

**Sub-supplier management - developing lower-tier suppliers
through sub-supplier specific investments**

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The President:

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Vorwort

Die vorliegende Dissertation entstand als Resultat meiner Forschungstätigkeit am Institut für Supply Chain Management zwischen September 2015 bis April 2019. Während meiner Tätigkeit am Institut durfte ich über die gesamte Zeit ein Innosuisse Forschungsprojekt und ein SNF Forschungsprojekt zum Thema «Management von Vorlieferanten» begleiten. Die Thematik die Lieferkette aus Sicht des einkaufenden Unternehmens vor dem direkten Lieferanten zu bearbeiten hat mich von Anfang an begeistert und die Begeisterung hat auch nach über 3 Jahren Forschung nicht nachgelassen. Obgleich bereits das Thema dazu beigetragen hat, dass ich mich in der Zeit immer wieder gerne mit meiner Dissertation auseinandergesetzt habe, wäre die Fertigstellung nicht ohne Beistand gelungen.

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Summary

Cooperation between buyer, supplier and sub-supplier is increasing due to a production of goods and services that spans across the globe (Gunasekaran et al., 2004). Through this changes 80% of supply chain failures or problems are caused beyond the direct supplier today. As failures in the supply chain are expensive and buying firms are hold accountable for the performance of the entire supply chain, buyer started to reach out beyond their direct supplier to implement management approaches down the supply chain. This is driven by the aim to increase efficiency, decrease risks and generate compliance with set sustainable standards. The trend of working together is expected to continue in the future. One of the observed management tools from buying firms are placing specific investments by the buyer in the sub-supplier to develop the sub-supplier. The present thesis focuses on sub-supplier specific investments as management tool in the context of sub-supplier management. It sheds light on the characteristics of sub-supplier specific investments, as well as on reasons and motivations. Furthermore it describes applicable interaction types in the triad, describes various sub-supplier specific investments and presents safeguarding mechanisms for sub-supplier specific investments. Additionally the thesis discloses barriers of sub-supplier specific investments, gives insights into risk consideration and offers implementation support for buyers that consider sub-supplier specific investments. The theoretical basis for the thesis lies upon agency theory, contingency theory, relational exchange theory and stakeholder theory. The empirical research, that included 5 case studies with

different companies, reveals that sub-supplier specific investments are either placed incident driven or pro-active by the buyer and are executed with 8 different interaction types. The motivations are inter alia an increase of quality, a decrease of costs, gain access to innovation or secure long-term availability of products. Depending on the interaction type, a contract or a trustful relationship is applied to safeguard the specific investments. Trust also helps to reduce barriers that could hinder sub-supplier specific investments. In summary, the thesis supports buyers that consider sub-supplier specific investments as management tool and provides them with a concept of placing sub-supplier specific investments that can easily be adapted by buying companies.

Zusammenfassung

Heutzutage findet über 70% der Wertschöpfung in der Lieferkette hinter den direkten Lieferanten statt. So werden 80% der Ausfälle oder Probleme in der Lieferkette nach den direkten Lieferanten verursacht. Da Ausfälle in der Lieferkette teuer sind und Unternehmen für die Performance der gesamten Lieferkette verantwortlich gemacht werden, haben Unternehmen damit begonnen, die Lieferkette hinter ihren Direktlieferanten zu bearbeiten. Dadurch erhoffen sie sich, die Effizienz der Lieferkette zu steigern und Risiken entlang der Lieferkette zu minimieren. Eines der beobachteten Management Tools zur Entwicklung der Vorlieferanten sind spezifische Investitionen in den Vorlieferanten von Seitens der Unternehmen. Die vorliegende Arbeit konzentriert sich auf dieses Management Tool. Es beleuchtet die Merkmale der spezifischen Investitionen in den Vorlieferanten, sowie die Gründe und Motivationen dafür. Darüber hinaus liefert die Arbeit Antworten, in welcher Art man mit den Vorlieferanten agieren kann, welche Investitionen in den Vorlieferanten getroffen werden können und wie diese Investments abgesichert werden können. Zusätzlich beleuchtet die Arbeit mögliche Barrieren bei der Umsetzung von Investitionen in den Vorlieferanten und führt sie in einem Konzept zusammen. Die theoretische Grundlage der Arbeit liefert die Agency Theorie, die Contingency Theorie, die Relational-Exchange Theorie und die Stakeholder Theorie. Die empirische Untersuchung, die 5 Fallstudien mit verschiedenen Unternehmen umfasste, zeigt, dass Unternehmen entweder durch einen Vorfall oder proaktiv, Investitionen in den Vorlieferanten tätigen. Die

empirische Arbeit hat acht Interaktionstypen identifiziert und verschiedene Motivationen herausgearbeitet, wie z.B. Qualitätssteigerung in der Lieferkette oder Zugang zu Innovationen beim Vorlieferanten, die Unternehmen dazu bewegen Investitionen in den Vorlieferanten zu tätigen. Verträge und Vertrauen helfen dabei, die Investitionen abzusichern und Barrieren abzubauen. Zusammenfassend unterstützt die Arbeit Unternehmen, die planen Investitionen in den Vorlieferanten zu tätigen und bietet Ihnen ein Konzept zur Planung der Umsetzung, die von Unternehmen leicht angewendet werden kann.

1 Introduction to the research of sub-supplier specific investments

1.1 Managerial relevance

The inter-organizational cooperation between buyer, supplier and sub-supplier is increasing due to a production of goods and services that spans across the globe (Gunasekaran et al., 2004). This goes so far, that over 70% of value in the supply chain is created beyond the direct supplier (Backhaus & Voeth, 2010). Suppliers and sub-suppliers are distributed across the globe, making supply chains highly complex (Grimm et al., 2014). As the trend of outsourcing continues to increase steadily and a concomitant shift in value creation downstream the supply chain rises, the responsibility of sub-suppliers to deliver the right quality of products increases (Choi & Linton, 2011). Thus, according to Dyer and Singh (1998), the “explosion in alliances” (p.661) increases the importance of alliances in networks and hence deserves more research attention. While research on supply chain alliances focuses on the relation between buyer and direct supplier, it is worthwhile to shed more light on the phenomenon of the triadic relation between buyer, supplier and sub-supplier (McCarter & Northcraft, 2007). Hence, research is needed to provide insights like that to buyers today who do not have a clear picture of managing their supply chain beyond the direct supplier (Meinlschmidt et al., 2017). The first reason for the lack of a clear picture of the supply chain is that the buyer usually has no contact or interaction with the sub-suppliers, resulting in a shift in value creation that causes downfalls and bottlenecks in the supply chain beyond the direct supplier.

(Grimm et al., 2014). The second reason for firms becoming interested in managing the upstream supply chain is that today suppliers, upstream the direct supplier, cause over 80% of the problems arising in the supply chain (Hauf, 2012¹; Denning, 2013). Problems range from product fraud to quality problems to sustainability or compliance violations (Smith, 2001; Grimm et al., 2014). Although most of the incidents in the supply chain have their origin beyond the buyer's firm, stakeholders of the buyer (mostly customers or end consumers) have started to generate pressure on buying firms and hold them accountable for failures in the supply chain (Mena et al., 2013; Hartmann & Moeller, 2014). They demand that the buyer control the entire process of the production of a product and guarantee that its guidelines or codes of conduct be executed along the entire supply chain (Dou et al., 2018; Mentzer et al., 2008). Stakeholders include employees, suppliers, end consumers, governments and non-profit organizations (NGOs).

As outlined above, many firms have begun to understand the importance of managing sub-suppliers and have thus started becoming actively involved with the lower-tier suppliers, whether reactively or proactively (Hofmann et al., 2015). To fulfill the various stakeholder expectations of a transparent supply chain, buyers reach out, beyond their first-tier suppliers to implement numerous approaches to manage the supply chain (Awaysheh & Klassen, 2010; Burkhardt, 2018). Reasons for that are manifold. Buyers want to decrease possible pitfalls in their supply chain, e.g. assure product availability, increase product quality, put pressure on production costs or get access to innovation (MacCarthy &

¹ Interview LOG-Kompass (2012). R. Kümmelen with Dr. Hauf (AUDI AG).

