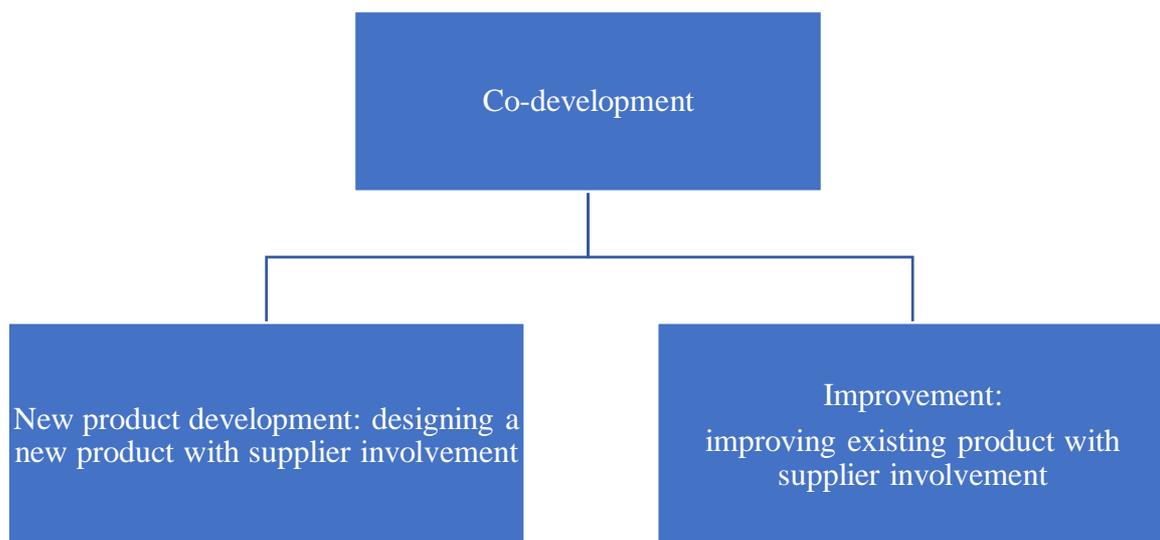


Figure 3. The external origins of innovation (modified from Schiele, 2006)

3.1 The motives and benefits of collaborative innovation

The motives driving companies to engage in collaborative innovation are linked its perceived benefits (Bruce, Leverick, Littler & Wilson, 1995), and extant literature provides extensive insights on these benefits of collaborative innovation. Furthermore, a lot of the motives and

benefits of collaboration discussed in chapter 2 drive companies to collaborate in the innovation context as well. The abovementioned notion that collaboration is the only pathway to innovation can itself serve as an important motive, as also implied by Bruce et al. (1995). Hence, it is considered inevitable and necessary.

The literature suggests that increasing knowledge flow, acquiring missing knowledge, and accessing complementary resources are perhaps the primary motives. This is consistent with scholars recognising knowledge as a key factor in innovation and an essential element of the innovation process (Kohlbacker, 2008; Urbancova, 2013). Companies can, for example, gain access to new technology and expertise that will be useful in their product development. (Van de Vrande, De Jong, Vanhaverbeke & De Rochemont, 2009; Bruce et al., 1995; Bogers et al., 2017). In product innovation, knowledge is used for recombining components and/or linkages in a product architecture (Henderson & Clark, 1990).

Companies may capture other benefits as well, and they can be divided into short-term and long-term, following the work by Van Echtelt, Wynstra, Van Weele & Duysters (2008). Though, short-term benefits of collaborative innovation, which are primarily project specific, have been studied significantly more than longer term benefits (Wynstra, Van Weele & Weggemann, 2001). For instance, Hoegl and Wagner (2005) found that buyer-supplier collaboration in product development projects improves the project performance by positively influencing development schedule and development cost as well as product cost and product quality. Hence, strong collaboration is positively related to the efficiency and effectiveness of development projects. Similarly, Ragatz, Handfield & Scannel (1997) found benefits in areas such as material cost and quality and reduced product development time. Likewise, Ragatz et al. (2002) reported cost, quality, and development cycle (i.e. time-to-market) related benefits, while Bonaccorsi and Lipparini (1994) listed reduced development costs, higher quality and reduced time-to-market.

As mentioned earlier, the access to suppliers' technological knowledge and (new) technologies are primary motives for collaborating with suppliers in innovation and can be considered as one of the most important long-term benefits as well especially when such access can be considered permanent (Bonaccorsi & Lipparini, 1994; Wynstra et al., 2001; Van Echtelt et al., 2008). Second, studies suggest that a more efficient and effective collaboration can be a long-term

benefit resulting from long-term buyer-supplier relationships (Ragatz et al., 1997; Sobrero & Roberts, 2001; Van Echtelt et al., 2008). Bonaccorsi and Lipparini (1994) claim that close relationships with key suppliers can benefit the buying company in terms of better predictability of development results and ability to respond to the competition. According to Wynstra et al. (2001), such long-term collaboration is more focused on developing underlying technologies and capabilities rather than developing a specific product.

Third, one major benefit that should be considered is that collaborative innovation may enhance the buying company's ability to differentiate products and thereby gain competitive advantage. A fourth long-term benefit suggested by studies is concerned with aligning technology strategies with key suppliers using roadmaps (Van Echtelt et al., 2008). For exploiting new market opportunities in the future, collaboration partners must match future product and technological requirements with the technological opportunities that become accessible in supplier markets (Handfield et al., 1999; Monczka et al., 2000; Van Echtelt et al., 2008). Furthermore, companies may want to influence supplier decisions regarding possible technology investments in order to ensure best conditions for future collaboration. Such efforts of long-term alignment can be visualised in technology roadmaps created together with suppliers, which can be used to identify technological trends and serve as a basis for considering future investments for both parties. (Wynstra et al., 2001) A fifth long-term benefit concerns the fact that collaborating companies may be able to transfer specific solutions developed in collaboration to other projects (Sobrero & Roberts, 2001). Finally, Bonaccorsi and Lipparini (1994) consider supplier-originated innovations as one main benefit that can be considered long-term since the alternative is that suppliers innovate autonomously and offer their solutions in the open market. Table 4 provides an overview of the discussed short-term and long-term benefits.

Table 4. Benefits of collaborative innovation

Benefits of collaborative innovation		Reference to literature
Short-term	<ul style="list-style-type: none"> • improved project performance • reduced development costs • higher product quality • reduced product and material costs • shorter development cycle/reduced time-to-market 	Hoegl & Wagner (2005); Ragatz et al. (1997); Bonaccorsi & Lipparini (1994); Van Echtelt et al. (2008)
Long-term	<ul style="list-style-type: none"> • access to knowledge and (new) technologies • increased collaboration efficiency and effectiveness • alignment of technology strategies • ability to transfer solutions to other projects • supplier-originated innovations • product differentiation • competitive advantage 	Van Echtelt et al. (2008); Handfield et al. (1999); Monczka et al, (2000); Wynstra et al. (2001); Sobrero & Roberts (2001); Bonaccorsi & Lipparini (1994)

However, these benefits are not fully supported in literature since there are studies that provide contradicting results. For example, Eisenhardt and Tabrizi (1995) found no positive relationship between supplier involvement and faster development time. Moreover, Littler, Leverick and Wilson (1998) conclude in their empirical study concerning technology-intensive sectors that collaborative development with suppliers can, in fact, be more costly, slower, and less efficient because the supplier involvement increases the complexity of managing such projects. Likewise, Von Corswant and Tunälv (2002) found that the benefits do not always come about and that involving suppliers in innovation is time-consuming and difficult to manage. However, this puts much emphasis on successful management in which case the benefits could outweigh the disadvantages. The mixed results regarding the benefits highlight the complexity of collaborative innovation and remind of the potential risks related to it.

3.2 Suppliers' contribution to innovation

The discussion above shows that suppliers contribute positively to innovation as their involvement is reflected on the achieved benefits. The contributions of suppliers can be related to different aspects (Rosell & Lakemond 2012), for example, radical or incremental innovations. Soosay et al. (2008) found that both incremental and radical innovations can be achieved through collaboration in the supply chain. The results were based on data collected from companies engaging in collaborative activities with their customers and suppliers. The incremental innovations were related to outcomes such as enhanced processes, more efficient operations, better quality, and lower costs. Radical innovations, in turn, were related to new technology implementation and changes in strategy, for example. However, the majority of the outcomes were seen as incremental and resulting from more efficient processes. As a result of collaboration, the companies were able to enhance their innovation capabilities for continuous innovation. (Soosay et al., 2008) However, Belderbos, Carree and Lokshin (2004) provide support for supplier contributions to incremental innovation only, while Su, Tsang and Peng (2009) find no contributions from suppliers at all.

It is challenging to pinpoint from the studies what the actual contributions from suppliers are, as they do not explicitly provide information on when and if suppliers are the brains behind the innovation (Rosell & Lakemond 2012). Focusing on NPD literature, Rosell and Lakemond (2012) attempted to analyse and categorize the inputs from suppliers. Based on the 80 articles reviewed, the authors were able to develop a conceptual model for characterizing supplier contributions. The model is created based on a two-level categorization of supplier contributions. The first one characterizes supplier contributions to component and architectural levels. Component level innovations are related to knowledge extensions where existing capabilities are extended with additional knowledge. The architectural level innovations pertain to knowledge configuration where existing knowledge is reconfigured into new types of capabilities. The second categorization of the model distinguishes between incremental and radical supplier contributions. A slightly modified version of this conceptual model is presented below in Table 5.

Table 5. Supplier contributions to innovation (modified from Rosell & Lakemond, 2012)

Contribution by supplier	Component level (extending existing knowledge)	Architectural level (reconfiguring existing knowledge)
Radical	<ul style="list-style-type: none"> • Knowledge extension dictated by supplier • Technology knowledge dependence on supplier • For example: responsibility in problem-solving activities for highly critical components 	<ul style="list-style-type: none"> • Joint knowledge reconfiguration by buyer and supplier • Technology and process knowledge dependence on supplier • Innovation less likely to come from supplier
Incremental	<ul style="list-style-type: none"> • Knowledge extension dictated by buyer • Process knowledge dependence on supplier • For example: product quality improvements, adherence to product cost targets, development of budgets and development schedules 	<ul style="list-style-type: none"> • Knowledge reconfiguration dictated by buyer • Process knowledge dependence on supplier • Innovation less likely to come from supplier

In terms of component and architectural innovations, studies seem to suggest that suppliers' knowledge base is more related to the component side while buyers' knowledge is more related to the architecture side (Lee & Veloso, 2008; Li & Vanhaverbeke, 2009; Sobrero & Roberts, 2002). This is not, however, entirely supported by Rosell and Lakemond (2012) as they also take into consideration the radical and incremental inputs. As shown in the table above, the incremental contributions from suppliers mainly come from their knowledge on processes, whereas in the case of radical contributions, the contributions are related to both technology and process knowledge.

3.3 The role of purchasing in innovation

After innovation research began to draw attention to the opportunities of collaboration and supplier involvement in innovation, a natural next stage of research studies what role is played by the purchasing department in innovation as it is the common interface between the suppliers and the focal company (Luzzini et al., 2015; Patrucco et al., 2017; González-Benito, 2007). The importance of purchasing in innovation has been recognized from different perspectives among scholars. First, Schiele (2006) points out that the increased dependence on external sources for innovation has led to the rise of purchasing's essential new task of identifying the suppliers that have the potential to contribute to the company's innovativeness and which do not. Second, the fundamental supply management capabilities which include fostering close relationships, promoting collaboration, and creating a long-term strategic orientation (Chen, Paulraj & Lado, 2004), are particularly important in the context of collaborative innovation since the ability to manage knowledge for acquiring, sharing, and application increases the chances of getting the most from suppliers and, eventually, contributes to the company's innovation performance (Patrucco et al., 2017). Third, long-term collaboration benefits may only be achieved if a company is able to establish long-term relationships with key suppliers, with which it creates learning routines and ensures that the capabilities of both parties are aligned and remain useful for future collaboration projects. Consequently, activities typically adopted by purchasing, such as supplier selection, resource allocation, ensuring suppliers' commitment, development work coordination, and information exchange, become essential (Rosell & Lakemond, 2012). And finally, being the preferred customer of innovative suppliers in order to get access to the resources and innovations of those suppliers has become a fundamental way for companies to grow. To achieve such status, companies must develop new sourcing criteria to first identify innovative suppliers and re-evaluate their supplier relationship portfolio. (Schiele, 2012)

In order to identify innovative suppliers, Schiele (2006) suggests companies assess the three following things: the character of the supplying firm, the character of the buyer-supplier relationship, and the enabling and supporting factors. Using this approach, the author concludes that "specialized, technically competent firms, located in the proximity of the buyer, being embedded in a trusted and intensive relationship" are more likely to be the core innovative suppliers. Consequently, these criteria can be used in strategic sourcing decisions and objectifying discussions of technical and commercial issues, which engineering and purchasing

often represent. (Schiele, 2006) The need for better cross-functional collaboration between engineering and purchasing was previously brought up by Wynstra et al. (2001), who see the interface between the two as critical for the success of supplier involvement in product development. Later, Schiele concludes that the identification of innovative suppliers is also an important task in achieving preferred customer status (Schiele, 2012).

Patrucco et al. (2017) analysed the contribution of both suppliers and the purchasing department to a company's ability to innovate. The results show that the involvement of purchasing can foster supplier collaboration which, in turn, enhances innovation outcomes. The contribution by purchasing arises from their absorptive capacity which can be defined as "a firm's ability to value, assimilate and utilize external knowledge" (Patrucco et al., 2017, 2). Absorptive capacity is also considered a success factor in the knowledge-transfer process (Cohen & Levinthal, 1990). Such ability becomes crucial in the context of innovation and should be leveraged by the company. The absorptive capacity, in turn, is affected by purchasing status and innovation objectives. The purchasing status should be enhanced by involving the purchasing department more in the company's strategic activities, including innovation. Further, there is a need to incorporate innovation objectives into purchasing strategy and purchasing objectives. (Patrucco et al., 2017)

Luzzini et al. (2015) found that the purchasing department can contribute to the innovation outcomes by adopting supplier collaboration and strategic sourcing practices. In fact, these two practices significantly improve the innovation performance. Furthermore, the study shows that there is a positive link between purchasing knowledge and both supplier collaboration and strategic sourcing. On one hand, the more skilled the buyers are the more they will facilitate the process of involving suppliers in innovation (Schiele, 2006; Wynstra et al., 2001). On the other hand, knowledgeable and mature purchasing professionals are likely to engage more in strategic activities rather than operational and administrative ones (Chen et al., 2004). Moreover, monitoring the supply market and the continuous exploration of new sources of innovation are strongly dependent on the availability of appropriate knowledge and skills in the purchasing department. Hence, purchasing knowledge becomes crucial for innovation since it is a requirement for achieving success in both supplier collaboration and strategic sourcing. (Luzzini et al., 2015) The findings by Pulles, Veldman and Schiele (2014) provide support for the significance of supplier collaboration. They found that supplier development programs

which are closely related to collaboration have a positive effect on the supplier's contributions to the buying company's innovation.

Schiele (2012) highlights the importance of being the preferred customer for key suppliers as not all skilled suppliers are willing to collaborate with all buyers. According to the author, the number of highly innovative suppliers is rather small which can lead to competition since often those innovative suppliers seen as potential partners by one company, would be seen the same way by the company's competitors as well. To pursue preferred customer status, the author first suggests new sourcing criteria to identify innovative suppliers. The criteria are used to assess whether the buyer company is important enough to the supplier for it be a preferred customer. The first criterion is technical importance which refers to the strategic significance of the customer firm to the supplier due their technological roadmaps being congruent. The second one is commercial importance, referring to the significance of purchasing volume in supplier's business. The third criterion is cultural fit which means assessing whether similar values exist in buyer and supplier firms. The fourth one is past preferential treatment which pertains to the indication of preference in the past behaviour of the supplier. The last criterion is the key account status, and it pertains to whether a key account status is awarded for the buyer within the sales, R&D, quality, and production departments of the supplier. Using such targeted supplier selection criteria can enhance the success of collaborative development projects and prevent failure due to lack of cooperation from suppliers. Second, the author suggests using a supplier portfolio model to identify the suppliers that treat the buying firm as a preferred customer with which collaborative innovation may then be pursued. The author proposes that with, for example, a supplier with low competitiveness but with which the buyer has a preferred customer status, a supplier development strategy should be pursued to increase competitiveness. In conclusion, all companies, not just those who are trying to find new innovative suppliers, can benefit from re-evaluating their supplier network while adopting the preferred customer logic. The importance of having a preferred customer status is supported by Pulles et al. (2014) as they found that it positively affects the supplier's contribution to the buying company's innovations.

Based on the findings by Luzzini et al. (2015) and Patrucco et al. (2017), a supplier should carefully assess for example the status of the purchasing department in the buying company since it can affect the innovation success significantly. Based on such assessment, the supplier

can then make an informed decision on whether to commit to collaborative innovation activities. Furthermore, in a Capgemini consulting report based on a survey, Penka and Schipper (2017) state that traditional purchasing departments should be transformed into “Innovation Driven Procurement (IDP) groups” to help companies pursue their innovation objectives. Such groups are firstly, able to assist in finding scarce sources of innovation capabilities, second, involved in innovation projects from start to finish, and finally, able to collaboratively manage supplier involvement. It is concluded in the study that having the right talent in the procurement organisation is an important part of successful innovation projects. More specifically, strong relationship building, facilitation, and moderation skills possessed by purchasing are essential. In summary, the literature seems to indicate that the role of the purchasing department mainly relates to the issue of how to utilize its capabilities in order to distinguish innovative suppliers, to promote and foster collaborative relationships, and to achieve the status of being attractive in the eyes of the suppliers to get innovation contributions from them. By leveraging these capabilities, the purchasing department can, above all, serve as an enabler of collaborative innovation (Luzzini et al., 2015).