Jayarathne, 2012; Burkhardt, 2018). For these reasons, the trend of working together along the supply chain is expected to continue in the future (Choi & Linton, 2011). This is not dependent on size or the specificity of an industry as the importance of becoming involved beyond the direct supplier is acknowledged across industries (Tse & Tan, 2010).

In practice, buyers approach their sub-suppliers in various ways. Among the approaches observed during this empirical research, sub-supplier integration, sub-supplier strategy alignment and sub-supplier development are the most common. Sub-supplier integration involves the active integration of sub-supplier activities or responsibilities in the processes of the buyer (Hofstetter, 2016), for example, the adaption of system designs or a collaborative development across firm boundaries (Hofstetter, 2016). Sub-supplier strategy alignment refers to the alignment of sub-supplier objectives with those of the buying firm (Hofstetter, 2016). Tools to manage this are the communication of the company strategy down the supply chain (Hofstetter, 2016). Sub-supplier development pertains to the development of sub-suppliers by building relationships with them through cooperation or by applying management tools in order to develop the sub-suppliers (Hofstetter, 2016). One management tool that is increasingly being considered and employed by buyers in the context of sub-supplier development or sub-supplier strategy alignment involves sub-supplier specific investments.

Specific investments are a core concept of the transaction cost theory (Williamson, 1985). They are characterized by the non-recoverable expenditures that a firm makes to support another specific firm and that cannot

be reassigned to an alternative use (Williamson, 1985). In the relationship between buyer and supplier, specific investments are one of the key components for improving existing relationships with business partners, creating networks or strategic alliances, and enhancing business performance (Kwon, 2011). In the context of sub-supplier management, the buyer places specific investments in his sub-suppliers. Just as specific investments between buyer and supplier, they are a form of relationship-specific investment, making them unilateral and difficult to transfer to other relationships (Kang et al., 2009, Wagner & Bode, 2013).

The triadic context makes placing sub-supplier specific investments more challenging as buyer and sub-supplier usually have no contact with one another, increasing the risk of generating sunk costs (Grimm et al., 2014). In fact, the role of the supplier in the triad includes the communication to the buyer and to his own supplier (the buyer's sub-supplier) (Wilhelm et al., 2016a). Thus, within this triadic relation, the supplier acts as the middleman that connects both buyer and sub-supplier (Wilhelm et al., 2016a). Consequently, when buyers consider sub-supplier specific investments in the triad, they face more difficulties than in the dyad and they are often dependent on the direct supplier for support (Grimm et al., 2013; Wilhelm et al., 2016a). The contact between buyer and sub-suppliers usually does not exist, making the identification of and interaction with sub-suppliers by the buyers for placing sub-supplier specific investments challenging (Norrmann & Jansson, 2004). Having the suppliers as support in identifying the key sub-suppliers and as the middleman in communication in the triad has proven to be helpful for the buyer (Grimm et al., 2013). Hence, the

buyer has to consider the role and the relationship he has with his direct supplier before he can think about placing sub-supplier specific investments.

The buyer is confronted with, *inter alia*, the questions such as “Which of my direct suppliers do I have the closest contact with?”, “Who are my strategic suppliers?”, “Who are my sub-suppliers?”, “Where are my sub-suppliers located?” and “Which sub-suppliers require development?” As mentioned before, the buyer’s relationship with his direct supplier affects the possible interaction types in the triad. Within this setting, suppliers take on a significant role for the success of specific investments in sub-suppliers (Wilhelm et al. 2016a).

On the one hand, direct suppliers can provide support when buyers decide to place sub-supplier specific investments (e.g. failure at a lower-tier level that cannot be solved by the direct supplier alone) (Wilhelm et al., 2016a). In cases where the buyer has no knowledge of his sub-suppliers, only the direct supplier can provide the names of the sub-supplier and support buyers with approaches to contacting them (Giunipero & Eltantawy, 2003). Furthermore, the suppliers have records and information about the performance of their sub-suppliers, supporting buyers’ considerations regarding which investments would be useful in certain situations (Fawcett et al., 2008). Moreover, suppliers can advise buyers about the sub-suppliers that they work well with, increasing the effect of sub-supplier specific investments (Fawcett et al., 2008).

On the other hand, first-tier suppliers can be very powerful if they disapprove of investments by the buyer in the sub-supplier and can try to hinder contact between buyer and sub-supplier (Grimm et al., 2014). Suppliers might fear that

the buyer will replace them if the buyer directly interacts with the sub-supplier. One reaction might be a refusal to disclose their suppliers or to collaborate with the buyer (Grimm et al., 2014). If the buyer knows who the sub-supplier is and has already invested in the sub-supplier, suppliers can terminate the relationship with the buyer – or with their direct supplier (the buyer's sub-supplier), thus making already executed sub-supplier specific investments of the buyer worthless and hence creating sunk costs (Williamson, 1985).

If the question of identifying the sub-supplier from the buyer's side is solved, the buyer is confronted with the question of the type of interaction with his sub-supplier. The empirical research conducted in this study has shown that choosing a type of interaction is highly dependent on the relationship between buyer – supplier – sub-supplier and also on the circumstances that lead to the specific investment. Is the investment a reaction to an incident or is the buyer following a proactive approach to developing his sub-suppliers? If the buyer decides to proactively develop his sub-suppliers, he is confronted with the question of which sub-suppliers he should choose from. After gathering information on possible sub-suppliers to develop, the buyer has to decide on the type of interaction in the triad. He has to decide whether he will interact directly with the sub-supplier or include the supplier when planning sub-supplier specific investments. Finding a suitable type of interaction is challenging. Direct contracts between buyer and sub-supplier are nonexistent and long-term relationships are mostly lacking (Grimm et al., 2014). Furthermore, sub-suppliers are often located far from the buyer at other points around the globe, which may result in language and cultural barriers that increase difficulties in

placing sub-supplier specific investments (Wilhelm et al., 2016b). If the form of interaction is defined, the buyer is confronted with the question of what he could invest in his sub-supplier.

The following examples from practice demonstrate in a nutshell the challenges a buyer is confronted with when deciding to place sub-supplier specific investments. Each of the companies placed sub-supplier specific investments, be they incident driven or proactive, to improve the performance of the sub-supplier in the supply chain.

Incident-driven sub-supplier specific investments from practice

An incident in the aviation supply chain forced Boeing, an aircraft manufacturer, to become engaged in sub-supplier management. Procurement in the aviation industry is highly regulated. Purchasing departments are active in global supply chains, rely on single source suppliers that can be described as monopolist. Comparable to train manufacturing, product cycles are long and demands on product safety and quality are high. Boeing experienced that these demands can be difficult. They relied strongly on their direct suppliers to pass on standards and requirements in the supply chain. However, this resulted in several incidents up the supply chain, concerning burning batteries in 2013. The US National Transportation Board found that the failings of the battery production were caused at sub-supplier level, which forced Boeing to provide expensive support at the sub-supplier to solve the issue. Boeing send out engineers to the sub-suppliers at second- and third-tier level. Hence, Boeing started to place sub-supplier specific investments in form of man power, trainings, transferred knowledge and provided tools to overcome the difficult situation at the sub-

supplier level (Denning, 2013). After the supply chain was secured again, Boeing began an expensive redesign of their sub-assembly structure.²

Another example of incident driven sub-supplier specific investments can be found at Ericsson, a former producer of mobile phones. They faced a severe failure at sub-supplier level when one of their sub-suppliers was not able to deliver microchips, after its production plant had been destroyed in a fire (Norrmann & Jansson, 2004). Ericsson had to start supporting the sub-supplier with specific investments by providing machines and monetary subsidies to get production restarted at the sub-supplier, because their direct supplier was not able to cover the investments. After this incident, Ericsson changed its incident-driven management practices to a proactive approach that included mapping their supply chain and identifying various supply chain risks in order to categorize them e.g. country risks of sub-suppliers, financial risks at sub-supplier level (Norrmann & Jansson, 2004). That provided the impetus for Ericsson to include their identified risk sub-suppliers in their normal management routine. They started visiting lower-level suppliers and providing them with trainings and hence, installed pro-active sub-supplier management. Next to Ericsson, the researcher found several other companies that already execute pro-active sub-supplier specific investments. In the following, some of these examples are presented.

² If this topic is of further interest, the following article can be recommended: “Challenges of sub-supplier management – from a cross industry perspective”, Burkhardt & Stölzle, 2017.

Proactive sub-supplier specific investments from practice

Nestlé, one of the biggest food producers in the world, has already become proactively involved in managing the supply chain beyond their direct suppliers. Nestlé has put a strong focus on reaching out to their raw material producers, which are spread across the globe, to guarantee the long-term availability of products, the product right quality as well as fair working and sustainable conditions for producers in the production process³. One of Nestlé's projects is the development of coffee plantations in Ivory Coast or in the Philippines with sub-supplier specific investments. Initially, Nestlé had to attain actor-specific transparency in their supply chain by identifying from which farmers they actually purchase their coffee beans. After the initial identification, Nestlé was able to directly contact the raw material producers (coffee bean farmers). In order to ensure availability, quality level and guarantee fair working conditions actively, Nestlé concentrated on the transferring of knowledge, provision of equipment, and training of farmers in growing and maintaining coffee beans. In doing so, Nestlé placed sub-supplier specific investments in the identified farmers. These direct investments in the coffee bean producers was possible only because the direct suppliers revealed the identity of their suppliers to Nestlé.

³ The paragraph about Nestlé used information retrieved from sources that have been provided by Nestlé on their website: Nestlé in society. Creating Shared Value and meeting our commitments 2016. Full report, 2017 (https://www.nestle.com/assets/library/documents/library/documents/corporate_social_responsibility/nestle-in-society-summary-report-2016-en.pdf)

Another example of proactive sub-supplier specific investments can be found at the company Coop. The Swiss retailer engaged proactively in managing their supply chain beyond the first tier through sub-supplier specific investments. The Swiss retailer uses this proactive approach in the company's food, as well as the non-food sector of the company. The following example highlights an approach from the food sector. Procurement in Coop's food sector is often composed of global and local supply chains that must be managed equally. Coop wanted to guarantee the sustainable production of oranges for its organic orange juice brand Naturaplan. Similarly to Nestlé, Coop was at first confronted with the challenge of identifying their sub-suppliers. By mapping their supply chain beyond the direct supplier, Coop was able to identify their sub-suppliers and supply regions. The first insight for Coop was that they partially source from a region that was internally rated as "unfavorable to source". As a result, Coop was able to redesign the supply chain of oranges, substitute sub-suppliers they did not find suitable, and stabilize the existing relationships in the supply chain through sub-supplier specific investments. They identified the producers of oranges in Brazil through their direct supplier in Switzerland. The supplier in Switzerland (a bottling plant) is irreplaceable in the production process of orange juice and therefore agreed to reveal its suppliers and also agreed that Coop approaches the producers directly. Coop invested in training and built long-term relationships with farmers that produce oranges in Brazil to guarantee the availability of organically produced oranges for their organic orange juice brand (Workshop with Coop, Basel, 2016). The sub-supplier specific investments were used to stabilize the relationship and guarantee long-term

access to organic oranges of the right quality produced under sustainable conditions. In addition to an increased product quality and improved sustainable conditions, Coop also got insights into the price composition, which allowed long-term price negotiations.

As demonstrated by these examples, sub-supplier specific investments are already used in triadic relationships in practice. They are necessary to the development of sub-suppliers and are commonly used to, e.g., guarantee availability of products, and gain insight into the cost structure of products or insurance of sustainable production along the supply chain. Placing sub-supplier specific investments come with challenges. As previously stated, specific investments are not re-deployable and cannot be used in any other transactions (Morrill & Morrill, 2003). This is also applicable for sub-supplier specific investments. Furthermore, the execution of specific investments comes with transaction cost that are composed through coordination costs and risks of the transaction (Williamson, 1975). This applies as well in triadic relationships. The previous stated challenges are already known in dyadic relationships and are also present in triadic relationships. Additional to the existing challenges in the dyad, a triadic relationship is always confronted with three participating partners that have different power positions and interests in the supply chain. The risks involved in placing sub-supplier specific investments in the triad include a replacement of the sub-supplier by the supplier or the sub-supplier ending the relationship with the direct supplier, both of which make a specific investment in the sub-supplier from the buyer worthless. Furthermore, the sub-supplier could use the specific investment to improve relationships to his other suppliers

(misuse of the specific investments). Transaction cost risks are increasing in a triadic relationship as the formal safeguard of a contract as risk mitigation is not present between the buyer and the sub-supplier.

Summarizing the managerial relevance of the topic, it can be stated that the newly generated interest in managing the supply chain beyond the direct supplier with sub-supplier specific investments stems from the aim of the buyer to increase quality, guarantee availability of products, gain access to innovation and obtain insights into the cost structure of his products (Grimm et al., 2014). However, an obstacle is that the sub-suppliers are usually unknown and therefore a direct relation between buyer and sub-supplier is non-existent (Wilhelm et al., 2016b). When contacting the sub-supplier, buyers have to be aware that they do not have legal contracts with the sub-supplier (Choi & Linton, 2011). Furthermore, the management tool of sub-supplier specific investments is rather new. Thus, buyers are faced with uncertainty regarding which investments in the sub-suppliers are sufficient for their specific purposes and goals as well as which safeguards to use when making use of specific investments. Following, the demonstration of the managerial relevance of the topic, the present thesis continues with outlining the theoretical relevance of the topic.

1.2 Theoretical relevance

Investigating the management of supply chains reveals that the predominant focus of the present research lies on investigating dyadic interaction in the supply chain. Since research concentrates on specific investments, there is an

immense gap in the literature, as no research to date has tackled the topic of sub-supplier specific investments by the buyer. Although research in managing the direct supplier (or dyadic relationships in general) through the placement of specific investments is investigated in depth in research, the motivations, antecedents, applicable triadic interaction types, types of investments or safeguards for triadic interactions are lacking in the scientific context. This is astonishing as the prerequisites in the triad are very different and much more complex than in a dyadic relationship. Hence, whether the existing body of knowledge on dyadic specific investments can also be applied in the triadic concept is at this point doubtful.

1.2.1. Research fields

Included in the scope of this thesis is gaining an understanding of why and how buyers place sub-supplier specific investments and how they establish safeguards for their specific investments. Therefore, the existing literature on placing specific investments (De Vita et al., 2011; Gelei & Kenesei, 2016; Bensaou & Anderson, 1999; Ebers & Semrau, 2015), as well as the literature on safeguarding specific investments has to be considered (Dyer & Singh, 1998; Jap & Ganesan, 2000; Subramani & Venkatraman, 2003). Furthermore, research streams such as multi-tier management (Mena et al., 2013; Wilhelm et al., 2016a & b), management of supply chain alliances (Monczka et al., 1998) and supply networks (Harland, 1996; Yan et al., 2015) have to be investigated. Alongside the approach of placing sub-supplier specific investments, there exist other possibilities for developing the sub-supplier that will not be discussed here as

such a discussion would exceed the scope of the dissertation. Nevertheless, the author is aware that other sub-supplier development tools exist.⁴ Following the research call from Hofstetter (2016) to provide greater depth to his proposed sub-supplier management framework, the author concentrated on the process of sub-supplier development, and within the sub-supplier development, the author chose the management tool “sub-supplier specific investments” placed in the sub-supplier by the buying firm.

1.2.2. State of research and research gaps

The phenomenon of managing the supply chain beyond the direct supplier is known in practice and implemented in many firms. As Hofstetter (2016) stated, sub-supplier development will enable sub-suppliers to achieve targeted performance (Krause et al., 2007). The core element is the improvement of capabilities and resources that are suitable for the business relationship (Hofstetter, 2016). It is possible that the buyer and intermediate supplier may actively engage in collaboratively helping each other with sub-supplier development (Wagner, 2010). However, practice shows that most buyers have applied the management of the sub-suppliers and sub-supplier specific investments without a clear approach in the past. Buyers that want to become involved in sub-supplier management (incident driven or proactive) are lacking in knowledge about executing sub-supplier specific investments. Some researchers have started to develop frameworks for a triadic interaction in the supply chain (Hofstetter, 2016; Tachizawa & Wong, 2014; Mena et al., 2013).