3.4 The relationship between innovation and sustainability

An important link exists between innovation and sustainability, as implied in the ninth Sustainable Development Goal (United Nations, 2020), which calls for the fostering of innovation while ensuring sustainable development. Indeed, this linkage has become a topic of scientific discussion (Michelino, Cammarano, Celone & Caputo, 2019). Studies indicate that an orientation towards sustainability can result in important innovations among companies (Adams, Jeanrenaud, Bessant, Benyer & Overy, 2016; Kuzma, Padilha, Sehnem, Julkovski & Roman, 2020; Barbieri, Gouveia de Vasconcelos, Andreassi & de Vasconcelos, 2010; Nidumolu, Prahalad & Rangaswami, 2009). In fact, sustainability is considered a key driver of innovation (Nidumolu et al., 2009; Juntunen, Halme, Korsunova & Rajala, 2019).

According to a Harvard Business Review article (Nidumolu et al., 2009), sustainability can generate both bottom-line and top line returns for businesses. Becoming environmentally friendly cuts costs because companies end up reducing the inputs they use. Moreover, it yields additional revenues from improved products or allows companies to create new businesses. These being the objectives of corporate innovation, sustainability should be treated as the new

frontier of innovation. (Nidumolu et al., 2009) In this respect, innovation is the way to achieve sustainability through its contributions to sustainable development, and it should consider all three dimensions of sustainability – environmental, social, and economic (Barbieri et al., 2010). Moreover, Nidumolu et al. (2009) claim that few innovations can be developed purely within the company borders, thus supporting the aforementioned studies on the importance of external collaboration for innovation.

A study by MIT Sloan further highlights the link between sustainability and innovation. In the study, Eccles, Miller Perkins and Serafeim (2012) compared companies that had demonstrated a great sustainability performance with traditional, poor sustainability companies and found that those sustainable companies have organisational cultures based on strong change capabilities, trust and innovation. To improve sustainability, sustainable companies tend to innovate in processes, products, and business models. When it comes to the sources of value-creating innovations, both employee engagement and engagement with external stakeholders are important. In fact, the sustainable companies proved to be considerably more likely to encourage their employees to assimilate knowledge from external sources external than the traditional companies. Sustainable companies engage in external collaboration to advance their goals. In a similar vein, Rodriguez, Ricart and Sanchez (2002) conclude in their study that a sustainable company is a knowledge based and a knowledge creating company. Kuhl, da Cunha, Maçaneiro and da Cunha (2016) conducted a similar comparison between sustainable companies and less sustainable companies and found that more sustainable companies are also more prone to innovation and to be collaborative in innovation than other companies. These findings emphasize not only the importance of innovation for sustainability but the accessing of external knowledge and collaboration as essential elements in the innovation process.

According to a Deloitte article (Capozucca & Sarni, 2012), sustainability certainly becomes more relevant in the context of innovation. While it is valid to discuss sustainability as a driver in value creation, product or service differentiation will ultimately assume a more important role in shaping a company's prospects in the marketplace. This differentiation is increasingly the result of sustainability-oriented innovation. Indeed, sustainability can drive innovation as it introduces new design constraints that ultimately shape how resources can be used in products and processes. (Capozucca & Sarni, 2012) In this respect, sustainability can be linked to firm competitiveness through innovation since differentiation is one fundamental strategy for

gaining competitive advantage (Porter, 1985). This is supported by Chen, Lai and Wen (2006) who found that investing in green innovation, a facet of sustainability innovation related to the environmental dimension, can help companies gain competitive advantage. Through green innovation, companies can increase the productivity of resources, design and develop sustainable products that allow them to ask for higher prices and to enhance their corporate image, and even develop new market opportunities. In other words, those companies that are able to pioneer in green innovation can enjoy the first-mover advantages when launching new sustainable products. (Chen et al., 2006) Kuzma et al. (2020), in turn, investigated the effects of innovation on companies' sustainability performance and found that innovation positively impacts sustainability performance considering the environmental, economic and social dimensions. The most significant correlations occurred between economic innovation and sustainability performance and between environmental innovation and sustainability performance. Accordingly, there is a positive relationship between innovation and sustainability, and innovation should be encouraged as a means of ensuring success in all three dimensions of sustainability. Moreover, innovation that is used as an asset to improve performance can provide competitive advantage over competitors.

In conclusion, sustainability is recognized as a driver of innovation by scholars (Nidumolu et al., 2009; Juntunen et al., 2019; Capozucca & Sarni, 2012) and thereby, a connection between the two concepts is established. In addition, given that collaboration is recognized as a key element for companies to achieve sustainability and for developing innovations (Eccles et al., 2012; Kuhl et al., 2016), it can be leveraged to connect the objectives of both sustainability and innovation. Furthermore, when innovation is oriented towards sustainability, it can create value not only for the company itself but for society as a whole (Rodriguez et al., 2002). In other words, the contributions of sustainability innovation extend beyond organisational borders. Most importantly, innovation driven by sustainability can generate competitive advantage for companies through, for example, product differentiation and first-mover advantages (Chen et al., 2006; Capozucca & Sarni, 2012). Considering the growing pressures to improve sustainability as well as the scarcity of resources, adopting a sustainability approach to innovation becomes crucial.

4 METHODOLOGY

Qualitative research methods are used in this study to analyse the collaborative innovation phenomenon in the Finnish food supply chain context. Qualitative research is particularly valuable for enabling the description and understanding of the real interactions and meanings that occur in real-life organisational settings. Furthermore, from a management perspective, it can provide examples of important management issues as well as a base for understanding social processes that underlie management. (Gephart, 2004) Specifically, a multi-case study was chosen as the method to conduct the qualitative research. Having multiple cases increases external validity and helps to avoid observer bias (Voss, Tsiriktsis & Frohlich, 2002). Case studies in general are particularly useful for research in many areas of supply management, as stated by several authors (Ellram, 1996; Halinen & Törnroos, 2005; Järvensivu & Törnroos, 2010; Seuring, 2008). For instance, they are suitable when approaching several supply chain stages in the research (Seuring, 2008). In this regard, given that the focus of this study is on buyer-supplier relationships, a case study method permits to capture the perceptions of both buyers and suppliers. In addition, one key strength of case methods is that they allow the questions of how, why, and what, to be answered with a rather complete understanding of the research phenomenon and its complexity (Meredith, 1998; Benbasat, Goldstein & Mead, 1987), and those are exactly the three ways how the research questions in this study are formed. Hence, the chosen methodology can be justified. Finally, in terms of the three case study types – exploratory, explanatory, and descriptive, this study is descriptive in nature since the aim is to provide a complete description of the phenomenon within its context (Yin, 2009; Seuring, 2008).

4.1 Data collection and analysis

The primary data of this study was collected through eight interviews with six different companies, meaning two companies gave two interviews. Having multiple interviewees helps to capture the richness of their opinions based on the position of their company in the supply chain and the interviewees' differing roles in the companies (Stuart, McCutcheon, Handfield, McLachlin & Samson, 2002). The companies were approached via email and selected based on whether there were indications of previous participation in collaborative innovation projects and some information on sustainable packaging on the company websites. The interviewees to

represent the supplier side were chosen based on their involvement in innovation or related work (e.g. product development) and experience from collaborating with the buyer company in the innovation context. The interviewees to represent the buyer side were also chosen based on involvement in collaborative innovation projects and preferably experience from purchasing. Though, these decisions regarding the interviewees were essentially made by the contacted company. Three of the interviewed companies are the brand owners that manufacture the food products, two provide packaging solutions and/or packaging materials, and one can be considered a raw material supplier for packaging. Thus, the study approaches three stages of a supply chain.



Figure 4. The food supply chain (modified from Keränen, Komulainen & Ulkuniemi, 2019)

Figure 4 illustrates a simplified food supply chain highlighting the position of the different actors included in this study. Some of the interviewed companies are located more in the upstream part of the chain and others closer to the consumers. However, as mentioned, this is a simplified version of a food supply chain, excluding actors like packaging converters or processors. The food companies represent the buying company –perspective since they buy packaging for their products from their suppliers. Regarding the supplier companies, food packaging represents only one part of their business as they may offer packaging solutions and materials for other kinds of applications. The interviewed companies were selected individually and were contacted via email. The interviews do not focus on any specific buyer-supplier relationship that the selected companies may be involved in, rather the aim is to capture the overall perspective of both sides on the research topic. Furthermore, this study does not comment on whether these companies have collaboration relationships with each other.

The interview questions are based on the conceptual framework and the research questions. The questions were mostly the same for all interviewees, however, the questions were adjusted based on whether the interviewee represented the supplier or the buyer side and their role in the organisation. The interview questions can be found in Appendix 1. All interviews were conducted as individual interviews via video calls. The length of the interviews ranged from 30 minutes to 1 hour and 10 minutes. The interviewees were first asked about their position and main role in the company to get an idea of how close the research topic is to their work. Table 6 presents the essential information about the interviewees and the case companies. The company -column shows which perspective, that of the buyer or the supplier, each interviewee represents. A short description of the companies is also included. In addition, the role of the interviewee – column briefly discloses what the interviewees’ job is related to.

Table 6. Interviewees of the study

Company (buyer/supplier):	Description of the company:	Interviewee:	Role of the interviewee:
supplier	Large global supplier of packaging materials and solutions	A B	Innovation center Packaging sustainability
buyer	Brand owner and large Finnish food manufacturer	C D	Packaging development Sourcing for packaging
buyer	Brand owner and a Finnish food manufacturing company with international operations	E	Sourcing for packaging materials
supplier	Large global supplier of raw materials	F	Business unit director
buyer	Brand owner and large food manufacturer	G	Commercial innovation
supplier	Global supplier of packaging solutions	H	Food packaging R&D

The interviews were conducted as semi-structured theme interviews. They were based on pre-selected themes to be discussed with the interviewees, but there was no strict structure in terms of the interview, the questions or their order. Hence, when interesting avenues not directly

related to the interview questions surfaced, those avenues were pursued further, and the comments noted (Ellram, 1996; Yin, 2009). There were two main themes: sustainability in food supply chains and collaborative innovation. The interviews were held in Finnish because it is the native language of all the participants. The interviews were audio recorded and transcribed after each interview. The interview data was complemented by secondary data gathered from the companies' web pages and reports to confirm the observations of the interviews, which also enhances the validity of the study.

The transcribed interviews were analysed using content analysis methods. Moreover, given that the case study is descriptive in nature, a deductive approach is employed which means using data to test theory rather than trying to build one (Eisenhardt, 1989). The purpose was to find similarities and differences within the interview data in order to make conclusions. Those similarities and differences were mirrored between 1. the buyers and suppliers, 2. the buyers, and 3. the suppliers. This allowed to see whether, for example, the buyers and suppliers have conflicting views on the research phenomenon. This, in turn, could reveal some important issues that hinder attaining the full potential of collaborative innovation. The data analysis process started by first getting familiar with the interview data, which included reading and re-reading the text. Each case was analysed separately before exploring common patterns. This is called a within-case analysis method, and it accelerates cross-case comparison since the investigator has first gained a rich familiarity with each case (Eisenhardt, 1989). Next, coding of the data was conducted by colouring interviewee quotes and statements that were considered significant. These were essentially the initial findings of the interview, and they were then translated into English. Each interviewee was assigned its own colour. Finally, the data was grouped under each interview question in which the findings from each interview were summarized. Here, a cross-case analysis method was used so as to identify the differences and similarities across the cases.

4.2 Reliability and validity

The quality of the research should be ensured by pursuing validity and reliability (Seuring, 2008; Yin, 2009). In case studies particularly, Yin (2009) proposes the testing of construct validity, internal validity, external validity, and reliability. Likewise, Ellram (1996) states that good research design must have these four qualities. Hence, Table 7 consists of the descriptions

of these different research quality indicators, some case study tactics for their testing, and explanation of how they are addressed in this study.

Table 7. Reliability and validity of the study (modified from Yin, 2009)

Test	Description	Case study tactic	Tactic in this study
Construct validity	Establishing correct operational measures for the concepts being studied (Voss et al., 2002; Ellram, 1996)	Using multiple sources of data, aiming for triangulation, establishing chain of evidence, and having respondents review the draft study report (Yin, 2009; Voss et al., 2002; Ellram, 1996; Stuart et al., 2002)	Multiple interviewees from different organisations and departments are used to (data triangulation) confirm evidence and a logical flow (a chain of evidence) is established through external verification
Internal validity	Addresses whether a causal relationship can be established and only concerns explanatory cases	Making proper inferences from the data, considering alternative explanations, and using convergent data (Ellram, 1996)	Not relevant for this study since it is descriptive in nature
External validity	Regards to the generalizability of results beyond the immediate case study (Ellram, 1996; Yin, 2009)	Replicating the case study and verifying patterns (i.e. replication logic) (Ellram, 1996; Yin, 2009)	Replication is not possible due to the scope of the study, however, it is considered in the limitations and further suggestions
Reliability	Addresses whether the same results would be achieved through replication	Using case study protocol and developing a case study database (Yin, 2009; Ellram, 1996)	Interview data and related documentation are stored in a cloud database. Case study protocols are followed.

Construct validity is closely related to reliability and relates to data collection (Ellram, 1996). The primary way the construct validity is augmented in this study is through the use of multiple interviewees as data sources. Secondary data sources, like company websites, are also used to affirm some interview observations regarding the companies' sustainability targets and previous packaging innovation projects, for example. Hence, triangulation of data is ensured for corroborating evidence. In addition, a chain of evidence is established. In the case of this study, a supervisor reviewed the entire content and logic of the study, including both research and interview questions. Hence, based on the guidelines by Ellram (1996), this can be said to have provided some external verification for the existence a logical chain of evidence in this study. Regarding external validity, the lack of generalisability of results is one major reason why case studies have received a lot of criticism, according to Ellram (1996). The generalisability issue can be best addressed by replication (Ellram, 1996; Yin, 2009). However, the scope of this study does not allow for the replication logic to be implemented. This problem can be addressed later in the limitations and future suggestions of this study. Internal validity will not be addressed here since it only concerns explanatory case studies (Ellram, 1996). Finally, the reliability of this study is increased by two ways. First, this study follows the general case study protocols and guidelines presented by Ellram (1996) and Yin (2009), and second, a case study database was created and maintained in order to access all the documentation and retrieve notes throughout the research process. According to Stuart et al. (2002), having a case study database would permit another researcher to replicate the analytical process, starting with the original interview transcriptions.

5 RESULTS AND ANALYSIS

This chapter presents the results and analysis of the study based on the eight interviews at six different food supply chain companies. This empirical part of the thesis gives a real-life perspective to the study topic of collaborative innovation in the sustainable food packaging context in Finnish food supply chains. The results are reviewed according to the two main interview themes: sustainability and collaborative innovation. The interview questions can be found in the appendices (Appendix 1). The analysis first focuses on the sustainability issue in food supply chains, and more specifically, its role and influence among the case companies. Second, the results regarding collaborative innovation are reported and analysed while also tying together the supply chain collaboration and sustainability themes.

5.1 Sustainability in food supply chains

All the interviewees consider sustainability to be extremely important in their company. Some interviewees stated that nowadays, it is at the core of business and operations. In a similar vein, one interviewee pointed out that sustainability is not a separate issue, rather it is considered holistically as part of business and operations. For another interviewee representing the supplier side, being a sustainable company can be a deciding factor when you are being assessed as a potential collaboration partner and a supplier. A competitor might perform better in some other area, but sustainability and sharing the same values are often the most important things for customers, according to the interviewee. Although environmental sustainability was discussed the most, many interviewees mentioned the social and financial aspects of sustainability as well. For example, animal welfare is an important part of one company's supply chain, while another interviewee mentioned work safety. One interviewee highlighted the financial aspect by stating that sustainability and all long-term issues around sustainability require that the economic and financial side of business is at the heart of sustainable development. If the economic conditions do not exist, then it is pointless to try to claim responsibility in the other areas. Undoubtedly, the interviewees are well informed on the entirety of sustainability and its main three dimensions.

In terms of sourcing, sustainability is considered in supplier approval and supplier monitoring, for example. Different sustainability criteria are used for suppliers, and they extend to the whole supply chain. For example, Interviewee E mentioned that their raw material is purchased from 100 % verified sustainable sources in their global supply chain. With packaging sourcing specifically, sustainability is considered primarily in the material choices, which have an impact on the environment. Knowing the suppliers and fostering transparency in the supply chain is essential, according to interviewee E. Similarly, Interviewee G stated that they have had the same packaging suppliers for quite a long time and the sustainability issues have evolved with them over time. However, if current suppliers are unable to provide what is requested, then new suppliers will be sought. Furthermore, Interviewee D stated that circular economy dictates the decisions regarding packaging sourcing.