⁴ As drawn from the research in the dyadic relationships: Krause, 1997; Dalvi & Kant, 2015

However, only Hofstetter (2016) and Tachizawa & Wong (2014) address the triadic supply chain “buyer – supplier – sub-supplier” in their research. Mena et al. (2013) concentrate on the triadic relationship between one buyer and two direct suppliers.

Other researchers have addressed the management of the supply chain through the lens of the supply chain network perspective (Harland, 1996; Cooper et al., 1997; Yan et al., 2015). Nevertheless, research on actually managing the triad buyer – supplier – sub-supplier is sparse and the proposed frameworks by Hofstetter (2016) and Tachizwaw and Wong (2014) are not yet well established. They both propose interaction types to deal with sub-supplies from a buyer’s perspective; however, both lack a deep dive into the interaction types and an explanation of how tools, e.g., sub-supplier development, sub-supplier integration, sub-supplier strategy alignment, can be executed. Both research papers call for further research in this area. Some papers provide initial investigations into the field of sub-supplier specific investments. Kim, Park and Ryu (2017) investigated whether the development of sub-suppliers by the buyer through sub-supplier specific investments positively impacts the performance of the direct supplier. However, they failed to provide an overview of placing sub-supplier specific investments as buying company, e.g. which interaction types are applicable, which types of investments can be executed, how can these investments be safeguarded. Gelei and Kenesei (2016) investigate the effect of specific investments in the triad on supply chain performance; however, the triad investigated is that between supplier – buyer – customer, and hence, has another focus.

Other researchers have put their research focus on managing dyadic relationships in the supply chain or executing specific investments in the dyad (Ebers & Semrau, 2015; Kang et al., 2009; Wagner & Bode, 2014). When research expanded the management of the supply chain beyond the dyad, it was triggered by the attempt to be able to implement existing sustainability guidelines down the supply chain, e.g., through identifying critical factors for successful sustainable sub-supplier management (Grimm et al., 2013, 2014; Meinlschmidt et al., 2017; Wilhelm et al., 2016a; Mena et al., 2013; Wichmann et al., 2016). Consequently, research is lacking a deeper explanation of the proposed processes and cannot give recommendations for practitioners' actions. Carter, Rogers & Choi (2015) argue that the perspective on supply chains within research is "oversimplified" (dyadic view) or too complex, meaning it is too far away from reality. As Wichmann et al. (2016) stated, supply chain management research needs further research beyond the dyad of buyer and supplier. It is the author's opinion that the literature lacks in particular research that concentrates on recommendations for actions and deepening the provided processes of sub-supplier management. Although processes have been developed by Hofstetter (2016) and he has addressed sub-supplier specific investments as a management tool, the research on how these sub-supplier specific investments can be applied is lacking in the existing literature. The literature review and research analysis conducted in this study derives the following research gaps from literature:

Research gap 1:

The literature lacks in providing an implementation guideline for placing sub-supplier specific investments that can be applied by companies that want to start

using sub-supplier specific investments, be they incident driven or proactive. A buyer would find no suggestions for and no approach to making use of sub-supplier specific investments.

Research gap 2:

The literature does not offer insights about the phenomenon in practice that firms are executing sub-supplier specific investments. The literature lacks in providing antecedents or motivations that lead companies to the process of executing sub-supplier specific investments.

Research gap 3:

The literature lacks in providing an exhaustive overview of interaction types that are applicable for buyers when making use of sub-supplier specific investments.

Research gap 4:

The literature lacks in providing an overview of investments that are used in the triad. The literature on the various specific investment types only concentrates on investments that are applied in the dyad (De Vita et al., 2011). Therefore, an investigation would help to answer the question regarding which types of investments are the most promising in the triad and in the setting between buyer and sub-supplier.

Research gap 5:

The literature that describes safeguards for specific investments solely concentrates on safeguards that are effective in the dyadic setting (Heide & John,

1988; Poppo & Zenger, 2002). This includes the formal and informal safeguards that can be found in the literature. It is vital that research provide answers and possible safeguarding mechanisms that support firms that decide to place sub-supplier specific investments in the triad.

1.3 Research scope, objective and research questions

The following section will define the research scope and objective of the present thesis as well as the derived research questions. The focus of analysis is the triadic supply chain formed by buyer, supplier and sub-supplier. Specific investments placed by the buyer in the sub-supplier and their concomitant safeguards are the unit of analysis.

1.3.1. Research scope

The dissertation project contributes to research in supply chain and operations management. The basic unit of analysis is the triadic supply chain starting from the buying company (the buyer) down to its sub-supplier. The thesis uses the triad displayed in *Figure 1* buyer – supplier (tier-1) – sub-supplier (tier-2) as the object of study and as the basis for the concept, although the author is well aware that sub-supplier management could also be performed at the tier-3 level down to the tier-n level.

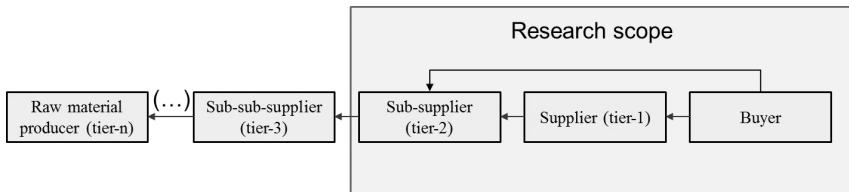


Figure 1: The triad – the basic unit of analysis for this thesis

As presented in *Figure 1*, the topic of placing sub-supplier specific investments is examined through the perspective of the buying company. The thesis applies the lens of a buying company seeking to explore its options regarding placing sub-supplier specific investments as a management tool in the process of developing their sub-suppliers (either incident driven or proactive). The author is aware that a buying company can have varying roles in a supply chain (Lambert & Cooper, 2000). A buying company can simultaneously fulfill the role of a buyer in one supply chain and be a supplier in another supply chain. One example would be the company BASF. BASF can act as the buying company and can, in the role of the buying company, execute sub-supplier specific investments, although if expanding the view to the entire supply chain, BASF acts as supplier (tier-1) for various firms. As outlined in *Figure 2* the research scope concentrates on BASF in the role of the buying company, with their respective supplier and sub-supplier.

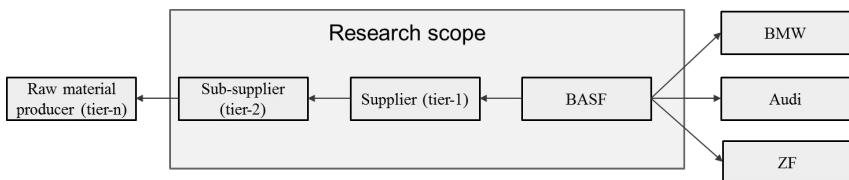


Figure 2: The triad – illustrating various roles of BASF in the supply chain

Furthermore, the thesis assumes that sub-supplier specific investments are only performed for external firms and not within firms, e.g., for subsidiary companies. The buying company is seen as an entire entity, not a single person, and not specified to the procurement or logistics department, although it is likely that decisions regarding investments in the sub-supplier are made by the procurement, the quality, and the sustainability departments or in board meetings. One challenge in the context of placing sub-supplier specific investments in the triad and in the supply chain in general is that companies in a supply chain are usually participating in multiple supply chains (Stölzle & Bachmann, 2006). This phenomenon is referred to as multiple membership (Stölzle & Bachmann, 2006). Multiple memberships of companies increase complexity and lead to conflicts between supply chain partners (Stölzle & Halsband, 2005). The research in supply chain management highlights that suppliers are often members in competing supply chains, as “it would be rare for a firm to participate in only one supply chain” (Lambert & Cooper, 2000, p.69). This phenomenon is transferable for sub-suppliers, as a supply chain is a “network of multiple businesses and relationships” (Lambert & Cooper, 2000, p.65). Often key sub-suppliers deliver their products to various suppliers (Yan

et al., 2015). Nevertheless, the empirical research in this study and the literature review revealed that buyers continue to manage their direct suppliers or their sub-suppliers, knowing that their development activities are also benefitting their competing firms (Bechtel & Jayaram, 1997; Lambert et al., 1996). The complexity of multiple supply chain memberships is illustrated in *Figure 3*.

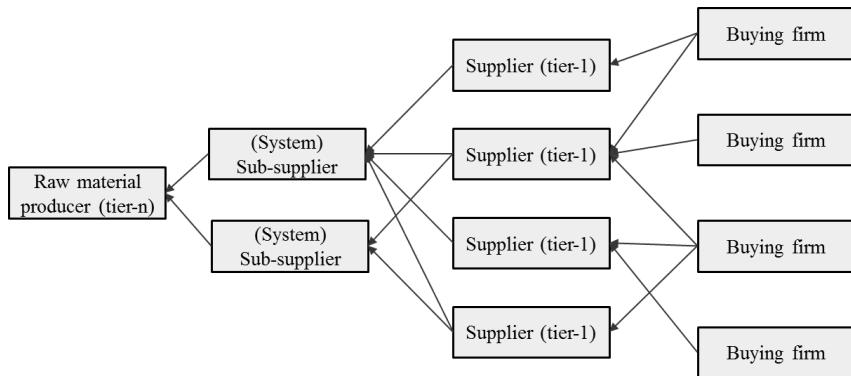


Figure 3: Illustration of multiple memberships in the supply chain

To master the increased complexity and develop solutions for problems within this phenomenon, business studies usually develop reference models or concepts that help to reduce complexity. Reference models or concepts are universally adjustable and applicable in various contexts (Tomczak, 1992). The requirement for each model is durability in regard to changes, flexibility and consistency of the model (Pfohl & Stölzle, 1997). The thesis follows this approach of business studies and develops answers for placing sub-supplier specific investments from the buyer's perspective. One important question in supply chain management in general, and in the management of sub-suppliers in specific focuses on; which partners should be managed in the supply chain at all? (Lambert & Cooper,

2000). Lambert & Cooper (2000) argue that buyers should concentrate on the members of the supply chain that best fit the “set of circumstances” (Lambert & Cooper, 2000, p. 69). The authors label it as the “most appropriate relationship” to be managed (Lambert & Cooper, 2000, p.69). This is in accordance with the reasons to start sub-supplier development initiatives such as placing sub-supplier specific investments. The execution of sub-supplier specific investments is only useful and fruitful in relationships in which the buyer, the supplier and the sub-supplier are in an “appropriate relationship”, hence a relationship that allows the successful implementation of investments. This dissertation project aims to elaborate these tensions by answering the question which interaction types are applicable in the triad, which types of investments are useful in the triad and which safeguarding mechanisms can be applied when placing sub-supplier specific investments.

1.3.2. Research objective and research questions

The leading research objectives are the specific investments a buyer places into his sub-suppliers and the questions that accompany them: What are characteristics of the investments, what are motivations for these investments, what kind of investments can the buyer place in what kind of relationship constellation, and how can the buyer safeguard these investments? The dissertation at hand strives to answer these questions from practice and provide solutions to allow for implementation in practice. Hence, the dissertation project develops a concept for placing sub-supplier specific investments from a buyer’s perspective that can be applied by practitioners in their daily management

activities and guides practitioners in answering the above questions. Derived from challenges in practice and the existing research gaps in the literature defined in chapter 1.2.2, the guiding research question of this thesis is defined as follows:

Research question 1: “How can buying firms execute sub-supplier specific investments?”

To be able to develop a concept for placing sub-supplier specific investments, research question RQ1 is divided into sub-questions.

A buying company has many suppliers and many sub-suppliers that can be considered for development initiatives such as sub-supplier specific investments. Not all of the sub-suppliers are relevant or significant for the buyer, hence, it is important for the buyer to classify his existing sub-supplier base. A classification of the sub-supplier base is relevant for incident-driven and proactive specific investments. What motivates the buyer to actually place sub-supplier specific investments in one specific sub-supplier? This gives rise to the second research question.

Research question 2: “Why do buyers decide to place specific investments in their sub-suppliers?”

After the identification of applicable sub-suppliers, the buyer has to determine how he can place sub-supplier specific investments in the sub-supplier. He is confronted with various, existing relationship constellations in the triad that affect how the sub-supplier can be managed by the buyer. The determination of

the relationship cooperation of the triad is relevant for incident-driven or proactive sub-supplier specific investments. This gives rise to the third research question.

Research question 3: “How can the buyer, the supplier and the sub-supplier interact in the triad when executing sub-supplier specific investments?”

Placing sub-supplier specific investments comes with the risk of sunk costs for the buyer. Hence, it is important for him to safeguard his investments. Safeguards of the investment are relevant for incident-driven and proactive specific investments. The existing literature offers possible applicable safeguards, however, none of the safeguards have been tested for their applicability in the triad. This gives rise to the fourth research question:

Research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad?”

1.4. Research design and research methodology

The following section illustrates the research design of the thesis and the applied research methodology that builds the foundation for this research project. The starting point of the dissertation process was derived from managerial practice. The dissertation project follows Ulrich’s understanding of business administration as an practical social science (Ulrich & Hill, 1976), which describes the design and management of productive social systems, in this case

a buying company⁵ (Ulrich, 1984). Ulrich (1984) states that companies that are defined as such are confronted daily with problems arising in the management and tend to try to find solutions to the problems that arise. This is in line with the phenomenon of placing sub-supplier specific investments in practice to solve problems arising at the sub-supplier level.

This dissertation aims at developing a solution in terms of a concept for placing sub-supplier specific investments for buying companies. This addresses the challenge from practice of placing sub-supplier specific investments with no defined concept of considerations; (1) how can sub-suppliers be addressed to place sub-supplier specific investments? (2) how can sub-supplier specific investments be safeguarded?

When confronted with choosing an adequate research approach for empirical investigation, there are several competing schools of thought that offer possible explanatory approaches. The researcher concentrates on two “opposing” approaches, the positivism approach and the interpretive (phenomenological) approach, knowing that post-positivism (the combination of qualitative and quantitative research) (Eisenhardt, 1989a, Eisenhardt, 1989b) and other schools of thoughts also exist (Bronowski, 1950, Easterby-Smith et al., 2012).

Positivism makes use of “quantitative and experimental methods to test hypothetical-deductive generalizations” (Amaratunga, et al., 2002, p.18).

⁵ A buying company is also often described as OEM, producer and manufacturer. In the dissertation at hand, the author only uses the term “buyer” or “buying company”.

Hence, positivism looks for explanations and fundamental laws and dismantles them into the smallest possible item to make them comprehensible (Easterby-Smith et al., 2012). In positivism the observer must be independent and solely focus on facts (Easterby-Smith et al., 2012). Following the positivist school of thought requires formulating hypotheses and testing them with large samples (Bortz & Döring, 2002). Through high standardization and the large sample, the generalization of results can be derived (Bortz & Döring, 2002).

In contrast, the interpretive (phenomenological) research approach makes use of qualitative methods and concentrates on recognizing, understanding and describing an observed phenomenon. As Ketokivi & Choi (2014) state: “qualitative research is the approach that examines concepts in terms of their meaning and interpretation in specific contexts of inquiry” (Ketokivi & Choi, 2014, p.233). It is an inductive-exploratory research approach that tries to understand the phenomenon (Kubicek, 1977; Gammelgaard, 2017). As the depth of the analysis is usually deeper and samples are observed over a longer period of time than in quantitative research, it can be more difficult to analyze the data and as result, generalization is harder to achieve than through quantitative research (Yin, 2014). Nevertheless, researchers agree that qualitative results gained through, e.g., case study research is deep and meaningful (King, 1994, Yin, 2014).

When confronted with the choice between qualitative and quantitative research, the empirical research approach should be chosen under consideration of the research topic. In this case, the topic is “placing sub-supplier specific

investments from the buyer's perspective". The research object of sub-supplier specific investments from the buyer's perspective, or sub-supplier management in general, is a rather new and contemporary phenomenon in management and in the research context. A description of the occurrences of sub-supplier management has until now only been done partly as outlined in the literature review (see Chapter 2.1-2.5.). Although Hofstetter (2016) and Grimm (2014 and 2016) have investigated the phenomenon of sub-supplier management, a hypothesis proving the quantitative research approach on sub-supplier specific investments does not seem applicable here. The researcher states that it is important to build the foundation for understanding the phenomenon of sub-supplier specific investments. As it is a very complex phenomenon, it requires more insights than an experiment or a survey could provide when trying to understand the motivations for sub-supplier specific investments or the interaction types in a triad. Hence, the author decided that using a qualitative research approach is the best option for obtaining useful results and insights, as the author seeks to determine "why" and "how" buyers conduct sub-supplier specific investments.