The motives identified by the interviewees for improving sustainability in food supply chains are presented below in Table 8. They are divided into five main motive types: product-related, market, competitiveness, and values. Firstly, both national and EU legislations set some sustainability requirements that must be met in the food products and their packaging in terms of safety and quality. This is the minimum requirement for companies when addressing sustainability. The interviewees agree that safety and quality certainly are the most important things that need to be in check. Second, the need to respond to the consumer and customer requirements and needs in the market is a fundamental motive. Almost all interviewees mentioned that they want to do more than what the market is demanding because anticipating future legislation and market demand and acting upon them, is crucial. This is closely linked to the next motive as well, which is competitiveness. Indeed, there is a competitiveness aspect to sustainability and its motives as well, because without addressing the sustainability issues and stakeholder pressure, the company cannot survive in the competition. Some interviewees even mentioned the term frontrunner and the desire to fulfil that role when it comes to sustainability. So, in this sense, the companies are also competing on being the leader of sustainability and a trendsetter, in a way. Additionally, the pursuit of economic benefit is the ultimate motive, according to one interviewee. Essentially, sustainability practices must bring some added financial value and success for the business to maintain the economic conditions for all operations and to be able to grow. Indeed, sustainability has become so important that the companies see no other option than doing business in a sustainable way. There are too many risks involved if the business is not based on sustainability because, in the end, there is no

demand for such business. Finally, some motives related to the planet and the climate were mentioned, which reflect the company values. Climate change needs to be slowed down and eventually stopped, which affects how and what resources should be used, for example. One interviewee also mentioned their vision of doing the right thing, which means working in a responsible, honest, and transparent way.

Table 8. Motives for improving food supply chain sustainability

Type of motive	Motive
Product-related	Food safety
	Food quality
Market	Responsiveness to market needs
	Doing more than what the market demands
Competitiveness	Showing the way/being frontrunners
	Pursuit of economic benefit
	No business without sustainability
Values	Ending climate change
	Saving the planet
	Doing the right thing

The abovementioned motives stem from both internal and external sources to the company, which Figure 5 below illustrates. The interviewees identified forces such as customers, consumers, legislation, taxation, competition, as well as company strategy, targets and values as the key drivers behind the motives to improve sustainability. One interviewee also mentioned investors as a driver because they are increasingly thinking about sustainability criteria and issues in their investment decisions. They seek companies that create value for them by contributing to sustainable development. The external factors were always mentioned first and more repeatedly during the interviews. The pressure to be more sustainable stems from the consumers first and carries from the downstream supply chain to upstream, concerning food

retailers, food manufacturers and their supplier network. In other words, the pressure is felt throughout the entire supply chain.

“As a company, we try to meet the needs of the market and preferably even be ahead of other competing companies, and I think we have succeeded quite well.” – Interviewee A

“In the future, only sustainable companies and manufacturing will be viable. You cannot expect technology to rectify the situation sooner or later, but you must be involved in the matter. Then there is, of course, the demand of customers and also consumers. Consumers are more enlightened [about sustainability] nowadays and more careful in their choices, and the same pressure is then targeted to the whole chain.” – Interviewee H

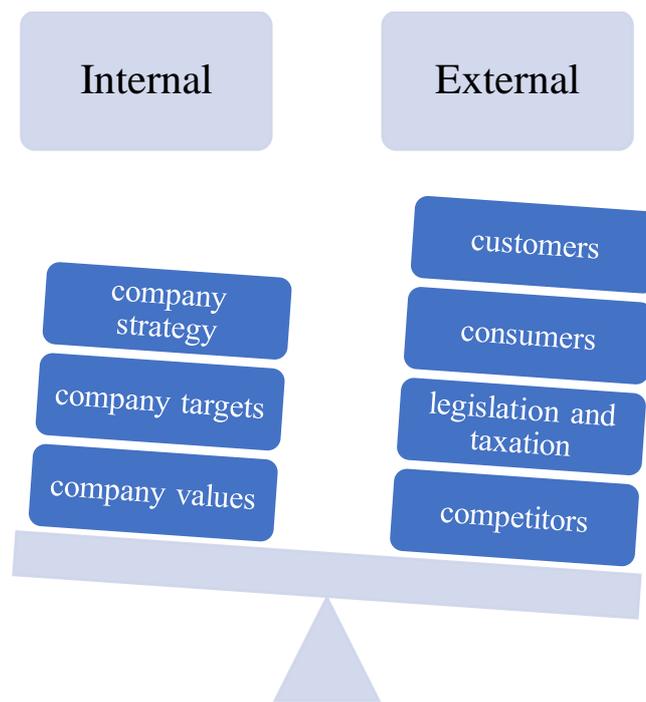


Figure 5. The driving forces of sustainability

As Figure 5 illustrates, the pressure to act sustainably stems mostly from sources external to the company. However, the internal side plays an essential role when wanting to go beyond the requirements of the market and legislation. In a such case, the company strategy, values and targets influence the sustainability actions of the company.

“There is also the very inner desire to go in that [more sustainable] direction as well. We have different types of goals to work towards. We want to show in which direction to go in order to be, so to speak, more sustainable and environmentally conscious.” – Interviewee C

However, interviewee H also recognized the role played by marketing and, more specifically, the promotion of one’s sustainability image. Everyone wants to create an image of sustainability but there should be real actions to support it. It seems that there is a more opportunistic side to the sustainability theme as well.

“Of course, there is always some kind of marketing theme involved in these in some ways, especially in the early stages. Our customers want to promote their own sustainability agenda or something towards consumers with certain targeted promotions or product segments that provide them with visibility [...] Nowadays, it is so easy to appear as sustainable on the internet and LinkedIn and elsewhere. But what the real actions behind it are, is what truly matters” – Interviewee H

When it comes to the role of food packaging, all the interviewees agreed that it affects sustainability and that it can be used to improve it. Namely, packaging can support minimizing the negative environmental effects and even maximizing the positive ones created in the chain. The companies have specific and measurable sustainability targets to minimize their impact on the environment in which packaging has its own role. Carbon neutrality, reduction of plastic use, and increasing recyclability were the most frequently mentioned themes during the interviews. The bigger picture, however, is the promotion of circular economy, which was mentioned by several interviewees. Packaging can contribute to it if the product life cycle is considered in terms of recyclability and reuse, for example. These sustainability themes and concerns are the same for the companies regardless of whether they are a buyer or a supplier.

“I definitely believe that the food industry has an important role to play in food waste and also in the fact that consumers are able to easily recycle the packaging that is then left in their hands.” – Interviewee G

Moreover, the role of food packaging in sustainability concerns the issues of food waste and loss, the use of fossil-based materials like plastics, and the amount of packaging used. Still, the main function of packaging is to ensure the safety and quality mentioned earlier, and thus, protect the food product throughout the whole supply chain. That is the priority also when developing sustainable features. One interviewee summarized the role of packaging in sustainability well by stating that it should be designed in a way that it fulfils its protective role while causing the lowest possible negative environmental impact. These main points regarding the role of food packaging in sustainability from the interviews are summarized below in Table 9.

Table 9. Food packaging sustainability

Sustainability area	Solution
Food waste	<ul style="list-style-type: none"> • ensuring the protective function of packaging
Recyclability and circularity	<ul style="list-style-type: none"> • improving the recyclability of the packaging • ensuring the reuse of materials
Materials and resources	<ul style="list-style-type: none"> • reducing the amount of plastic used • increasing the share of renewable materials and decreasing fossil-based materials • reducing the overall amount of packaging used (thinner packaging)

In order to implement the solutions to minimize the negative environmental effects of packaging, viewing the entire manufacturing process and the supply chain holistically is important. A lot of the decisions made on one sustainability area affect other areas. For example, the issue regarding the use of plastic is not so straightforward. Interviewee F mentioned that plastic manufacturers advocate for the existence of plastic on the grounds that if food is not packed carefully, it ends up as waste and thereby causes greater harm to the environment than the packaging itself. On the other hand, it is relevant to look at how much emissions are caused in the manufacturing process of packaging overall. In other words, considering the carbon footprint is important, which was a common theme arising during the interviews.

If 15% of a product's weight is plastic, and this plastic can be changed from fossils to renewables, then the carbon footprint of the product itself changes into something completely different than what it was before.” – Interviewee F

5.2 Collaborative innovation among Finnish food supply chain companies

The buyer-supplier collaboration theme was first discussed on a general level to gain an understanding of how the interviewees experience it and what kinds of elements they relate to it. All the interviewees agree that there are different levels of buyer-supplier collaboration. Typically, close collaboration occurs with key customers and suppliers that have some strategic significance for the company. Several interviewees referred to such close collaborative relationships as partnerships. Moreover, it seems that the decisions to collaborate are based on some categorization or segmentation of those customers and suppliers. One interviewee stated that while they are able to collaborate closely only with 1-2 packaging supplier(s) per packaging purchase group, collaboration with all suppliers is necessary to a certain extent. With the 1-2 supplier(s), innovation and development work is part of the collaboration. In collaborative innovation, it is important for the relationship to be in balance so that the continuity is not compromised.

“It has to be that both sides receive. If the supplier brings a lot of innovations to the customer but they never materialize then it doesn't last for a long time the collaboration. This is also one of the reasons why there cannot be many suppliers in a purchasing group with whom we work many blanks into projects and practice. But there is a need to work with all suppliers to a certain point. We conduct supplier evaluations, and our suppliers also want to hear what we think of them. But of course, as a customer, we are also really interested in knowing how the supplier sees us as a customer, that is, whether we are an important customer to them or more like a nuisance or how this collaboration is in a balance.” – Interviewee D

Open communication and sharing of information are seen as essential elements of collaboration. The biggest difference between collaborative relationships and more transactional and traditional ones seems to be the element of reciprocity in collaboration. In collaboration, the interviewees agree that both parties gain something from the relationship. Additionally, there

are usually some common goals and an element of mutual understanding in collaborative relationships. Interviewee E stated that when it comes to purchasing, they do not want to have an outdated way of viewing it that is just driven by price, but rather consider the total cost and recognize that there is some value that packaging creates for the product. Likewise, interviewee G states that collaboration is not about just buying a million plastic packages and being happy with that, so buying is not so mechanical anymore. The interviewees clearly understand well the distinction between so-called traditional buyer-supplier relationships and collaborative relationships.

At best, it [collaboration] is well-tailored to a specific purpose. At the very least, collaboration is quite transactional – “I sell, you buy” and the money flows and the contract terms are pretty much what the conversations are about” – Interviewee F

Furthermore, all interviewees agree that collaboration is necessary for business. One company cannot do everything on their own. Both buyers and suppliers engage in collaboration because it offers some business benefits for them. Collaboration allows for a win-win situation to occur, which was mentioned in several interviews as a motive for collaboration in general as well as in the collaborative innovation context. The interviewees acknowledged that innovation and product development offer an important opportunity for collaboration, especially with those strategic partners. Interviewee E sees innovations nowadays as the only way to create new business, and for them, innovations often involve triangular collaboration which means collaborating not only with the packaging manufacturer but the raw-material supplier as well. Furthermore, sustainability being so important nowadays, the buyer companies collaborate considerably with their suppliers on developing more sustainable packaging solutions. In addition to the win-win situation being a major motive, there were some other motives specific for sustainability innovation mentioned by the interviewees. According to Interviewee B, sustainability concerns the entire value chain, not just one part of it. In order to make a big impact, everyone needs to be involved and work together. Moreover, innovations specifically related to sustainability, such as recycling solutions and carbon neutrality, quite often require partners from different fields to implement them as they offer complementary industry expertise. In this sense, the interviewee concluded that value chain development and partnerships are necessary for these “eco-systems” or co-development projects that concern sustainability innovations. Another interviewee stated that collaboration is needed due to the

complexity of sustainability issues. The complexity creates a lot of opportunities to make mistakes that lead to the credibility of sustainability starting to crumble. Collaboration allows the companies to contemplate those issues together and simultaneously increase each other's understanding.

Another motive seems to pertain to competitiveness, which was discussed also in the food supply chain sustainability context. Interviewee G stated that as a result of good collaboration, they hope to hear about new products that the supplier has been innovating as early as possible so that they can test them and consider them for use. This view was shared by Interviewee D who stated that they want to be among the first whom the suppliers bring their innovations to because it allows them to be the first or at least among the first companies to enter the market with a new solution that attracts customers. In order to do so, the interviewee explained that they aim to develop relationships characterized by openness and mutual benefits. Then, the supplier would hopefully view them as an important client. One supplier company representative confirmed this motive by stating the following:

“If we see that we have this kind of partnership with them [a customer], then, of course, we give a promise that they have the privilege of accessing and hearing about them [innovations] first and taking those things forward [...] It's about them staying at the forefront of development.” – Interviewee H

When it comes to the suppliers, one buyer representative explained that the packaging suppliers benefit from collaborative innovation because the buyers are the ones that commercialize the solutions. The packaging always needs a customer and a product around it. Interviewee A agrees as they stated that by helping customers find desired solutions, they are simultaneously able to promote their products' (the packaging) entry to the market. Furthermore, given that the buying companies are closer to the end-users in the supply chain, they are better informed of the consumer demand. Thus, given the increased demand for sustainable products from the consumers, the suppliers see it as a business opportunity to collaborate with their customers on developing more sustainable packaging alternatives.

“In a way, our suppliers get a customer out of us that actually takes it [packaging] to the market and commercializes the product. They may have something in product development or

some raw material they would like to test, but it needs a customer and that product around it. We implement the solution in a way. We also test a lot of materials and do test runs, which the suppliers themselves cannot do. They do have the manufacturing machines, of course, but there are different things that may emerge only in the actual packing phase.” – Interviewee E

In term of the nature of collaborative innovation in the buyer and supplier companies, it is mostly project-based. Furthermore, according to the interviews with the buyer companies, the suppliers do a lot of innovation work in the background. The buyer may reach out to a supplier about a problem that they have, or the supplier may take initiative and introduce some of their newest solutions and innovations they have been working on to the buyer. If the supplier’s solution can be applied to the buyer’s product range, the project can begin during which further development is done in collaboration. According to one supplier, their customer is just as involved in innovation as they are, but it may vary according to the development stage of the product. The more developed the product is, the more dialogue with the customer and collaboration is needed in order to reach the objective.

However, the interviewees also mentioned that they participate in more long-term projects and continuous innovation with their suppliers, which is more about starting the work together from scratch. It may even involve other external partners like research institutes or universities, according to Interviewee E. Such projects can take several years. Nevertheless, the most common approach seems to be the one where the supplier does much of the initial innovation.

“Usually, the packaging material supplier has already done quite a lot of work at the point when they come to introduce some sustainable packaging solution to us, the customer. At best, they possibly have a reasonably finished concept already in existence. But it is also possible to start collaborating at a very early stage, when the supplier may not even have the manufacturing equipment and machinery in which the packaging materials are manufactured. And then, in collaboration, we are able to make more the kind of adjustments that serve us better in some way.” – Interviewee D

5.2.1 Collaboration partners and the extent of collaboration

When it comes to the types of suppliers the buyers choose to collaborate closely with in innovation and product development, those previously discussed strategic and key suppliers represent the best opportunity for it. The same approach applies to the suppliers as well since they, too, evaluate the strategic importance of their clients. For example, Interviewee H explained that the turnover with the strategic, key clients is significant, and if such a client was to drop out, it would have a big impact on their company. Filling the void left by a strategic client would be challenging and time-consuming because a certain capacity of production is reserved to produce and serve the volumes of those big clients. This indicates dependence on the buyer. Of course, the buyer could also be dependent on the supplier when the relationship is considered strategic on their behalf as well. In this sense, there is a significant financial incentive to collaborate and develop things together.

Furthermore, several interviewees emphasized the importance of having long-term partners in collaborative innovation. For example, Interviewee D explained that the suppliers have proven their innovation capabilities throughout the years and are able to offer solutions for the company that are aligned with their goals. Roadmaps are a way to map out how the goals can be achieved together. Furthermore, Interviewee E mentioned that having partners that share similar values is important for collaboration especially when it comes to developing sustainable solutions. At best, they have a common interest regarding environmental issues on top of the business interest. Interviewee E also added that having a long-term orientation in product development can help to get the suppliers committed to it better. As a buyer company, they aim to communicate their intentions of seeking strategic partnerships to the suppliers from the start and that they are committed to developing together even through contracts.

“They are certainly all long-term partners with whom we have deeper collaboration in innovation. We have kind of seen over the years that these [suppliers] have innovations and these [suppliers] have innovations that go hand in hand with our goals. We have made joint road maps with a few material suppliers. There, we have shared our target levels, and then the supplier, in turn, has told us how they would be able to achieve our goal together.” –

Interviewee D

Even though the preferred approach seems to be to collaborate with existing strategic and preferably long-term partners, it does not mean that the buyers do not look for partners outside their organisation. Sometimes those collaborative relationships need to be established with new suppliers. For example, Interviewee G stated that if a supplier does not want to work together, they have to seek new suppliers that want to collaborate because as a company, they have high sustainability targets that they need to reach. So, the companies cannot always rely solely on their existing supply base to further their company's sustainability. The interviewee mentioned having noticed that the impetus to look for better, more sustainable packaging has come from their initiative rather than from the supplier side. In such a case, the buyer has more responsibility to drive the change towards sustainability in the supply chain and encourage suppliers to take part in it. In turn, Interviewee E mentioned that although they try to utilize large international suppliers that are frontrunners in innovation and have big product development organisations, they also want to collaborate with smaller, domestic suppliers. The domestic suppliers may be eager to work with them specifically and develop sustainability further on a domestic level. Moreover, they might have valuable first-hand information about legislations and recycling guidelines.

According to the buying companies, collaboration regarding innovation is very close with their packaging suppliers. One interviewee even stated that one of their big packaging suppliers is almost like a sister company to them because they collaborate so closely in several areas, including product development, production and maintenance. With this supplier, the company has reached many ambitious sustainability targets regarding their products and packaging. They have developed, for example, fully plant-based and fossil-free packaging in collaboration. Interviewee F representing the raw-material supplier, however, had an opposing view as they described that on average, they are not in a marriage with their customers. The other supplier companies considered the collaboration with their partners to be close in innovation and development work. Based on this, it appears that although a raw-material supplier may be involved in collaborative innovation, the closest collaboration occurs between the food company and its direct, first-tier packaging supplier.