Following an interpretive approach using qualitative research, the author decided to apply case study research. This was used for the following reasons. As Yin (2014) stated, a case study design can be used, when (1) the focus of the research lies in answering "how" or "why" questions. Furthermore, Yin (2014) suggests considering case study research when (2) the behavior of the people involved in the study cannot be manipulated. In addition, case study research has proven to be valuable for (3) finding contextual conditions as they can be

relevant for the research. The last reason suggested by Yin (2014) to consider case studies is when (4) “boundaries between phenomenon and context are not clear” (Yin, 2014). As a result, descriptive case studies with qualitative interviews are used to find out “why” and “how” firms conduct sub-supplier specific investments. The application of case study research provides support in “grounding situations” and at the same time, helps to generalize findings (Ketokivi & Choi, 2014). Qualitative research is usually an in-depth research that uses methods like case studies or interviews as sources of information (Urquhart, 2013). In accordance with that, the dissertation outcome makes use of mainly single observations that were collected during case study research that included, *inter alia*, project experience and interviews. The dissertation project follows empirical inductivism. The single observations help to confirm rules or principles and help to derive new insights. This follows the approach of Kubicek (1977), who developed the exploratory research cycle in marketing research. On the basis of the collected data, the research process is designed as an iterative learning process (Kubicek, 1977). An iterative learning process guarantees that the researchers build a deep understanding of the phenomenon in place (Tomczak, 1992). In the beginning, the understanding of the phenomenon is influenced by the experience of the researcher and the insights from theory. Through the collection of data, it is possible to differentiate the phenomenon, gain a higher abstraction and allow a change of perspective on the theoretical understanding (Tomczak, 1992). Additionally, it is of importance that the theoretical perspectives chosen by the author are well explained and iteratively

questioned during the research process. Figure 4 portrays and summarizes the applied research process in this study.

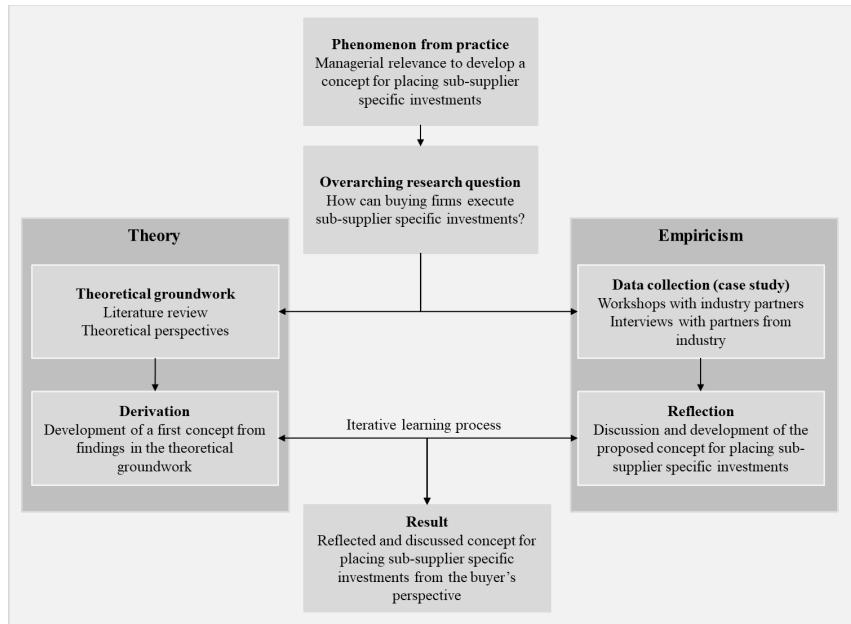


Figure 4: Research process

As outlined in Figure 4, this research project combines theoretical groundwork with empiricism in the form of case study research. Overall, the over-arching research question (research question 1) leads the conducted qualitative research approach, which consists of case study research accompanied by theoretical groundwork, which consists of a literature review and provides the basis for the theoretical perspective. The findings from the literature were iteratively compared with the findings from the case studies to derive the concept for placing sub-supplier specific investments from the buyer's perspective. In the

following, the theoretical research approach and the empirical investigation are briefly described.

Theoretical approach

The first pillar of the theoretical groundwork is the literature review. Literature reviews are a systematic approach for the identification, evaluation and synthetization of the existing body of knowledge of a topic. An accurate literature review helps to prevent systematic errors and minimizes bias in the research (vom Brocke et al., 2015). The validity of a literature review is maximized by a guarantee of rigor and validity through systematic checklists while conducting literature reviews, as stated by vom Brocke et al. (2015) and Müller and Stölzle (2015) as well as by Sauer and Seuring (2017). The literature review in the study at hand allowed the identification of various streams of the literature. Initially, the current status of research on multi-tier supply chains, including the literature on sub-supplier management and lower-tier management, was identified. Second, the current status of research on specific investments and specific investments in the triad was identified, including the identification of motivations, antecedents, types of interaction, types of sub-supplier specific investments and safeguards for placing specific investments in the triad. The second pillar of the theoretical groundwork was the testing of different theoretical approaches for their applicability in the triadic setting and for the given context. It showed that, to date, none of the investigated theories have been applied in the triadic context. Nevertheless, four theories were selected that can contribute to answering the research questions.

1) Agency theory

Agency theory broaches the subject of incomplete and asymmetric information between two business partners, resulting in “agency costs”, that are required to install control mechanisms (e.g. contractual agreements) (Jensen & Meckling, 1976, p.308). Control mechanisms help to create insights on the performance of the agent or could be incentive-based mechanisms to avoid bounded rationality or opportunistic behavior between business partners (Eisenhardt, 1989b). Hence, agency theory could help to answer research question 4:

RQ4: How can investments by the buyer in the sub-supplier be safeguarded in the triad?

2) Contingency theory

Contingency theory analyzes relations between situational context, organizational behavior and organizational structures. It states that firms perform better when they can adapt their structure to situations (Drazin & Van de Ven, 1985). Contingency theory postulates that strategic decisions depend on multiple factors. The theory can be applied to explain the situations that lead buyers to execute sub-supplier specific investments. Hence, contingency theory can be applied in answering various research questions:

RQ2: Why do buyers decide to place specific investments in their sub-suppliers?

RQ3: How can the buyer, the supplier and the sub-supplier interact in the triad?

RQ4: How can investments by the buyer in the sub-supplier be safeguarded in the triad?

3) Relational exchange theory

Relational exchange theory developed from marketing literature and focuses on relational exchange in the business-to-business context (Macneil, 1980). Relational exchange theory offers explanation approaches for applying governance mechanisms, like cooperation or relational contracts as safeguards in relationships (Hallen et al., 1991; Machneil, 1980). Therefore, it is used as the theoretical groundwork for answering research question 4.

RQ4: How can investments by the buyer in the sub-supplier be safeguarded in the triad?

4) Stakeholder theory

Stakeholder theory focuses on all parties that are involved in the value-creation process, including suppliers, employees, customers, investors and among others (Gassmann et al., 2016, Freeman et al., 2007). It furthermore states that managing stakeholders can create more value for buyers (Freeman et al., 2007). Harrison et al. (2010) note that firms can increase their innovation level, and the interconnection with lower-tier suppliers can be helpful when unexpected events in the supply chain take place. Harrison et al. (2010) also point out that the theory explains how managers invest more in some stakeholders than necessary. Freeman, Wicks & Parmar describe “the core of stakeholder theory: Economic value is created by people who voluntarily come together and cooperate to improve everyone’s circumstances”(Freeman et al., 2004, p.364). Thus, stakeholder theory can be applied to answer research question 2:

RQ2: Why do buyers decide to place specific investments in their sub-suppliers?

Empirical research

Alongside the theoretical approach, the conducted research applies empirical research in the form of case study research. Case study research can be applied to describe, test or generate theory. The process of building theory from case study research is followed as propagated by Eisenhardt (1989). According to her, conducting a case study consists of the processes of getting started, selecting cases, crafting instruments and protocols, entering the field, analyzing data, shaping hypotheses, enfolding literature and reaching closure of the research project. The usual data sources in case studies are archives, observations, questionnaires, interviews and annual reports of the companies interviewed (Eisenhardt, 1989), but data sources can also include workshops.