It can be concluded that the companies recognise that collaboration is not only important for business in general but for innovation as well. It is seen as a mutually beneficial, win-win situation. One of the things pursued through collaborative innovation is sustainability-related

improvements, which are a top priority for all the case companies. Specifically, collaboration is seen as necessary when innovation is oriented towards sustainability because it allows access to needed, external expertise from different fields. Additionally, sustainability is a complex matter which a single company cannot tackle on its own. Even though collaborative innovation is mostly project-based, it still requires commitment and long-term orientation to the development work. Strategic partnerships seem to enable this the best because the partners have proven their significance to one another over the years and the supplier has demonstrated its ability to innovate.

5.2.2 Suppliers' innovation contributions for sustainable packaging

Based on the suppliers' views, the suppliers are able to contribute to innovation for more sustainable packaging through their knowledge on packaging materials, legislations and regulations as well as through their networks and information gained in industry discussions. This knowledge is then shared with the customer in the collaboration discussions. Furthermore, the supplier can educate the customer on things they have more knowledge on, which enables the customer to learn. On the packaging design side, the supplier can do a lot of work in terms of visualization before the customer has even decided to commercialize the innovated packaging solution.

“We are the material expert for the customers. A customer comes to us with a challenge or a problem and we as a team start thinking about a solution. We think about our entire company and what kind of materials the customer could use for this solution. I have a design team here who of course is already sketching out how this problem could be solved and what the package would look like. And the project side recommends materials for [...]and then we try to visualize this to the customer by branding a nice image. [...] And then we have a very extensive network of processors, those who make the packaging from our cartons. We can directly recommend a company from the local market which then processes those packages, and the customer is then directed to discussions with this processor.”– Interviewee A

The customer can make a decision based on the sketches and designs, and then a pilot production may begin where the packaging can be tested. The customer makes sure to get the opinions of the end-user or consumer, and then it usually transforms into continuous sales and

business for both parties, according to Interviewee A. Interviewee B from the same company added that in the packaging design phase, there is an opportunity to greatly influence things like resource efficiency and the protective features, through which impact can be made on environmental issues, carbon footprint, and recyclability and so on. In addition to having a design team, the company also has a sustainability team and thus, they are able to offer customers holistic packaging solutions in which design, materials, and sustainability have all been considered. Furthermore, Interviewee A mentioned that they are involved in different governmental bodies globally where the company's representatives are able to influence things like how legislation is formed. Additionally, they are involved in different organisations where they have discussions on future packaging solutions. In a similar vein, Interviewee H pointed out their ability as a supplier to sense what is going on in other markets.

“Dialogue is important and the fact that we, for our part, are trying to keep ourselves up to date with what is happening in the domestic market and, of course, in the world. We are in a good position since we are an international company. We have operations on almost all continent [...] So, we have a very wide contact area, and we have good tentacles to feel out what is happening in the world and we are able to bring that information to our customers” –

Interviewee H

Such information can pertain to general packaging development but also legislation and regulations. Interviewee H added that they are involved in an organisation that produces information about the packaging industry to EU which, in turn, utilizes the information in its decrees about plastic packaging. Thereby, the company can also give its customer information about what is being discussed under the surface in the packaging industry and the EU. This is very beneficial for the customer especially when they are thinking about long-term actions or directions to go, according to the interviewee. Interviewee H also mentioned that they are frontrunners in material thinning techniques are thereby able to offer both cost and sustainability benefits to customers. In addition, they can provide their customers with calculations and simulations regarding the carbon footprint.

“We are able to simulate all kinds of carbon footprint calculations related to logistics and the entire product life cycle and make examples. We can concretely show the profitability of those concepts then computationally.” – Interviewee H

According to Interviewee F, much can be done by conventional ways like sitting down and having a conversation. It is important that there is communication between the right people. They can educate their customers on certain things, such as sustainable forest ecosystems, which has been effective, according to the interviewee. Though the company is not so involved in the physical product's innovation with customers, rather the collaboration is quite close in marketing campaigns, communications, and sustainability. This further highlights the fact that the raw material supplier is much less involved in collaborative innovation. Even so, they are able to contribute as raw material experts to advance their customers' learning on sustainability, starting from the source of the materials used in packaging.

Based on the interviews, the buyer side seems to agree with the abovementioned contributions stated by the supplier side. For example, Interviewee C stated that in one previous project, the supplier searched for sustainable raw materials that were then implemented in the supplier's packaging process, highlighting the supplier's role as a material expert. Similarly, Interviewee D pointed out that the contributions made by the supplier mostly concern the packaging material choices. The conversations in this context often pertain to the circular economy and recyclable packaging materials. The interviewee also added that they need technical assistance from the supplier regarding the packaging machinery for instance. This was brought up also by Interviewee G as they stated that it is important that the supplier has technical knowledge of the buyer's production machinery. Usually, the packaging materials and new solutions need to fit into the existing production set-up because investments in new machinery would be very large. Such investments are worthwhile only in the case of some extremely significant innovation. According to the interviewee, these issues regarding the compatibility of the packaging materials with the production machinery is often a stumbling block. Thus, the importance of the supplier's technical knowledge is highlighted. Interviewee D also mentioned that they may do machinery investments if necessary. Furthermore, interviewee C pointed out that suppliers can provide them with information about future packaging trends. In line with the suppliers' views, Interviewee E stated that they are able to get access to the supplier's network, for example to the raw material manufacturers, which is essentially the added value they bring according to the interviewee. If the supplier has an extensive network and they know their own supply chain well, it is possible to get ideas and competencies that can contribute to innovation from there.

To summarize, the suppliers can contribute to sustainable packaging innovation by sharing knowledge regarding the packaging (raw) materials, global and domestic legislations and future trends, packaging machinery, and different sustainability aspects of the packaging. In addition, they can provide technical assistance, packaging design and visualisation services, help in executing test runs and pilot production, and access to their network and own supply base. Figure 6 presents the summary of these contributions mentioned by the interviewees divided into four main categories: product, production, industry, and network –related contributions.

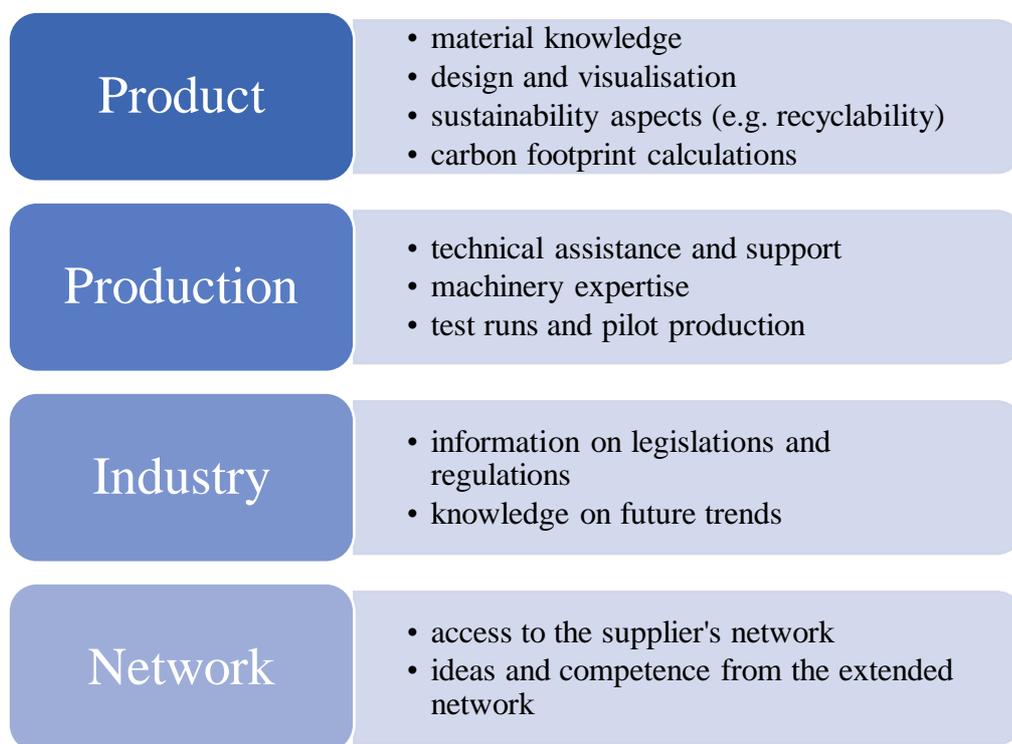


Figure 6. Suppliers' contributions to sustainable packaging innovation

From the buyers' perspective, the most important contributions in the context of sustainable packaging innovation seem to be the suppliers' material knowledge which arose most frequently from the interviews. From the suppliers' perspective, what seems to be particularly valuable for collaborative innovation is that they actively develop their knowledge base by acquiring information about legislations in the packaging industry and monitoring other markets to identify potential future trends.

5.2.3 Benefits of collaborative packaging innovation in food supply chains

As mentioned in the beginning, one of the major motives for collaboration recognized by the interviewees is the win-win situation which means that there must be benefits for both parties. According to the interviewees, these benefits resulting from collaborative innovation are mainly considered business or commercial benefits. On the supplier side, gaining new customers and the continuity with the current ones seem to be particularly important. For example, Interviewee A mentioned that a successful project with a customer leads to new projects with them. So, it can ensure continuity with existing customers. Furthermore, both Interviewee A and Interviewee F mentioned they get new customers as a result of collaborative innovation projects. The commercialization aspect of innovation is important for the suppliers and, as interviewee H mentioned, there is an expectation that the buyer commercializes the innovation with them and not with a competitor.

“Well, it [collaborative innovation] brings more work. That's where it always goes to. The customer has liked it so much that they come to us with a new project, and then of course, new [customers] come as well. Good things will be heard far, both in personal and professional life. So, we are flooded with more customers based on recommendations.” –

Interviewee A

“We have gained a lot of positive visibility, new customers. New opportunities to develop new applications. So, measurable commercial benefits.” – Interviewee F

“The goal is always that it materializes into business sooner or later. Of course, something new always emerges and something old disappears. The innovation projects or work may not necessarily have as much of an overall business-enhancing effect, but it does bring continuity. Often times an old product family or even an old packaging line will be decommissioned and replaced by some new investment [...] Then, usually the expectation is that the customer is loyal to us too and open and they want to create it into a commercial solution with us and not with a competitor.” – Interviewee H

Interviewee A also added that not only do they get to publish great news about the projects and inspire consumers with them, but they also develop a great internal spirit within the team and

the whole company when a project has been successful. It encourages the employees to succeed. In other words, employees experience better commitment and engagement to the work. Furthermore, Interviewee A mentioned that they are able to learn about upcoming trends in the market from their customers, which allows them to be prepared before they turn into legislation or other regulatory requirements.

For the buying companies, the main business benefit seems to be the innovations they get from their suppliers that can be applied and commercialized. Interviewee E stated that they get a lot of development ideas from their suppliers. They are then able to choose which ones are aligned with their strategy. Interviewee C, in turn, highlighted the role of information exchange and receiving information about future trends in the packaging industry from their supplier, which was also pointed out by Interviewee A from the supplier side. In addition, Interviewee C stated that they are able to achieve their goals faster through collaboration. Moreover, collaboration results in the expansion of the vision of both partners as they constantly exchange information and share ideas and goals. Interviewee G specified that while they do not start innovating so much from scratch with their suppliers, they bring into use the innovations that their suppliers have presented to them. The collaboration continues during the project after that, but as mentioned, the suppliers do much of the background innovation work. The interviewee sees the benefit being that those co-developed solutions have been commercially successful and good investments even though sustainable packaging is typically more costly.

“We exchange information considerably. The suppliers have different data from what they follow from their own market surface. For example, with [company name], we get worldwide information about future trends, for example. We achieve things faster by working together when we have a common goal and commonly agreed on targets [...] It furthers and facilitates the progress of things when both that partner and we have a common goal, so it is much easier to go towards it because those projects and processes are very multidimensional in terms of how to make them work in the industrial production. Then, naturally in marketing and sales, support is needed which can be obtained through that collaboration. With collaboration, we get to also expand our own vision and the vision of the partner. I see no choice but to collaborate very closely in principle always.” – Interviewee C

“I would say that all the so-called more sustainable packaging that we have introduced have been commercially good solutions for us, although they have also been investments for us because often the most sustainable packaging is more expensive than the so-called basic packaging.” – Interviewee G

Furthermore, the interviewees acknowledged that taking part in collaborative innovation projects has enhanced the sustainability of their company, which can be seen as another significant benefit. The projects enable both parties to ultimately develop a product portfolio that is more sustainable. Naturally, for the packaging suppliers, the effect is more direct since their product is packaging. The buyers, on the other hand, recognize it as an important part of their food products, after all, those food products could not be sold without being packed. In collaboration, the companies have commercialized plant-based solutions, fully recyclable and fossil-free packaging, plastic-free packaging or packaging with significantly less plastic. By doing so, they have taken significant steps towards their ambitious sustainability targets through innovation. For example, one interviewee described how they were able to significantly reduce the amount of plastic in one of their product categories with the help of a packaging supplier. According to the interviewee, the amount corresponds to approximately 7 million plastic grocery bags per year, which demonstrates how small changes in a product can have a big impact when the volumes are large. Another interviewee mentioned that they are currently collaborating on a project with one of their big, important packaging suppliers. According to the interviewee, the project is significant to them because the packaging material they have been developing is much more sustainable than what they now have on the market which the new material will replace.

Interviewee H talked about their past collaboration projects and stated that there have been total concept changes. They have, for example, helped their customers replace glass and aluminium packaging in baby foods with bags that have significantly less packaging material in them, and, in addition, those bags can even be made recyclable. Another example is the packaging concept of minced meat which has changed during the past few years as they are now being packed in vacuums rather than in plastic. All these improvements in packaging improve the efficiency of logistics as well because usually, the old concepts take up more of the transportation volume. With the new concepts, it becomes possible to transport more products at once and thereby reduce the number of trucks on an annual basis. The interviewee stated that these concept

changes are the result of collaboration and emphasized the importance of novelty value that such concepts hold for the customers.

“We can make good use of the fact that we have a wide foothold around the world. So, we are able to bring to the local market something that may not have been seen yet, something that might be in use elsewhere, but in that local market, there is no knowledge of it, or it has not yet been utilized [...] It is important for the customer that when there is a packaging concept, it also has some novelty value in the sense that they are the first to launch it. For example, this minced meat was like that, it had a certain novelty value. It had not yet been realized by anyone else. When our customer began to bring it to the market, others started to follow, and it became a trend for fresh meat and minced meat.” – Interviewee H

In this regard, the previously mentioned interest of the buyers to be the first ones to get innovations from their suppliers becomes very relevant. After all, the first-mover advantage implied by Interviewee H cannot be attained by the buyer unless they indeed are the company to which the supplier chooses to present their ideas.

One interviewee pointed out that on top of the advantage of packaging becoming more sustainable, they have been able to reduce the amount of waste since there is less plastic in production. As a result, the company’s waste costs have also decreased. The interviewee stated that packaging indeed is linked to their bigger sustainability targets and has its own role in that. Similarly, Interviewee H stated that shifting their product portfolio towards a more sustainable direction supports the fulfilment and development of their sustainability strategy. Interviewee F, in turn, talked about how a customer-centric perspective has led them to perform life-cycle assessment calculations, improve transparency in the value chain, and obtain certifications in order to meet the needs of their customers. This reflects how the sustainability pressure carries to the very upstream suppliers, which is why customer awareness is essential. Interviewee B brought up an even wider perspective, stating that collaborative innovation results in development that benefits the society as a whole. Indeed, the companies are able to contribute to sustainable development through their decisions made in the packaging innovation process.

“Our product portfolio is based on the needs of our customers. The more the market needs and desires and is attracted to these sustainable products, the more we need to turn our

portfolio in that direction as well. It also supports the implementation and development of our strategy. They are in direct symbiosis with each other.” – Interviewee H

“We've identified needs for things like doing new types of LCA calculations that we've done for our customers. Through that, we have been able to improve our transparency in the value chain and our understanding. We have acquired certain new certificates at customers' request. This kind of consumer and brand-driven approach has brought a new perspective to us in the sustainability conversation in general.” – Interviewee F

Interviewee E pointed out that packaging is what consumers first see in the store and take in their hands. People often link the product in the store to the company's brand and image, which is why it is extremely important to constantly advance sustainability even further, especially if the aim is to be a frontrunner. This indicates that the role of packaging can be an important indicator not only of a product's sustainability but also of the company's sustainability in the perceptions of the consumers.

The main conclusion here is that both parties are able to benefit from collaboration in innovation, and, as a result of sustainable, environmentally friendly products developed in collaboration, they become a more sustainable company. Hence, the benefits extend way beyond the product level. The concrete improvements in the products' sustainability regarding plastic reduction, for example, can be significant for the buying companies presuming they have large volumes for those products. The suppliers benefit also as they get to develop their own product portfolio towards being more sustainable and thereby, they are able to respond to the sustainability pressure better in general. It seems that for the buyer companies, the innovations or the initial ideas for new concepts mostly come from the suppliers, who often take the initiative to present them to their customers. It is clear that the buyers benefit from this since much of the initial development work has already been done for them. It can be particularly beneficial when the innovations are done with the specific products in mind. In this regard, the supplier should have a well enough knowledge of their customers' product portfolios so that those innovations can be applied to the products and turned into commercial solutions. The buyers, in turn, would benefit from being the first ones these innovations are presented to or being the chosen innovation partner as they could then enjoy the first-mover advantage if the innovated concept has novelty value in the local market. Given that innovation work takes time,

such an advantage could be long-term. In addition, both parties can receive positive visibility both in the media and within their industry and, as a result, get more customers and new projects. The benefits of collaborative innovation, including ones relating to sustainability, are summarized in Table 10.

Table 10. The benefits of collaborative packaging innovation

Short-term	<ul style="list-style-type: none"> • more sustainable/improved product • increased employee commitment and engagement • achieving targets faster
Long-term	<ul style="list-style-type: none"> • new customers • new projects • waste cost reductions • improved logistics efficiency • innovations from suppliers • learning about upcoming trends • enhanced company sustainability • first-mover advantage • access to expertise and competence • positive visibility

The interviewees mentioned different ways of measuring and keeping track of the benefits of collaborative innovation. They are summarized in Table 11 below. Interviewee E was not aware of any benefit monitoring practices in their company but mentioned that they do follow their various targets quarterly. Interviewee F was not asked about benefit monitoring due to very limited time. In general, these benefit monitoring practices seem to vary a lot among the interviewed companies. It is clear, however, that the companies use different kinds of measures to keep track of improvements regarding sustainability, which packaging is one aspect of. Interviewee D pointed out that there is definitely room for improvement in measuring the benefits of the projects as they have not yet found a particularly smart way to do it.

Table 11. Tracking the benefits of collaborative innovation

Interviewee	Description of benefit tracking practices
Interviewees A & B	<ul style="list-style-type: none"> • analysing each customer case • concrete sustainability calculations (e.g. calculating the amount of plastic being replaced or how much fewer carbon emissions will be emitted with new packaging)
Interviewees C & D	<ul style="list-style-type: none"> • company-level indicators, packaging development indicators, sustainability target indicators • indicators with a few important suppliers: how many innovation projects annually and what has resulted from them?
Interviewee E	<ul style="list-style-type: none"> • benefit monitoring practices may not be in place or they are not known by the interviewee • quarterly tracking of targets
Interviewee F	(was not asked about benefit tracking due to limited time)
Interviewee G	<ul style="list-style-type: none"> • one person monitors the benefits, including sustainability improvements • not only packaging-related sustainability improvements, but energy and water-related too
Interviewee H	<ul style="list-style-type: none"> • monitoring the sales of the sustainable product range and its development • monitoring the carbon footprint of the company and its development, including production, logistics, and energy use etc.

The benefits of collaborative innovation undoubtedly are connected to the motives and supplier contributions discussed above. Many of these abovementioned benefits relate to competitiveness, including sustainability. Also, it seems that the interviewees put more emphasis on benefits that are considered long-term rather than short-term project specific benefits. This may indicate that respectively, their work is oriented more towards reaching the long-term objectives of the company even though collaborative innovation is still mainly

project based. In terms of the benefit tracking practices, there are both project-specific monitoring as well as company-level monitoring.

5.2.4 The role of purchasing in collaborative packaging innovation

The buying companies, and specifically the interviewees working in sourcing, were asked about their purchasing department's role in enabling innovation with the packaging suppliers. Interviewee G mentioned being unaware of any specific practices but stated that some practices are perhaps formed during the innovation projects. The interviewee also mentioned that in the case of having to look for new suppliers and solutions from the market, the purchasing department is the one that sources for those alternative suppliers and can connect the company to different packaging suppliers. Moreover, the purchasing department also takes care of the official side, like negotiating prices. In this sense, the practices are quite flexible, as stated also by the interviewee. Interviewee D, in turn, pointed out first that packaging development certainly plays a bigger role than purchasing. Nevertheless, the interviewees did recognize a few ways the purchasing department is able to play a role in collaborative innovation. Interviewee E from the purchasing department stated that they have an innovation day annually with a few selected suppliers as well as monthly meetings and packaging development meetings with the suppliers where they are able to follow up on progress regarding test runs, for instance. Moreover, the interviewee mentioned that purchasing is the link between their R&D department and the suppliers and, in this regard, is the message broker. Similarly, Interviewee D mentioned innovation days and top-level meetings as a practice they have to enable collaborative innovation and, later in the interview, recognized that purchasing represents the interface to the supplier base. Furthermore, Interviewee E also added that they can utilize best practices used in another country within the organisation, for example, in order to get synergies and benefits and share that information internally on the company group level.

“Basically, we guide it [packaging development]. We have those contacts with the suppliers, and we try to act as a message broker, as if as a link between R&D and the suppliers. It is actually a kind of matrix organisation collaboration, and it is not really something that purchasing can do alone nor R&D nor the supplier. So, we have created these matrix teams.”

– Interviewee E

“Our packaging development actually plays a bigger role than purchasing, but of course we work together. And we have these top-level meetings with our most significant suppliers 1-2 times a year, in which we often go through the future in terms of what our company expects and how the supplier will be able to meet those expectations. In addition, innovation days are held.” – Interviewee D

Hence, it can be concluded that the purchasing department certainly plays a role in collaborative innovation, though it is not necessarily seen as important as the product development department, for example. Purchasing is recognized as an important interface, linking the internal and external stakeholders of the collaboration. In this sense, the importance of the purchasing department’s knowledge of their existing supplier base as well as the supplier market is highlighted so that they can connect the right people with the right supplier. Moreover, purchasing can be involved in the innovation projects through somewhat conventional means, such as meetings as well as negotiations and by handling contracts. Innovation days were also recognized as important ways for purchasing to be involved by a few interviewees. Moreover, it seems that cross-functional or matrix teams, which purchasing is a part of, are essential for collaborative innovation. Although the role of purchasing was recognized and a few important practices were mentioned, it seems to be more supportive than anything else. There does not seem to be a very extensive set of practices for collaborative innovation specifically employed by the purchasing departments that were interviewed.

5.2.5 Challenges and issues in collaborative innovation in food supply chains

In general, both the suppliers and buyers seem to have a positive mindset towards collaborative innovation, which reflects their past experiences in successful projects. In fact, most interviewees did not see there to be any negative effects resulting from collaborative innovation. Several other issues were mentioned during the interviews but they, however, are more challenges rather than negative effects.

One negative effect related to milking and fishing for information and exploiting know-how was identified by interviewee H, which concerns them as a supplier. However, the interviewee also remarked that this phenomenon does not occur often in the domestic market in Finland.

“In some markets, customers milk information. A lot of tests etc. are being done for them, but when the concept is ready, they go with a competitor, with some local competitor to implement it. They exploit know-how, and it is never concretized into business. There are quite a few of these examples. When it comes to a strategic partnership or key customer relationships, it really needs to be reciprocal. It is sometimes perhaps the challenge in that what we consider to be the key customer or partner to us, whether they really perceive us the same way. That is always a risk factor, if we [invest] development resources, will it ever materialize into business. Here, in our domestic market, there are no such concerns as much. The collaboration works well in both ways with our [domestic] customers”. – Interviewee H

Certainly, such exploitation is a risk the suppliers must consider. However, the interviewee pointed out that fishing of information is not necessarily a negative thing if it ends up advancing the entire industry. It is clear though, that to avoid such opportunistic behaviour, the relationship should be characterized by reciprocity and mutual dependence. Not only do the buyer companies want to be preferred customers to innovative suppliers, but the suppliers also want to be preferred suppliers for the customers they consider important. This would ensure that the customer is also committed to developing the concepts into commercial solutions with them and willing to collaborate with them in the long-term and not with a competitor. A certain level of loyalty is expected, as previously stated by the interviewee.

As for the challenges, Interviewee A mentioned that as a supplier, they have to educate their customers about legislation, and they try to make them understand that development work takes time. However, they are forced to be quick to find those sustainable solutions for the customers due to time pressure caused by legislations. The best way to overcome such challenges is information sharing, according to the interviewee. Similarly, Interviewee E mentioned the challenge of getting both parties committed to long-term work. They try to map out the supplier's interest too at the starting phase and include in the contract the things that are being developed. As the interviewee previously mentioned, as a buyer, they can also show their commitment to the supplier through contracts. They recognised that the supplier also has to invest a lot of time and money in product development before anything becomes concretized. This shows that a sourcing professional can have a good understanding of the interests of both parties and is able to act as a mediator in a way.

“... as material and packaging experts, we also educate the customer on legislation and especially on evolving legislation in the EU. We are trying to make them understand why the completely renewable solution they want may not be at hand tomorrow, the development work takes time [...] And then of course the fact that that time pressure is pretty hard. Europe has been quite active now in new legislation to replace plastic products with renewable ones. It feels like many customers may be surprised at how suddenly that time span arrives and how much plastic is in their packaging. Then, we too, will be required to be quick and agile to find solutions relatively soon. These are perhaps two of the biggest challenges.” – Interviewee A

According to Interviewee E, the role of purchasing is emphasized in overcoming the challenges since through contracts, purchasing can steer supplier collaboration to the desired direction, engage the supplier, and limit the information that can be shared elsewhere. Another challenge, however, lies in the contractual side. Interviewee B stated that when collaborative innovation is close, agreements need to be made very clearly on all issues. For example, when both parties do some background innovation on their own, it must then be clearly defined what is being innovated together. Relating to this, Interviewee E brought up the following challenge:

“...the challenge [of] when the defining has to be really precise on what things are being discussed with each other but then at the same time, the supplier must be able to develop with other customers as well [...] Understanding what those common, already commercial solutions things are or which matters are only confidential information still between two companies and things that cannot be disclosed.” – Interviewee E

Interviewee G pointed out that there are some challenges caused by the differences between the companies and between their ways of working. Some companies are more conservative and more careful and have more complex processes, whereas other companies are more agile. So, there might be challenges related to aligning these different ways of working and having to consider the different company cultures. There are also more practical challenges like scheduling and “getting the right people around the same table”, according to the interviewee. There were no specific solutions mentioned for such practical challenges.

Interviewee H brought up challenges related to the development costs and consumers’ willingness to pay for sustainable products. Developing a packaging solution based on

renewable, bio-based materials can raise the material costs by 25 %, for example. Justifying such purchases can be challenging from the buyer's perspective. The costs need to be compensated in the product's selling price. Whether consumers are willing to pay more must constantly be kept in mind. The interviewee mentioned that the consumer surveys and data regarding the issue are not always reliable because people can easily say they are willing to pay more for a sustainable product, but the reality is different. Consumers are very price-conscious of what they actually purchase from the stores. According to the interviewee, to overcome these challenges, consumer testing and pre-marketing should be conducted to make sure there is enough data. In addition, utilizing their knowledge of the global market and sharing information with their customer about which concepts worked and which did not in another market are valuable. So, experience and knowledge of the industry in general can essentially be leveraged to minimize risks. The interviewee also mentioned that after they move from the innovation stage to thinking about how to implement it in practice with the customer, they map out the risks quite carefully and try to take into account the various factors that can affect the outcome of the innovation project.

It is clear that there are many challenges related to collaborative innovation, but there are also ways to deal with them and even minimize some related risks. The challenges have three main themes: innovation-related, collaboration-related, and commercial. These are summarized in Table 12 along with some solutions suggested by the interviewees. Clearly, most of the challenges are related to dealing with the collaboration aspect of innovation. Though, opportunistic behaviour regarding the exploitation issues was said not to occur often in the domestic market.

Table 12. Challenges of sustainable packaging innovation

Type of challenge	Challenge	Solutions
Innovation	Having to be quick due to legislation pressure	Information sharing
	Justifying increased material costs	Having enough data Utilizing experience and knowledge of the global market and industry
Collaboration	Opportunistic exploitation of know-how and fishing for information	Being a preferred supplier No solution needed if it is for the good of the whole industry?
	Lack of long-term commitment	Mapping out supplier's interest Engagement through contracts
	Defining what is innovated in collaboration and what information can be disclosed	Understanding of common, already commercial solutions Non-disclosure agreement
	Supplier having to educate the buyer on legislation	Information sharing
	Different ways of working	-
	Scheduling	-
	Getting the right people from both organisations involved	-
Commercial	Unclarity of consumers' willingness to pay for sustainable products due to unreliable data	Risk mapping Consumer testing Pre-marketing
	Price-conscious consumers	

5.2.6 Harnessing the competence of both parties

The majority of the interviewees view that their competence is utilized enough in collaborative innovation. Only Interviewee D from purchasing did not share this view. Nevertheless, some interviewees had more immediate responses to the question, while others needed to think a bit more. For example, both Interviewees A and C were firm and quick in their responses, stating that their competence is utilized greatly. Interviewee A even emphasized that it is very much

utilized to the maximum. Interviewee H also agrees that at least with their main customers, their competence is well utilized, while Interviewee B stated that both parties' competence is probably utilized enough in order to find those new solutions.

Interestingly, Interviewees E and D, both representing purchasing, have different experiences when it comes to the competence of the purchasing department being utilized in innovation projects. Interviewee E feels that they are able to add value to the collaborative innovation work through networking with other sourcing managers on a company group level. Though there might be situations sometimes where they are not involved at all, or they are included only in the last purchasing stage. Still, the interviewee emphasized that in their company, purchasing gets to be involved in the projects a lot already from the beginning. They also get to influence the packaging on certain things, such as whether it should be recyclable or whether there are some new materials to bring to the packaging.

Interviewee D on the other hand feels both on a personal level as well as on the purchasing department level that the competence is not utilized enough. Firstly, the interviewee feels that sometimes the personal history in terms of having extensive purchasing experience in the company is left aside. Knowing what has been done or tried before, for example, 10 years ago, is useful, and it should be taken into account in collaborative innovation. The second issue is that the purchasing department is not included early enough in the projects and thus, they are not able to use their capabilities.

“We have that interface with our suppliers. In addition to knowing our current suppliers, we know a lot of potential suppliers, where it makes sense to investigate, to look for and to inquire about some new packaging materials. So, it would be really useful to be involved in the beginning and not only when a project is facing problems [...] We have so many projects, and purchasing is not involved in them. Of course, resources do not allow for active participation in all projects and project meetings constantly. But it would sometimes be enough to just be there at the kick-off, or before things have been figured out, to be included there at that stage. The project itself then often proceeds at its own pace, so purchasing may not need to play any role as the project progresses. But at the stage when making choices, it would be good to be involved because at that point, you could still have an influence.” –

Interviewee D

The interviewee also went on to describe a previous project in which purchasing was not involved in any way. The purchasing department was contacted when issues regarding the costs of a packaging material emerged. At that point, it was difficult for purchasing to then try to solve the situation as decisions and choices had already been made in the project. The interviewee stated that had they been involved in the early conversations, a different route in the project would have perhaps been taken. Furthermore, according to the interviewee, even though resources are limited, the work done in advance often takes less time than having to clear up problems and incomplete things later. This indicates that the involvement of purchasing from the start of the project could prevent some problems from occurring later on, and thereby, contribute to the smooth progress of the project. The interviewee added, though, that the role of purchasing has been emphasized more by the company recently, and that internal networking has increased as well.

“[It would be good for purchasing to be involved] at the stage before such decisions have been made that can no longer be changed. There should be the kind of work done in advance properly and weighing the options and making decisions with proper criteria. In that, to my understanding, they went with only one packaging material supplier and decided that this is what we are taking, and no investigation of any kind had been made for anything else. It is a fairly unthankful situation for purchasing to then start questioning at that point because the launch time had been decided. It came pretty close to not being able to even consider any test run stuff. The fact that a route was then found, however, was a great thing.” – Interviewee D

To conclude, the majority of interviewees agreeing on their competence being well utilized in collaborative innovation certainly indicates that the departments represented by the interviewees are able to contribute to the packaging development work and the collaborative innovation projects. Though, this is, of course, subject to the interviewees’ personal experiences. Furthermore, the responses imply that the food companies are able to extensively seize the innovation opportunities represented by the suppliers. However, when it comes to purchasing, the discussion with Interviewee D revealed that the lack of (early) purchasing involvement in a project can significantly hinder the progress of the project and even threaten its success. If purchasing is not even given the responsibility of supplier selection for the project, it can be considered the first misstep since proper sourcing criteria are likely to be ignored. Hence, the lack of purchasing involvement can be a stumbling block in collaborative

innovation with suppliers. In conclusion, even though the interviewed sourcing managers are involved in their company's collaborative innovation projects at least in some ways, it seems that the role of the purchasing department as an enabler of collaborative innovation is partly overlooked. Thus, the full potential of purchasing professionals remains untapped. The lack of resources, time particularly, appears to be a barrier to more extensive purchasing involvement.

5.2.7 Critical roles in collaborative innovation projects

The majority of the interviewees stated that there are no specific departments or individuals that play the most critical role in collaborative innovation projects for their success. However, some emphasised the role played by the packaging development or R&D department of both the buyer and the supplier. After all, that is where the actual innovation activities happen. One interviewee from the buyer side also mentioned that the role of the account manager from the supplier side is quite significant. Still, the prevailing view of the interviewees is that competence and expertise is needed from a lot of different departments and professionals in order to make collaborative innovation successful. For example, Interviewee A mentioned that it is important to get people involved cross-functionally, while Interviewee C emphasized the importance of top management and CEO commitment from both parties. According to another interviewee, in terms of expertise, it is important to ensure there is knowledge of the product side and the technical requirements as well as knowledge throughout the whole chain starting from the material and its conversion, to the packaging design with the end-use in mind. Moreover, all necessary expertise needs to be involved when the sustainability theme is concerned too. Interviewee H feels that perhaps it is not wise to include the purchaser from the customer's organisation in the beginning because they often prioritize price too much. This, in turn, can negatively affect the innovation work. Though, there are a lot of exceptions among the buyers, according to the interviewee. Some are more development-oriented.