The case studies conducted combine various data sources, including workshops, interviews, information derived from annual reports as well as the information retrieved from company websites and archives. Buying firms (that performed specific investments in their sub-suppliers) were the target group for interviewing in the course of the case study research as the research takes the perspective of the buying company. The purpose of the analysis of the buying firms is to derive reasons for investments in sub-suppliers, the types of interaction when executing sub-supplier specific investments as well as the identification of suitable safeguarding mechanisms in the buyer – supplier – sub-supplier relationship.

Five case studies with five different companies focusing on triadic buyer – supplier – sub-supplier supply chains and with a particular focus on specific investments in the sub-supplier executed by the buyer were conducted during

the years 2015 – 2018 by the researcher. The empirical research process was supported through an Innosuisse⁶ project that was executed at the Institute for Supply Chain Management Nov 2015 – Nov 2017. Altogether, eight interviews – each at least 30 minutes in length – plus around 50 bilateral workshops were carried out between 2015 to 2018 in Switzerland and Germany. The field notes taken during all the sessions included impressions gained. All the interviews and workshops were accompanied by a second researcher and were constantly compared with findings from literature. This approach can add to the richness of data, provides a different perspective on the collected data and supports confidence in the findings (Eisenhardt, 1989). To support the data examination of interviews and workshops and the construct validity, data triangulation was applied – examining data from interview transcripts, internal company documents (e.g., evaluation templates and service contracts), several site visits, observations, annual reports and the website of each company.

1.5. Structure of the thesis

The thesis is structured into five chapters.

Chapter 1 – Introduction to the research of sub-supplier specific investments

The first chapter provides the managerial relevance of the topic of placing sub-supplier specific investments from the buyer's perspective (1.1). This is

⁶ Innosuisse (former CTI – Commission for Technology & Innovation) is a Swiss funding company that funds science-based innovation projects between companies and Swiss-based Universities. For further information please visit: <https://www.innosuisse.ch/inno/de/home.html>

followed by a presentation of the theoretical relevance (1.2), which involves a first outlook on the research fields (1.2.1) as well as the state of research and the research gaps (1.2.2). This is followed by the research scope (1.3.1), the research objective and the accompanying research questions (1.3.2). Chapter 1 also gives a first overview of the research design and the research methodology (1.4). It concludes with the structure of the thesis (1.5).

Chapter 2 – Theoretical groundwork of placing sub-supplier specific investments

The second chapter gives an overview of the current research regarding sub-supplier specific investments and related theoretical accesses to the topic. First, the literature review approach is explained in detail (2.1), providing insight about the method of the literature review (2.1.1) and the bibliometric analysis of the literature (2.1.2). From the literature review we derive an overview of the relevant research streams of managing the supply chain beyond the dyad (2.2) and the current body of knowledge regarding sub-supplier specific investments (2.3). The body of knowledge concentrates on antecedents for placing specific investments (2.3.1), forms and types of investments (2.3.2) and safeguards for specific investments (2.3.3). The chapter closes with an introduction of possible theoretical lenses that could explain the phenomenon of placing sub-supplier specific investments (2.4.1-2.4.10). Chapter 2.4.11 links the applicable theories.

Chapter 3 – Empirical investigation of placing sub-supplier specific investments

The third chapter contains the empirical investigation, which consists of the case studies conducted. Chapter three lays out the conception of the case studies

(3.1), and continues with a within case study analysis in detail (3.2-3.6.). Each case study follows the same structure to ensure the consistency and validity of the data. The within case study analysis is followed by a cross-case analysis that allows insights to be derived from the case studies (3.7).

Chapter 4 – Concept of placing sub-supplier specific investments

The fourth chapter presents the results of the dissertation project. Chapter 4.1 introduces the topic of sub-supplier specific investments. Chapter 4.2 presents reasons and motivations for sub-supplier specific investments. Chapter 4.3 introduces the interaction types that can be used in the triad. Chapter 4.4 includes the forms and types of sub-supplier specific investments. Chapter 4.5 summarizes safeguarding mechanisms in the triad. Chapter 4.6 gives an overview of barriers to place sub-supplier specific investments. Chapter 4.7 highlights risks for the various types of interaction in the triad plus recommended safeguards. Chapter 4.8 gives recommendation for the implementation of sub-supplier specific investments.

Chapter 5 – Conclusion of the research of placing sub-supplier specific investments

The fifth chapter gives a summary of both the managerial results of the dissertation (5.1.) as well as of the theoretical contribution of the work (5.2). Furthermore, Chapter 5.3 gives an overview of the limitations that accompany the dissertation project, and the author provides recommendations for further research.

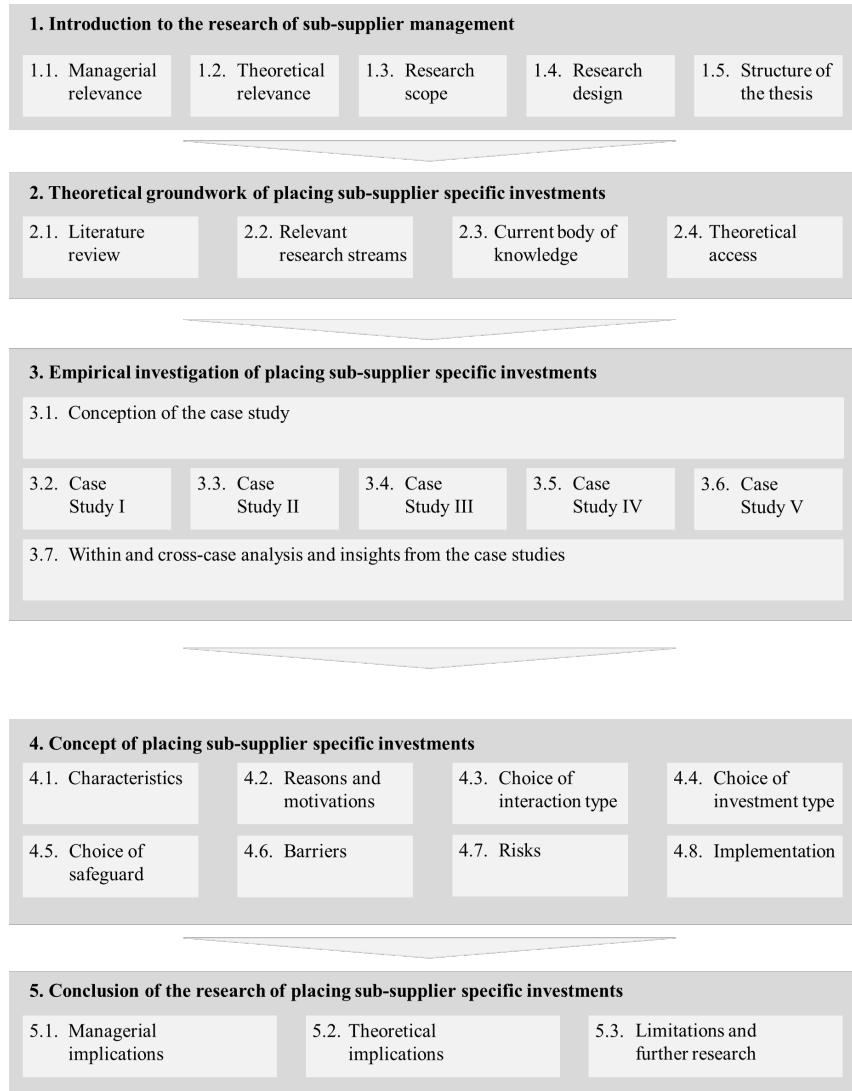


Figure 5: Structure of the thesis

2. Theoretical groundwork of placing sub-supplier specific investments

The following chapter will provide insight into how developed the research is in the field of managing the supply chain upstream beyond the dyadic relationship between the buyer and his direct supplier and the sub-supplier. More concretely, the chapter will give an overview of the existing body of knowledge on placing sub-supplier specific investments from the buyer's perspective in the upstream triad. The structure of Chapter 2 is as follows: in Chapter 2.1 a literature review is conducted that answers the following two questions: "How are hierarchical triads usually managed by the buyer in the supply chains?" and "What kind of sub-supplier specific investments conducted by the buyer can be found in the literature?" The findings from the literature review are presented in 2.2. and 2.3. After the literature review, Chapter 2 also concentrates on the theoretical access to explain the phenomenon of placing sub-supplier specific investments from the buyers' perspective. To find an explanation in theory, several theories are considered and tested for their applicability to the topic of developing the sub-supplier through sub-supplier specific investments.