“Those biggest customers, of course, have their own packaging development organisations and marketing team. A lot of ideas come from there, from their marketing and brand team, and then the packaging development starts to take it forward. And from us, of course, the product development and sales also contribute. It often kills the innovation if the buyer and seller start discussions, the price aspect can immediately become too high a priority. For example, if we introduce something new to the customer's buyer, then it is immediately like

what does it cost and what is the price and how much does it add to the costs [...]Perhaps it would be better to keep product development and packaging development at a technical level up to a certain point and then set out to refine it into a commercial concept and only there look more at those costs and how they can be influenced.” – Interviewee H

This view can be considered somewhat conflicting with the views of the purchasing representatives. As mentioned, Interviewee D for example wished for purchasing to be more involved in the collaborative innovation projects already from the beginning stages in order to be able to influence decisions. In this sense, it could potentially be a challenge for companies to align these contradicting preferences. To conclude, it is vital for collaborative innovation projects to get competence from a variety of different areas of expertise and departments from both organisations. Some of the interviewees mentioned cross-functional and inter-firm teams as ways of working and collaborating. Earlier, Interviewee E mentioned having matrix teams and stated that the R&D, nor the supplier, nor the purchasing department can do everything by themselves. Clearly, not only is external collaboration with a partner important but so is internal collaboration within the organisation. Collaborative innovation for sustainability especially requires a lot of different actors in the supply chain to be involved which suggests that effective communication is important. Based on the interviews, establishing inter-firm and cross-functional teams are ways to ensure that.

6 DISCUSSION AND CONCLUSIONS

The purpose of this study was to gain understanding of how both buyer and supplier companies are able to enhance their sustainability through collaborative innovation. The motives for supplier involvement in innovation, suppliers' contributions, as well as the role of purchasing were examined. The theoretical study revealed that collaboration is vital for companies to achieve sustainability and for developing innovations. Collaboration allows the parties to access needed knowledge and competence that they do not possess themselves. Next, the insights gathered from the empirical study are discussed in the light of previous research, and the answers to the research questions are presented.

Why do companies involve suppliers in their innovation activities?

Based on previous research (e.g. Van de Vrande et al., 2009; Van Echtelt et al., 2008; Bruce et al., 1995; Bogers et al., 2017), one of the main motives for companies to involve suppliers in innovation is getting access to missing knowledge and complementary resources. According to Melander (2017), the access to external knowledge enables the development of new products. This study provides support for the significance of external knowledge and complementary resources, and it can be concluded that they indeed are key motives for buying companies to involve suppliers in innovation. The Finnish food companies recognise that suppliers have some vital competencies that they need in order to reach their sustainability goals. The companies are facing increasing pressure from consumers, retailers, and legislations to enhance sustainability, which is reflected on their efforts to develop more sustainable packaging for their products. Packaging was recognised by the interviewees as a way to influence sustainability in areas of food waste, recyclability and circularity, as well as material and resource usage. This in itself increases the strategic role of packaging suppliers, as sustainability is perceived both as a necessity for business continuity and a precondition for remaining competitive. Hence, especially in the sustainable product development context, the need for complementary expertise from other industries and sectors was seen particularly crucial due to the complexity of sustainability issues and the fact that sustainability concerns several actors in the supply chain. This finding is in line with that of De Marchi (2012) who stated that integrating external stakeholders, like suppliers, is more important in environmentally sustainable product innovation than in traditional innovation. One interviewee also emphasised that big changes in

sustainability require involvement from the entire value chain, including suppliers. Supplier involvement can also expedite the achievement of specific targets regarding innovation and sustainability because the collaboration partners have set common goals to be pursued, as one interviewee pointed out. Thus, collaboration in the form of supplier involvement in innovation is seen as the only way to reach the sustainability objectives. This has been previously acknowledged by, for example, Eccles et al. (2012) and Kuhl et al. (2016).

There are also other important reasons for involving suppliers in innovation. The buyer companies clearly recognize that there is a lot of innovation potential among suppliers. This innovation potential has been acknowledged by researchers in the past (Apte & Sheth, 2017; Schiele, 2006). In the Finnish food supply chains, the packaging suppliers appear to innovate a lot on their own, outside of collaboration. In fact, a lot of innovations seem to originate from the suppliers, which makes the buyers want to continue involving them in developing new products or improving existing ones. Bonaccorsi and Lipparini (1994) identified supplier-originated innovations as one main benefit of collaborative innovation since the alternative is that suppliers innovate independently and offer their solutions in the open market. At best, the buyers get to be the first company the supplier introduces their new ideas and concepts to after which the collaboration can continue in the form of further product development towards commercialization. This is what Schiele (2012) referred to as preferred customer status. This is important for the buyers because being important for the supplier may result in being first to enter the market too with that new concept. This, in turn, can create competitive advantage for the companies especially if the concept is new in the local market. Hence, it can be stated that the pursuit of a preferred customer status also drives companies to innovate with their suppliers. Furthermore, given that many of the companies mentioned the desire to be frontrunners and leaders in sustainability, supplier involvement in innovation can be seen as a way to achieve it. In other words, without supplier involvement in innovation, the buyers feel they could not be able to reach their objectives of being sustainability leaders. These findings are in line with the insights of Chen et al. (2006) and Capozucca and Sarni (2012) who have stated that innovation driven by sustainability can generate competitive advantage through product differentiation and first-mover advantages.

How can suppliers contribute to innovation with their customers?

These abovementioned findings indicate that the suppliers give valuable contributions to innovation since they allow the buyers to have access to external knowledge, which Rosell and Lakemond (2012) have also emphasised as such access complements the company's internal knowledge base. On a more concrete level, the interviews revealed that the suppliers are able to contribute by sharing information and knowledge related to the product, production, their network, and industry. Regarding the product, the suppliers offer expertise on the materials in terms of which materials to use and how to use them. They can also have responsibility on designing and visualising the initial concept with the most suitable materials. The choice of materials seems to be highlighted in sustainability focused innovation. With the supplier's material expertise, different sustainability aspects can be influenced in the development stage. Suppliers can source those sustainable materials for the buyer. Given that the food companies put much emphasis on reducing the use of plastic in packaging and increasing the recyclability of the packaging, material suggestions by the supplier play a vital role in developing the packaging. Moreover, suppliers may even offer carbon footprint calculations for the whole life cycle of the product. In terms of production, the suppliers contribute by providing technical assistance and support throughout the project. Often, the innovation projects involve test runs and pilot production of the developed solution. Thus, supplier's competence regarding the production machinery is also important. Furthermore, a lot of supplier contributions come from their knowledge of future industry trends and information on current and emergent legislations and regulations related to packaging. Finally, the suppliers can allow their customers access to their own supplier network, and they can give recommendations on who to collaborate with on another area of packaging production, for instance. As one interviewee from a buyer company stated, a lot of ideas and complementary competence for innovation come from the supplier's networks, thereby highlighting further the importance of supplier involvement and getting access to external knowledge through it. As a result of these contributions, the buyers end up with products that are more sustainable with a decreased carbon footprint and minimal negative impact on the environment. In conclusion, it seems that the buyers in Finnish food supply chains rely heavily on their suppliers and their contributions in innovation and product development.

What is the role of the purchasing department in enabling collaborative innovation with suppliers?

Many studies have demonstrated that the purchasing department plays an increasingly important role in innovation when suppliers are involved and ultimately serve as an enabler (e.g. Schiele, 2006; Rosell & Lakemond, 2012; Luzzini et al., 2015; Patrucco et al., 2017; Schiele, 2012). This study provides support for the fact that purchasing certainly has a role in collaborative innovation, and the enabling aspect seems to emerge through their ability to serve as a link between the supplier base and their organisation. They have good knowledge of the both the suppliers and their own organisation in terms of goals, expectations, and capabilities. With such knowledge, they are able to guide and support the collaboration. Innovation days, roadmaps, and top-level meetings are some practices adopted by purchasing for collaborative innovation. Furthermore, the purchasing department can help to ensure commitment from the supplier to innovation through contracts, in which the mutual development work can be defined clearly. In this sense, a contract with clear definitions show commitment also from the buying company to the supplier. By being involved in collaborative innovation, the purchasing professionals can also influence decisions regarding the packaging itself, which essentially puts them in a great position to support their company in reaching their sustainability goals. This was previously recognised by Carter and Easton (2011).

Furthermore, the fact that the preferred collaboration partners in the packaging innovation projects seem to be ones with whom a strategic partnership has been established indicate that there is a role played by purchasing in enabling such a relationship to exist in the first place. The establishment of partnerships requires identifying those strategically important suppliers among the entire supplier base which can be based on for example, purchase categories as mentioned by one interviewee. The interviewees acknowledged that close collaboration cannot occur with all suppliers, which is in line with previous studies that have advocated for focusing collaboration efforts on a small number of strategically important suppliers which supplier segmentation or categorization can help identify (e.g. Dyer et al., 1998; Spekman et al., 1998; Cox, 2004; Barratt, 2004). Though it was not explicitly stated by the interviewees, given that the case companies are large organisations with distinct purchasing departments, it is likely that the purchasing department develops those categories and identifies which suppliers it makes sense to establish closer collaborative relationships with. Dyer et al. (1998) specifically stated

that resources should mostly be allocated to suppliers that provide high-value contributions and play an important role in differentiating the buyer's final product, which seems to be the approach within the case companies.

Furthermore, as the buyers recognised that the purchasing department is the interface between the company and suppliers, purchasing can seek for new suppliers that may offer the packaging solutions that are being sourced as well as the capabilities to develop those solutions further in collaboration. Though, the latter may not always come true, as revealed by the discussion with Interviewee D. Sometimes the purchasing department is left out from collaborative innovation projects completely, not even participating in supplier selection. This can significantly hinder the success of the innovation project as sourced material or supplier-related problems seem to be likely to occur due to lack of purchasing involvement. In the example case provided by interviewee D, the cost estimates in the project went wrong because the packaging material was more expensive than expected which ultimately threatened the whole schedule of the product launch. This underlines the importance of purchasing involvement early on in the project to properly evaluate the suppliers with proper criteria. It can be concluded that the lack of purchasing involvement can turn out to be a significant stumbling block for the collaborative innovation projects.

The findings also indicate that purchasing has an essential role in establishing a line of communication between the company departments involved in innovation and the supplier. One interviewee even called the purchasing professionals message brokers and stated that they communicate their intentions of creating long-term partnerships to the suppliers. Communication and information sharing are among the success factors of collaborative relationships recognised in literature (e.g. Mohr & Spekman, 1994), and the lack of these elements predict failure or inefficiency (Ellram, 1995). By communicating their intentions of building long-term partnerships and showing their commitment through contracts, the purchasing professionals can help their company increase their attractiveness as a partner to the supplier and thereby, they ultimately support the company to achieve a preferred customer status with the supplier. The role of purchasing in reaching such status has been acknowledged by Schiele (2012), though, they suggested using certain sourcing criteria and a supplier portfolio approach to achieve a preferred customer status. It remains unclear whether the interviewed buying companies have developed sourcing criteria specifically for identifying innovative

suppliers. Nevertheless, communicating intentions and commitment is vital since the suppliers are also interested in knowing whether they are seen as important by the buyer. Purchasing is in a favourable position to not only evaluate the supplier and their importance to their company, but also to get insight from the supplier on how important they consider them. It can reveal whether the collaboration is in balance and allows mutual benefits, which one interviewee mentioned being vital for the continuity of the collaboration.

Relationships characterized by reciprocity and mutual dependence revealed to be the most ideal conditions for a working collaborative innovation partnership. Mutual dependence arises from the buyer's dependence on the contributions and innovation capabilities of the supplier, whereas the supplier relies on the buyer in commercializing the innovated solution. Another factor affecting the supplier's dependence on the buyer is the significance of the buyer's purchasing volume in the supplier's business, which Schiele (2012) referred to as commercial importance. Hence, with their decisions on purchase volumes, the purchasing department has an important role in keeping key suppliers as strategic partners. Accordingly, as certain relationship conditions are the most conducive for collaborative innovation, purchasing professionals certainly play a part in enabling those conditions. Even so, it seems that the capabilities of the purchasing professionals are not utilized fully for purchasing to reach its full enabling potential. Although many interviewees stressed the importance of bringing several different actors and departments from both the partner and their own organisation together, the role of the purchasing was not mentioned by any interviewee as critical in collaborative innovation projects for their success.

How can buyer-supplier collaborative innovation enhance sustainability in companies?

Returning to the main research of this study, the way companies are able to enhance their sustainability through collaborative innovation is firstly, by focusing their innovation efforts on sustainability and secondly, from the buyer's perspective, by actively involving suppliers in these innovation efforts. The food companies benefit from the suppliers' innovativeness that arises mainly from their valuable knowledge of the materials as well as the packaging industry in terms of legislations and potential trends. The suppliers, in turn, get valuable insights of the consumer perspective from the buyer and are able to develop the innovations into commercial solutions that attract consumers. Certainly, supply chain partners can leverage each other's

resources and utilize opportunities in learning and knowledge exchange to enhance sustainability (Grekova et al., 2016).

In the food supply chain context, it is essential that the companies first recognise the role played by packaging in affecting sustainability which, in turn, is a significant factor in the competitiveness of a company. Scholars have acknowledged packaging as a strategic component that can support the implementation of sustainable strategies in supply chains and be a source of innovation itself and thus, it can contribute to competitiveness as well (Hellström & Nilsson, 2011; García-Arca et al., 2017). The efforts by the food supply chain companies to enhance packaging sustainability are led by a focus on recyclability and the use of renewable materials in product development in order to promote circular economy. The sustainability enhancements have emerged as the companies have commercialized plant-based solutions, fully recyclable and fossil-free packaging, plastic-free packaging or packaging with significantly less plastic. Indeed, collaboration has led to the companies supporting the implementation of their sustainability strategies, and it is a way to tackle the increasing stakeholder sustainability requirements (Blome et al., 2014).

This study shows that the best conditions for a successful collaboration are ones where a win-win situation is enabled through a reciprocal relationship and mutual dependence. Moreover, based on the findings, the best innovation outcomes result from collaboration where the competence of both parties is utilized. This includes involving the purchasing department of the buyer company in the collaborative innovation activities as it turned out that the lack of their involvement can negatively affect the efficiency of the innovation project. The purchasing department can enable collaborative innovation with suppliers when they get to be involved in the innovation projects. The role of purchasing and related strategic sourcing practices has been emphasised in collaborative innovation context in previous studies (Luzzini et al., 2015; Patrucco et al., 2017; Rosell & Lakemond, 2012; Schiele, 2006;2012). This study particularly highlights supplier evaluation, ensuring supplier commitment, and communication as important activities employed by the purchasing department.

6.1 Managerial implications

From a managerial perspective, this study has various implications for practitioners. This study illustrates the importance of sustainability focused innovation with the involvement of suppliers, which will ultimately support companies in improving not only their sustainability but also their competitiveness. Based on the findings, the following four suggestions were identified, and they should be taken into account by buyer companies. They are summarized in Table 13.

Firstly, companies should be aware of the contributions that suppliers can provide to innovation. Managers should acknowledge that supplier involvement in innovation is necessary, and they should increase the active involvement of suppliers in product development and innovation activities. This is particularly important for companies tackling sustainability-related challenges. Creating cross-functional matrix teams for collaborative innovation projects can help to ensure the utilization of the competence of both parties and increase communication which is essential for collaboration.

Second, the role of the purchasing department should be recognized as critical in the innovation projects by companies. When suppliers are involved in innovation, so should purchasing. With their sourcing knowledge, the purchasing professionals can facilitate the progress of the project and ensure that the best supplier is selected. The company should make sure that all the project members are aware of how the lack of purchasing involvement can cause major problems during the project which, in turn, may threaten the success of the project. To tackle the issue of lack of resources for purchasing involvement, there is an opportunity for companies to consider automation for some non-strategic purchasing tasks.

Third, companies should make sure that the purchasing professionals have the relational competencies to manage and guide the supplier collaboration. Such skills support the creation of the ideal conditions for collaborative innovation. A collaborative relationship characterized by reciprocity, mutual benefits, and mutual dependence would ensure commitment and getting the most out of an innovative supplier. The relational skills should be highlighted in employee training, for example.

Finally, there is a need for developing a proper monitoring system for evaluating and measuring the outcomes of collaborative innovation projects. It should specifically include the aspect of supplier involvement so that companies can properly assess how and what the supplier has contributed to the innovation work. It could reveal important insights about where to allocate resources. Furthermore, it could be used to justify further collaboration projects.

Table 13. Managerial implications of the study

Suggestion	Description
Suggestion 1	Creation of cross-functional matrix teams for collaborative innovation
Suggestion 2	Involvement of purchasing in collaborative innovation from the early stages of innovation projects
Suggestion 3	Develop relational competencies in the purchasing department
Suggestion 4	Develop monitoring strategies for collaborative innovation

6.2 Limitations and suggestions for further research

This study has limitations, some of which provide opportunities for future research. Firstly, the research design and scope of this study limit the generalizability of the results. This study presents only the perspectives of eight practitioners from six food supply chain companies which do not represent the entire industry. The representation of project members in this study was limited to 1-2 people per organisation, which is a clear limitation in this study. Furthermore, due to the specific context of the study of packaging in food supply chains, the results cannot be directly generalised to other contexts, like industries. These issues should be considered when interpreting the results. Hence, the generalizability of the results is clearly limited. It is important to note, however, that the objective of this study was not to offer generalizations, but rather to gain an in-depth understanding of the research topic, and this objective was reached.

For further research on the topic, investigating the role of the purchasing department in collaborative innovation projects as a potential success factor would provide an interesting avenue. Analysing the activities undertaken by purchasing at different project stages could potentially offer a deeper understanding of their importance. More project members from

purchasing and other departments, including those of the supplier, should be included in the study for a better understanding of how the role of purchasing is recognised and utilised.

Another avenue for further research pertains to the research design and methodology. More generalizable results would be achieved with a different, larger scale research design. The use of survey data gathered from a large sample from various industries and quantitative analysis methods would improve reliability and validity, and it would allow more generalizability of the results. Moreover, a quantitative study with different industries involved can provide interesting insights on the similarities and differences across the industries.

REFERENCES

- Adams, R., Jeanrenaud, S., Bessant, J., Denyer, D., & Overy, P. (2016). Sustainability-oriented innovation: A systematic review. *International Journal of Management Reviews*, 18(2), 180-205.
- Ageron, B., Gunasekaran, A., & Spalanzani, A. (2012). Sustainable supply management: An empirical study. *International Journal of Production Economics*, 140(1), 168-182.
- Albino, V., Balice, A., & Dangelico, R. M. (2009). Environmental strategies and green product development: An overview on sustainability-driven companies. *Business Strategy and the Environment*, 18(2), 83-96.
- Allred, C. R., Fawcett, S. E., Wallin, C., & Magnan, G. M. (2011). A dynamic collaboration capability as a source of competitive advantage. *Decision Sciences*, 42(1), 129-161.
- Apte, S., & Sheth, J. (2017). A sustainable supply chain: It begins with trust. *Industry Week*. [online]. Available at: <https://www.industryweek.com/supply-chain/article/22000658/a-sustainable-supply-chain-it-begins-with-trust> [Accessed 13 February 2021].
- Artz, K. W. & Norman, P.M. (1999). Buyer–supplier performance: The role of asset specificity, reciprocal investments and relational exchange. *British Journal of Management*, 10(2), 113-126.
- Barbieri, J. C., Gouveia de Vasconcelos, I. F., Andreassi, T., & de Vasconcelos, F. C. (2010). Innovation and sustainability: New models and propositions. *Rae-Revista De Administracao De Empresas*, 50(2), 146-154.
- Baregheh, A., Rowley, J., & Sambrook, S. (2009). Towards a multidisciplinary definition of innovation. *Management decision*, 47(8), 1323-1339.
- Barratt, M. (2004). Understanding the meaning of collaboration in the supply chain. *Supply Chain Management: An International Journal*, 9(1), 30-42.

- Belderbos, R., Carree, M., & Lokshin, B. (2004). Cooperative R&D and firm performance. *Research Policy*, 33(10), 1477-1492.
- Benbasat, I., Goldstein, D. K., & Mead, M. (1987). The case research strategy in studies of information systems. *MIS Quarterly*, 369-386.
- Blome, C., Paulraj, A., & Schuetz, K. (2014). Supply chain collaboration and sustainability: A profile deviation analysis. *International Journal of Operations & Production Management*, 34(5), 639-663.
- Bogers, M., Zobel, A.K., Afuah, A., Almirall, E., Brunswicker, S., Dahlander, L., Frederiksen, L., Gawer, A., Gruber, M., Haefliger, S. & Hagedoorn, J. (2017). The open innovation research landscape: Established perspectives and emerging themes across different levels of analysis. *Industry and Innovation*, 24(1), 8-40.
- Bonaccorsi, A., & Lipparini, A. (1994). Strategic partnerships in new product development: An Italian case study. *Journal of Product Innovation Management*, 11(2), 134-145.
- Brody, A. L., Bugusu, B., Han, J. H., Sand, C. K., & Mchugh, T. H. (2008). Innovative food packaging solutions. *Journal of food science*, 73(8), 107-116.
- Bruce, M., Leverick, F., Littler, D., & Wilson, D. (1995). Success factors for collaborative product development: A study of suppliers of information and communication technology. *R&D Management*, 25(1), 33-44.
- Brundtland, G. H., Khalid, M., Agnelli, S., Al-Athel, S., Chidzero, B. (1987). Our common future. World Commission on Environment and Development. *Business Logistics*, 17(2), 93-138.
- Cao, M., & Zhang, Q. (2011). Supply chain collaboration: Impact on collaborative advantage and firm performance. *Journal of Operations Management*, 29(3), 163-180.

Cao, M., & Zhang, Q. (2012). Supply chain collaboration: Roles of interorganizational systems, trust, and collaborative culture. Springer Science & Business Media.

Capozucca, P. & William, S. (2012). Sustainability 2.0: Using sustainability to drive business innovation and growth. [online]. Available at: <https://www2.deloitte.com/us/en/insights/deloitte-review/issue-10/sustainability-2-0-innovation-and-growth-through-sustainability.html> [Accessed 2 April 2021].

Carter, C. R., & Easton, L. P. (2011). Sustainable supply chain management: Evolution and future directions. *International Journal of Physical Distribution & Logistics Management*, 41(1), 46-62.

Carter, C. R., & Rogers, D. S. (2008). A framework of sustainable supply chain management: Moving toward new theory. *International Journal of Physical Distribution & Logistics Management*, 38(5), 360-387.

Chapman, R. L., & Corso, M. (2005). From continuous improvement to collaborative innovation: The next challenge in supply chain management. *Production Planning & Control*, 16(4), 339-344.

Chen, I. J., Paulraj, A., & Lado, A. A. (2004). Strategic purchasing, supply management, and firm performance. *Journal of Operations Management*, 22(5), 505-523.

Chen, L., Zhao, X., Tang, O., Price, L., Zhang, S., & Zhu, W. (2017). Supply chain collaboration for sustainability: A literature review and future research agenda. *International Journal of Production Economics*, 194, 73-87.

Chen, Y. (2008). The driver of green innovation and green image—green core competence. *Journal of Business Ethics*, 81(3), 531-543.

Chen, Y. S., Lai, S. B., & Wen, C. T. (2006). The influence of green innovation performance on corporate advantage in Taiwan. *Journal of business ethics*, 67(4), 331-339.

Chesbrough, H. W. (2003). *Open innovation: The new imperative for creating and profiting from technology*. Harvard Business Press.

Chin, T. A., Tat, H. H., & Sulaiman, Z. (2015). Green supply chain management, environmental collaboration and sustainability performance. *Procedia Cirp*, 26, 695-699.

Christopher, M. (2017). *Logistics & Supply Chain Management* (4th ed.). Pearson.

Clark, K. B. (1989). Project scope and project performance: The effect of parts strategy and supplier involvement on product development. *Management Science*, 35(10), 1247-1263.

Cohen, W. M., & Levinthal, D. A. (1990). Absorptive capacity: A new perspective on learning and innovation. *Administrative Science Quarterly*, 128-152.

Corso, M., Martini, A., Paolucci, E., & Pellegrini, L. (2001). Knowledge management in product innovation: An interpretative review. *International Journal of Management Reviews*, 3(4), 341-352.

Corsten, D., & Felde, J. (2005). Exploring the performance effects of key-supplier collaboration: An empirical investigation into swiss buyer-supplier relationships. *International Journal of Physical Distribution & Logistics Management*, 35(6), 445-461.

Cox, A. (2004). The art of the possible: Relationship management in power regimes and supply chains. *Supply Chain Management*, 9(5), 346-356.

Crossan, M. M., & Apaydin, M. (2010). A multi-dimensional framework of organizational innovation: A systematic review of the literature. *Journal of management studies*, 47(6), 1154-1191.

Damanpour, F. (1996). Organizational complexity and innovation: developing and testing multiple contingency models. *Management science*, 42(5), 693-716.

De Marchi, V. (2012). Environmental innovation and R&D cooperation: Empirical evidence from Spanish manufacturing firms. *Research Policy*, 41(3), 614-623.

De Medeiros, J. F., Ribeiro, J. L. D., & Cortimiglia, M. N. (2014). Success factors for environmentally sustainable product innovation: a systematic literature review. *Journal of Cleaner Production*, 65, 76-86.

Del Borghi, A., Gallo, M., Strazza, C., & Del Borghi, M. (2014). An evaluation of environmental sustainability in the food industry through life cycle assessment: The case study of tomato products supply chain. *Journal of Cleaner Production*, 78, 121-130.

Doukidis, G. I., Matopoulos, A., Vlachopoulou, M., Manthou, V., & Manos, B. (2007). A conceptual framework for supply chain collaboration: Empirical evidence from the agri-food industry. *Supply Chain Management: An International Journal*, 12(3), 177-186.

Dubois, A., & Araujo, L. (2007). Case research in purchasing and supply management: Opportunities and challenges. *Journal of Purchasing and Supply Management*, 13(3), 170-181.

Duffy, R., & Fearne, A. (2004). The impact of supply chain partnerships on supplier performance. *The International Journal of Logistics Management*, 15(1), 57-72.

Dyer, J. H., & Singh, H. (1998). The relational view: Cooperative strategy and sources of interorganizational competitive advantage. *Academy of Management Review*, 23(4), 660-679.

Dyer, J. H., Cho, D. S., & Cgu, W. (1998). Strategic supplier segmentation: The next "best practice" in supply chain management. *California management review*, 40(2), 57-77.

Eccles, R. G., Miller Perkins, K., & Serafeim, G. (2012). How to become a sustainable company. MIT Sloan. [online]. Available at: <https://sloanreview.mit.edu/article/how-to-become-a-sustainable-company/> [Accessed 7 April 2021].

Eisenhardt, K. M. (1989). Building theories from case study research. *Academy of Management Review*, 14(4), 532-550.

Eisenhardt, K. M., & Tabrizi, B. N. (1995). Accelerating adaptive processes: Product innovation in the global computer industry. *Administrative Science Quarterly*, 84-110.

Elkington, J. (1998). Partnerships from cannibals with forks: The triple bottom line of 21st-century business. *Environmental Quality Management*, 8(1), 37-51.

Ellram, L. M. (1995). Partnering pitfalls and success factors. *International Journal of Purchasing and Materials Management*, 31(1), 35-44.

Ellram, L. M. (1996). The use of the case study method in logistics research. *Journal of*

European Commission (1994) Directive 94/62/EC on Packaging and Packaging Waste; European Union: Brussels, Belgium.

European Commission (2004) Directive 2004/12/EC on Packaging and Packaging Waste; European Union: Brussels, Belgium.

European Commission (2008) COM/2008/397 Sustainable Consumption and Production and Sustainable Industrial Policy Action Plan. Brussels, Belgium.

European Commission (2018) Directive 2018/852 on Packaging and Packaging Waste; European Union: Brussels, Belgium.

FAO. (2019). The state of food and agriculture 2019. Moving forward on food loss and waste reduction. [online]. Available at: <http://www.fao.org/3/ca6030en/ca6030en.pdf> [Accessed 17 March 2021].

Fawcett, S. E., Jones, S. L., & Fawcett, A. M. (2012). Supply chain trust: The catalyst for collaborative innovation. *Business Horizons*, 55(2), 163-178.

Fearne, A., Duffy, R., & Hughes, D. (2001). Concepts of collaboration: Supply chain management in a global food industry. In: Sharples, Liz and Ball, Stephen and Eastham,

Fritz, M., & Schiefer, G. (2008). Food chain management for sustainable food system development: A European research agenda. *Agribusiness: An International Journal*, 24(4), 440-452.

Gadde, L., & Snehota, I. (2000). Making the most of supplier relationships. *Industrial Marketing Management*, 29(4), 305-316.

Galpin, T., & Whittington, J. L. (2012). Sustainability leadership: From strategy to results. *Journal of Business Strategy*, 33(4), 40 – 48.

García-Arca, J., Garrido, A., & Prado-Prado, J. C. (2017). “Sustainable packaging logistics”. The link between Sustainability and Competitiveness in Supply Chains. *Sustainability*, 9(7), 1098.

Gephart, R. P. (2004). Qualitative research and the academy of management journal. *Academy of Management Journal*, 47(4), 454-462.

Gold, S., Seuring, S., & Beske, P. (2010). Sustainable supply chain management and inter-organizational resources: A literature review. *Corporate Social Responsibility and Environmental Management*, 17(4), 230-245.

González-Benito, J. (2007). A theory of purchasing's contribution to business performance. *Journal of Operations Management*, 25(4), 901-917.

Grekova, K., Calantone, R. J., Bremmers, H. J., Trienekens, J. H., & Omta, S. (2016). How environmental collaboration with suppliers and customers influences firm performance: Evidence from Dutch food and beverage processors. *Journal of Cleaner Production*, 112, 1861-1871.

Guillard, V., Gaucel, S., Fornaciari, C., Angellier-Coussy, H., Buche, P., & Gontard, N. (2018). The next generation of sustainable food packaging to preserve our environment in a circular economy context. *Frontiers in Nutrition*, 5, 121.

Gunasekaran, A., Patel, C., & Tirtiroglu, E. (2001). Performance measures and metrics in a supply chain environment. *International Journal of Operations & Production Management*, 21(1/2), 71-87.

Gustafsson, J. (2017). Single case studies vs. multiple case studies: A comparative study.

Gutierrez, A., Kothari, A., Mazuera, C. & Schoenherr, T. (2020). Taking supplier collaboration to the next level. McKinsey. [online]. Available at: <https://www.mckinsey.com/business-functions/operations/our-insights/taking-supplier-collaboration-to-the-next-level> [Accessed 18 February 2021].

Halinen, A., & Törnroos, J. (2005). Using case methods in the study of contemporary business networks. *Journal of Business Research*, 58(9), 1285-1297.

Han, J. H. (2014). *Innovations in food packaging* (2nd ed.). Amsterdam: Elsevier.

Handfield, R. B., Ragatz, G. L., Petersen, K. J., & Monczka, R. M. (1999). Involving suppliers in new product development. *California Management Review*, 42(1), 59-82.

Handfield, R., Walton, S. V., Sroufe, R., & Melnyk, S. A. (2002). Applying environmental criteria to supplier assessment: A study in the application of the analytical hierarchy process. *European Journal of Operational Research*, 141(1), 70-87.

Hassini, E., Surti, C., & Searcy, C. (2012). A literature review and a case study of sustainable supply chains with a focus on metrics. *International Journal of Production Economics*, 140(1), 69-82.

Hellström, D., & Nilsson, F. (2011). Logistics-driven packaging innovation: A case study at IKEA. *International Journal of Retail & Distribution Management*, 39(9), 638 – 657.

Henderson, R. M., & Clark, K. B. (1990). Architectural innovation: The reconfiguration of existing product technologies and the failure of established firms. *Administrative Science Quarterly*, 9-30.

Hoegl, M., & Wagner, S. M. (2005). Buyer-supplier collaboration in product development projects. *Journal of Management*, 31(4), 530-548.

Hogarth-Scott, S. (1999). Retailer-supplier partnerships: Hostages to fortune or the way forward for the millennium? *British Food Journal*, 101(9), 668-682.

Hollos, D., Blome, C., & Foerstl, K. (2012). Does sustainable supplier co-operation affect performance? examining implications for the triple bottom line. *International Journal of Production Research*, 50(11), 2968-2986.

Horvath, L. (2001). Collaboration: The key to value creation in supply chain management. *Supply Chain Management: an international journal*, 6(5), 205-207.

Hult, G. T. M., Ketchen Jr, D. J., & Slater, S. F. (2004). Information processing, knowledge development, and strategic supply chain performance. *Academy of Management Journal*, 47(2), 241-253.

Inkpen, A. C. (1996). Creating knowledge through collaboration. *California Management Review*, 39(1), 123-140.

Järvensivu, T., & Törnroos, J. (2010). Case study research with moderate constructionism: Conceptualization and practical illustration. *Industrial Marketing Management*, 39(1), 100-108.

Johnsen, T. E. (2009). Supplier involvement in new product development and innovation: Taking stock and looking to the future. *Journal of Purchasing and Supply Management*, 15(3), 187-197.

Juntunen, J. K., Halme, M., Korsunova, A., & Rajala, R. (2019). Strategies for integrating stakeholders into sustainability innovation: A configurational perspective. *Journal of Product Innovation Management*, 36(3), 331-355.

Kähkönen, A. (2014). Conducting a case study in supply management. *Operations and Supply Chain Management: An International Journal*, 4(1), 31-41.

Kähkönen, A., & Lintukangas, K. (2012). The underlying potential of supply management in value creation. *Journal of Purchasing and Supply Management*, 18(2), 68-75.

Keränen, O., Komulainen, H., & Ulkuniemi, P. (2019). Restructuring value networks to enable sustainable innovations in food packaging plastic industry. In: 35th Annual IMP Conference. Paris.

Ketokivi, M., & Choi, T. (2014). Renaissance of case research as a scientific method. *Journal of Operations Management*, 32(5), 232-240.

Klassen, R. D., & Vereecke, A. (2012). Social issues in supply chains: Capabilities link responsibility, risk (opportunity), and performance. *International Journal of production economics*, 140(1), 103-115.

Kohlbacher, F. (2008). Knowledge-based new product development: Fostering innovation through knowledge co-creation. *International Journal of Technology Intelligence and Planning*, 4(3), 326-346.

Kotabe, M., Martin, X., & Domoto, H. (2003). Gaining from vertical partnerships: Knowledge transfer, relationship duration, and supplier performance improvement in the US and Japanese automotive industries. *Strategic Management Journal*, 24(4), 293-316.

Kotler, P., & Keller, K. L. (2016). *Marketing management* (15th ed.). Boston: Pearson.

Krause, D. R., & Ellram, L. M. (1997). Critical elements of supplier development the buying-firm perspective. *European Journal of Purchasing & Supply Management*, 3(1), 21-31.

Krause, D. R., Handfield, R. B., & Scannell, T. V. (1998). An empirical investigation of supplier development: Reactive and strategic processes. *Journal of Operations Management*, 17(1), 39-58.

Krishnan, R., Yen, P., Agarwal, R., Arshinder, K., & Bajada, C. (2021). Collaborative innovation and sustainability in the food supply chain-evidence from farmer producer organisations. *Resources, Conservation and Recycling*, 168, 105253.

Kuhl, M. R., Da Cunha, J. C., Maçaneiro, M. B., & Cunha, S. K. (2016). Relationship between innovation and sustainable performance. *International Journal of Innovation Management*, 20(06), 1650047.

Kuzma, E., Padilha, L. S., Sehnem, S., Julkovski, D. J., & Roman, D. J. (2020). The relationship between innovation and sustainability: A meta-analytic study. *Journal of Cleaner Production*, 259, 120745.

Lambert, D. M., Emmelhainz, M. A., & Gardner, J. T. (1996). Developing and implementing supply chain partnerships. *The International Journal of Logistics Management*, 7(2), 1-18.

Lavie, D. (2006). The competitive advantage of interconnected firms: An extension of the resource-based view. *Academy of Management Review*, 31(3), 638-658.

Lee, J., & Veloso, F. M. (2008). Interfirm innovation under uncertainty: Empirical evidence for strategic knowledge partitioning. *Journal of Product Innovation Management*, 25(5), 418-435.

Lee, K. H., & Kim, J. W. (2011). Integrating suppliers into green product innovation development: an empirical case study in the semiconductor industry. *Business Strategy and the Environment*, 20(8), 527-538.

Lee, K., & Min, B. (2015). Green R&D for eco-innovation and its impact on carbon emissions and firm performance. *Journal of Cleaner Production*, 108, 534-542.

Lee, S. Y., & Klassen, R. D. (2008). Drivers and enablers that foster environmental management capabilities in small-and medium-sized suppliers in supply chains. *Production and Operations management*, 17(6), 573-586.

- León-Bravo, V., Caniato, F., Caridi, M., & Johnsen, T. (2017). Collaboration for sustainability in the food supply chain: A multi-stage study in Italy. *Sustainability*, 9(7), 1253.
- Leuschner, R., Rogers, D. S., & Charvet, F. F. (2013). A Meta-Analysis of supply chain integration and firm performance. *The Journal of Supply Chain Management*, 49(2), 34-57.
- Lewis, J. D. (2002). *Partnerships for profit: Structuring and managing strategic alliances*. The Free Press. New York.
- Li, Y., & Vanhaverbeke, W. (2009). The effects of inter-industry and country difference in supplier relationships on pioneering innovations. *Technovation*, 29(12), 843-858.
- Licciardello, F. (2017). Packaging, blessing in disguise. review on its diverse contribution to food sustainability. *Trends in Food Science & Technology*, 65, 32-39.
- Littler, D., Leverick, F., & Wilson, D. (1998). Collaboration in new technology based product markets. *International Journal of Technology Management*, 15(1-2), 139-159.
- Luzzini, D., Amann, M., Caniato, F., Essig, M., & Ronchi, S. (2015). The path of innovation: Purchasing and supplier involvement into new product development. *Industrial Marketing Management*, 47, 109-120.
- Marsh, K., & Bugusu, B. (2007). Food packaging—roles, materials, and environmental issues. *Journal of Food Science*, 72(3), 39-55.
- Melander, L. (2017). Achieving sustainable development by collaborating in green product innovation. *Business strategy and the environment*, 26(8), 1095-1109.
- Meredith, J. (1998). Building operations management theory through case and field research. *Journal of Operations Management*, 16(4), 441-454.
- Michelino, F., Cammarano, A., Celone, A., & Caputo, M. (2019). The linkage between sustainability and innovation performance in IT hardware sector. *Sustainability*, 11(16), 4275.

Miemczyk, J., Johnsen, T. E., & Macquet, M. (2012). Sustainable purchasing and supply management: a structured literature review of definitions and measures at the dyad, chain and network levels. *Supply Chain Management: An International Journal*.

Min, S., Roath, A. S., Daugherty, P. J., Genchev, S. E., Chen, H., Arndt, A. D., & Richey, R. G. (2005). Supply chain collaboration: What's happening? *The International Journal of Logistics Management*, 16(2), 237-256.

Mohr, J., & Spekman, R. (1994). Characteristics of partnership success: Partnership attributes, communication behavior, and conflict resolution techniques. *Strategic Management Journal*, 15(2), 135-152.

Mota, B., Gomes, M. I., Carvalho, A., & Barbosa-Povoa, A. P. (2015). Towards supply chain sustainability: Economic, environmental and social design and planning. *Journal of Cleaner Production*, 105, 14-27.

Nidumolu, R., Prahalad, C. K., & Rangaswami, M. R. (2009). Why sustainability is now the key driver of innovation. *Harvard business review*, 87(9), 56-64.

Nyaga, G. N., Whipple, J. M., & Lynch, D. F. (2010). Examining supply chain relationships: Do buyer and supplier perspectives on collaborative relationships differ? *Journal of Operations Management*, 28(2), 101-114.

OECD (2005). *The Measurement of Scientific and Technological Activities: Guidelines for Collecting and Interpreting Innovation Data: Oslo Manual, Third Edition* prepared by the Working Party of National Experts on Scientific and Technology Indicators, OECD, Paris, para. 146.

Patrucco, A. S., Luzzini, D., & Ronchi, S. (2017). Achieving innovation through supplier collaboration: The role of the purchasing interface. *Business Process Management Journal*, 23(6), 1270-1289.

Pauer, E., Wohner, B., Heinrich, V., & Tacker, M. (2019). Assessing the environmental sustainability of food packaging: An extended life cycle assessment including packaging-related food losses and waste and circularity assessment. *Sustainability*, 11(3), 925.

Penka, A., & Schipper, K. (2017). Innovation in procurement: A new era of innovation in procurement process. Capgemini Consulting. [online]. Available at: https://www.capgemini.com/wp-content/uploads/2017/07/Innovation_in_Procurement.pdf [Accessed 19 April 2021].

Phillips, N., Lawrence, T. B., & Hardy, C. (2000). Inter-organizational collaboration and the dynamics of institutional fields. *Journal of Management Studies*, 37(1).

Porter, M. E., & Advantage, C. (1985). Creating and sustaining superior performance. *Competitive Advantage*, 167, 167-206.

Pujari, D. (2006). Eco-innovation and new product development: Understanding the influences on market performance. *Technovation*, 26(1), 76-85.

Pulles, N. J., Veldman, J., & Schiele, H. (2014). Identifying innovative suppliers in business networks: An empirical study. *Industrial Marketing Management*, 43(3), 409-418.

Ragatz, G. L., Handfield, R. B., & Scannell, T. V. (1997). Success factors for integrating suppliers into new product development. *Journal of Product Innovation Management: An International Publication of the Product Development & Management Association*, 14(3), 190-202.

Ragatz, Gary L., Handfield, Robert B. and Petersen, Kenneth J. (2002). Benefits associated with supplier integration into product development under conditions of technology uncertainty.

Ring, P. S., & Van de Ven, A. H. (1994). Developmental processes of cooperative interorganizational relationships. *Academy of Management Review*, 19(1), 90-118.

Rodriguez, M. A., Ricart, J. E., & Sanchez, P. (2002). Sustainable development and the sustainability of competitive advantage: A dynamic and sustainable view of the firm. *Creativity and Innovation Management*, 11(3), 135-146.

Rosell, D. T., & Lakemond, N. (2012). Collaborative innovation with suppliers: A conceptual model for characterising supplier contributions to NPD. *International Journal of Technology Intelligence and Planning*, 8(2), 197-214.

Rota, C., Reynolds, N., & Zanasi, C. (2013). Sustainable food supply chains: The role of collaboration and sustainable relationships. *International Journal of Business and Social Science*, 4(4)

Sahay, B. S. (2003). Supply chain collaboration: The key to value creation. *Work Study*, 52(2), 76-83.

Samaddar, S., & Kadiyala, S. S. (2006). An analysis of interorganizational resource sharing decisions in collaborative knowledge creation. *European Journal of Operational Research*, 170(1), 192-210.

Sarkis J., Cordeiro, J.J. & Vazquez Brust D.A. (2010). Facilitating Sustainable Innovation through Collaboration. In: Sarkis J., Cordeiro J., Vazquez Brust D. (eds) *Facilitating Sustainable Innovation through Collaboration*. Springer, Dordrecht.

Schiele, H. (2006). How to distinguish innovative suppliers? Identifying innovative suppliers as new task for purchasing. *Industrial Marketing Management*, 35(8), 925-935.

Schiele, H. (2012). Accessing supplier innovation by being their preferred customer. *Research-Technology Management*, 55(1), 44-50.

Scholten, K., & Schilder, S. (2015). The role of collaboration in supply chain resilience. *Supply Chain Management: An International Journal*, 20(4), 471-484.

Seuring, S. A. (2008). Assessing the rigor of case study research in supply chain management. *Supply Chain Management: An International Journal*, 13(2), 128-137.

Seuring, S., & Müller, M. (2008). From a literature review to a conceptual framework for sustainable supply chain management. *Journal of Cleaner Production*, 16(15), 1699-1710.

Seuring, S., Sarkis, J., Müller, M., & Rao, P. (2008). Sustainability and supply chain management – an introduction to the special issue. *Journal of Cleaner Production*, 16(15), 1545-1551.

Simatupang, T. M., Wright, A. C., & Sridharan, R. (2004). Applying the theory of constraints to supply chain collaboration. *Supply Chain Management: An International Journal*, 9(1).

Sobrero, M., & Roberts, E. B. (2001). The trade-off between efficiency and learning in interorganizational relationships for product development. *Management Science*, 47(4), 493-511.

Sobrero, M., & Roberts, E. B. (2002). Strategic management of supplier–manufacturer relations in new product development. *Research Policy*, 31(1), 159-182.

Soosay, C. A., Hyland, P. W., & Ferrer, M. (2008). Supply chain collaboration: Capabilities for continuous innovation. *Supply Chain Management: An International Journal*, 13(2), 160-169.

Spekman, R. E. (1988). Strategic supplier selection: Understanding long-term buyer relationships. *Business Horizons*, 31(4), 75-81.

Spekman, R. E., Kamauff, J. W., & Myhr, N. (1998). An empirical investigation into supply chain management: A perspective on partnerships. *Supply Chain Management: An International Journal*, 3(2), 53-67.

Stank, T. P., Daugherty, P. J., & Autry, C. W. (1999). Collaborative planning: Supporting automatic replenishment programs. *Supply Chain Management: An International Journal*, 4(2), 75-85.

Stank, T., Crum, M., & Arango, M. (1999). Benefits of interfirm coordination in food industry supply chains. *Journal of Business Logistics*, 20(2), 21.

Stuart, I., McCutcheon, D., Handfield, R., McLachlin, R., & Samson, D. (2002). Effective case research in operations management: a process perspective. *Journal of operations management*, 20(5), 419-433.

Su, Y., Tsang, E. W., & Peng, M. W. (2009). How do internal capabilities and external partnerships affect innovativeness? *Asia Pacific Journal of Management*, 26(2), 309-331.

Svanes, E., Vold, M., Møller, H., Pettersen, M. K., Larsen, H., & Hanssen, O. J. (2010). Sustainable packaging design: A holistic methodology for packaging design. *Packaging Technology and Science: An International Journal*, 23(3), 161-175.

Tan, K. C. (2001). A framework of supply chain management literature. *European Journal of Purchasing & Supply Management*, 7(1), 39-48.

Tassabehji, R., & Moorhouse, A. (2008). The changing role of procurement: Developing professional effectiveness. *Journal of Purchasing and Supply Management*, 14(1), 55-68.

Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal*, 18(7), 509-533.

Trienekens, J. H., Wognum, P. M., Beulens, A. J., & van der Vorst, J. G. (2012). Transparency in complex dynamic food supply chains. *Advanced Engineering Informatics*, 26(1), 55-65.

Tuomi, J., & Sarajärvi, A. (2018). *Laadullinen tutkimus ja sisällönanalyysi*. Helsinki: Tammi.

United Nations (2020). The 17 Goals. [online]. Available at: <https://sdgs.un.org/goals> [Accessed 1 April 2021].

Urbancova, H. (2013). Competitive advantage achievement through innovation and knowledge. *Journal of Competitiveness*, 5(1), 82-96.

Vachon, S., & Klassen, R. D. (2006). Extending green practices across the supply chain: The impact of upstream and downstream integration. *International Journal of Operations & Production Management*, 26(7), 795-821.

Vachon, S., & Klassen, R. D. (2008). Environmental management and manufacturing performance: The role of collaboration in the supply chain. *International Journal of Production Economics*, 111(2), 299-315.

Van de Vrande, V., De Jong, J. P., Vanhaverbeke, W., & De Rochemont, M. (2009). Open innovation in SMEs: Trends, motives and management challenges. *Technovation*, 29(6-7), 423-437.

Van Der Vorst, J.G.A.J., & Beulens, A. J. (2002). Identifying sources of uncertainty to generate supply chain redesign strategies. *International Journal of Physical Distribution & Logistics Management*, 32(6), 409-430.

Van Echtelt, F. E., Wynstra, F., Van Weele, A. J., & Duysters, G. (2008). Managing supplier involvement in new product development: A multiple-case study. *Journal of Product Innovation Management*, 25(2), 180-201.

Vereecke, A., & Muylle, S. (2006). Performance improvement through supply chain collaboration in Europe. *International Journal of Operations & Production Management*, 26(11), 1176-1198.

Vergheze, K., Lewis, H., Lockrey, S., & Williams, H. (2015). Packaging's role in minimizing food loss and waste across the supply chain. *Packaging Technology and Science*, 28(7), 603-620.

Von Corswant, F., & Tunälv, C. (2002). Coordinating customers and proactive suppliers: A case study of supplier collaboration in product development. *Journal of Engineering and Technology Management*, 19(3-4), 249-261.

Voss, C., Tsiriktsis, N., & Frohlich, M. (2002). Case research in operations management. *International Journal of Operations & Production Management*, 22(2), 195-219.

Wagner, S. M., & Hoegl, M. (2006). Involving suppliers in product development: Insights from R&D directors and project managers. *Industrial Marketing Management*, 35(8), 936-943.

Wernerfelt, B. (1984). A resource-based view of the firm. *Strategic Management Journal*, 5(2), 171-180.

Wheelwright, S. C., & Clark, K. B. (1992). Creating project plans to focus product development. *Harvard Business Review*, 70-82.

Wiengarten, F., Pagell, M., & Fynes, B. (2012). Supply chain environmental investments in dynamic industries: Comparing investment and performance differences with static industries. *International Journal of Production Economics*, 135(2), 541-551.

Williamson, O. E. (1975). *Markets and hierarchies: analysis and antitrust implications: a study in the economics of internal organization*. University of Illinois at Urbana-Champaign's Academy for Entrepreneurial Leadership Historical Research Reference in Entrepreneurship.

Williamson, O. E. (1979). Transaction-cost economics: The governance of contractual relations. *The Journal of Law and Economics*, 22(2), 233-261.

Wilson, E. J., & Vlosky, R. P. (1997). Partnering relationship activities: Building theory from case study research. *Journal of Business Research*, 39(1), 59-70.

Wynstra, F., van Weele, A., & Weggemann, M. (2001). Managing supplier involvement in product development: Three critical issues. *European Management Journal*, 19(2), 157-167.

Yin, R.K. (2009). *Case study research: design and methods*. 4. ed. Thousand Oaks: SAGE

Zainal, Z. (2007). Case study as a research method. *Jurnal Kemanusiaan*, 5(1).

Zecca, F., & Rastorgueva, N. (2014). Supply chain management and sustainability in agri-food system: Italian evidence. *Journal of Nutritional Ecology and Food Research*, 2(1), 20-28.

APPENDICES

Appendix 1. Interview questions

Background:

1. What is your position in the company?
2. What are your main responsibilities?

Question for supplier company only

Question for buyer company only

Sustainability in food supply chains

3. How important is sustainability in your company? How do you take it into account in your procurement activities?
4. How do you take sustainability into account when sourcing for packaging materials for food products? Are there some specific practices?
5. What are the motives for enhancing sustainability in food supply chains in general and where do they stem from?
6. How does food packaging affect sustainability?

Collaborative innovation

7. What do you think buyer-supplier collaboration is?
8. What are the motives for collaboration in general? What about in the contexts of sustainability and innovation?
9. What kinds of customers/suppliers do you collaborate with in innovation regarding food packaging products? How closely and to what extent?
10. In what concrete ways can a packaging supplier contribute to innovation for more sustainable packaging?
11. What kinds of practices does your purchasing department use to enable collaboration with packaging supplier(s) and ensure their involvement in innovation?
12. What benefits have resulted from collaborative innovation for your company? What about negative effects?
13. Has taking part in collaborative innovation projects enhanced sustainability in your company? If yes, in what specific ways?

14. How do you measure or keep track of the benefits?
15. Would you say that generally your capabilities and know-how (as a supplier/buyer) are utilized enough in collaborative innovation? If not, explain why you think so.
16. Can you give an example of an on-going or a past collaborative innovation project that you have been involved in?
17. What are the challenges related to such projects? How have/would you overcome these challenges?
18. Which functions/departments or individuals (both internal and those of the other party) do you think have the most critical roles in a collaborative innovation project for its success?