2.1. Literature review approach

To get an overview of the knowledge base on sub-supplier management, and on placing sub-supplier specific investments in particular, the author conducted a literature review. A literature review helps to gain an overview of a topic and transfers existing knowledge into a useable format (Denyer & Tranfield, 2009). Furthermore, a literature review captures and provides a summary of the existing

body of knowledge, which helps to uncover and justify new research fields and gaps found in practice (Hart, 1998). The state-of-the-art research outcome serves as the groundwork for building new knowledge (Seuring & Gold, 2011). The process of selecting new literature, adding further articles, reading and evaluation of literature is not limited to the beginning of the research process, but rather spans across the entire research process (Seuring & Gold, 2011). The literature review is an important step in the research process as it lays the groundwork for further research. Therefore, a systematic literature review approach is required (Rousseau et al., 2008). “A systematic review ‘locates existing studies, selects and evaluates contributions, analyses and synthesizes data, and reports the evidence in such a way that allows reasonably clear conclusions to be reached about what is and is not known’ (Denyer & Tranfield, 2009)” (Burkhardt, 2018). Following this definition, it can be stated that the literature research process is a project in and of itself (Denyer & Tranfield, 2009).

The course of the dissertation lead by the data collection and review of the state of the knowledge base follows the specifications established by vom Brocke et al. (2009) and Denyer and Tranfield (2009). They agree that a literature review must guarantee rigor and validity throughout the entire research process of the literature review (Denyer & Tranfield, 2009; vom Brocke et al., 2009). This is also in accordance with other researchers, e.g., Fink (2005), who notes that literature reviews are required to be “reproducible” and need to be conducted while keeping rigor in the focus.

The rigor of a research process refers to the validity and reliability of the entire research process (Burkhardt, 2018). The validity of the research is substantiated by the amount to which the selected literature reveals the sources the researchers wants to find. Validity of the research uncovers “does the researcher search right?” (vom Brocke et al., 2009, p. 3). Selecting the “right” literature includes various steps. First of all choosing the right database, suitable publications, suitable keywords, correctly covered time periods, consideration of available articles, backward and forward search and continuous review of the literature during the research process (vom Brocke et al., 2009). “Backward search refers to reviewing older literature cited in articles extracted from a keyword search, whereas forward search refers to reviewing articles that have been cited in the articles (Webster & Watson, 2002)” (extracted from Burkhardt, 2018, p. 4).

The reliability of research is given when the research process and the research outcome are replicable. Hence, reliability is provided “when the process of choosing articles is transparent, clearly reported and all decisions taken within the literature review are justified and documented for the reader (Rousseau et al., 2008)” (extracted from Burkhardt, 2018, p. 4).⁷

2.1.1. Method of literature review

Following the guidelines by Denyer and Tranfield (2009) and vom Brocke et al. (2009), the focus of the literature review needs to be defined. The literature

⁷ The entire paragraph is a slightly adapted extract of the published article: “Specific investments in the supply chain – a literature review on the state-of-the-art knowledge with an outlook on safeguarding mechanisms and avenues for further research”, Burkhardt (2018), In: Supply Management Research: Aktuelle Forschungsergebnisse 2018: Bode et al., (2019), Springer Gabler

review seeks to gain an overview of management methods in the supply chain conducted by the buyer beyond the dyad with a special focus on sub-supplier specific investments. As the research area is rather new, the literature research will be conducted in two steps. The first part of the literature review will concentrate on the question “how are hierarchical triads usually managed by the buyer in supply chains?” The second part of the review will concentrate on the following two questions: “What kind of sub-supplier specific investments conducted by the buyer can be found in the literature?” and “What safeguards are used, and which theoretical constructs explain the motivations for placing sub-supplier specific investments?”

To find the appropriate answers to these questions, the author used a checklist to detect applicable papers. This was done to minimize bias and maximize validity in order to eventually guarantee the rigor and validity of the research (vom Brocke et al., 2009). The checklist that was used comprised English-speaking publications, including journals, conference proceedings, book (-chapters) and working publications in the field of supply chain management. The research examined various database searches that included, *inter alia*, all EBSCOhost databases, SCOPUS, Ab/Inform and Wiley Only Library. The exploitation of various databases revealed different articles. This is a known phenomenon in research and led the researcher to the usage of several databases to avoid missing literature (Schiederig et al., 2012). For the execution of the literature research, a set of search strings following simple operator rules and (combined) Boolean logic rules was conducted.

The first part of the literature review was composed of the following terms: “sub-supplier”, “sub-supp”, “multi-tier”, “supply chain”, “buyer”, “supplier”, “focal company”, “focal firm”. After the first keyword search, the outcome generated 8,527 hits. After narrowing the scope to abstract, keyword or title, the results were limited to 844 hits. As the author only understands “English” and “German”, the results were further narrowed, and additionally, the filter to peer-reviewed journal articles was applied as well. The outcome of the literature research ultimately yielded 195 articles on the topic searched. By manually removing the duplicates and after scanning the remaining abstracts for relevance, the number of papers was reduced to 24 papers each of which focuses on sub-supplier management or multi-tier management in the supply chain. These 24 papers were further analyzed in the bibliometric analysis and the content analysis. Table 1 summarizes the first literature research string and the results.*

Table 1 : Search strings for the first part of the literature review

Step	Filter Type	Specification	Number of results in databases
1	Keyword search	((sub-suppl* OR multi-tier)) AND (("supply chain" OR supplier*)) AND (buyer OR supplier OR "focal company" OR "focal firm")	8,527
2	Scope 1	Abstract, Keyword, Title	844
3	Language	English	494
4	Type of publication	Academic Journal, Peer reviewed	195
5	Abstract screening I	Manually: Focus on sub-supplier or multi-tier management in supply chains	43
6	Removing duplicates	Removing duplicates	24
7	Abstract screening II	Manually: Focus on concrete management methods of sub-suppliers	10

The second part of the literature review was composed of the following terms: “invest”, “fund”, “specific”, “idiosyncratic”, “dedicated”, “relational”,*

“unilateral”, “asset”, “supplier”, “supply chain”, “OEM”, “buyer”, “focal firm”, “focal comp” and “manufacturer”. After the first keyword search, the number of results added up to 3,167,565 hits. The topic of “specific investments” in the supply chain seemed to be of research interest. After narrowing the scope to abstract, keyword or title, 52,804 results were detected. The next two applied filters were language (English and German) and type of publication (academic journal, peer reviewed), which yielded 198 results. The remaining papers were screened for relevance and duplicates were removed, which led to 44 articles focusing on specific investments in the supply chain, with the main focus on dyadic relationships. Only one identified paper focused on specific investments in a triadic supply chain. Hence, the 44 papers were further analyzed in the bibliometric and content analysis. Interestingly, one paper focused on specific investments in the triad and investigated the impact of specific investments on performance, but made use of the triad “supplier – buyer – customer” (Gelei & Kenesei, 2016). *Table 2* summarizes the second literature research string and the results.

Table 2: Search strings for the second part of the literature review

Step	Filter Type	Specification	Number of results in databases
1	Keyword Search	((invest* OR fund)) AND ((*specific OR idiosyncratic OR dedicated OR relational OR unilateral" OR "asset")) AND ((supplier* OR "supply chain" OR "OEM" OR "focal firm" OR "focal comp*" OR buyer OR manufacturer))	3,167,565
2	Scope 1	Abstract, Keyword, Title	52,803
3	Language	English	328
4	Type of publication	Academic Journal, Peer reviewed	198
5	Abstract screening	Manually: focus on specific investments in the supply chain	46
6	Removing duplicates	Removing duplicates	44
(7)	Abstract screening	Manually: focus on specific investments in the triad	1)

2.1.2. Bibliometric analysis

The outcome of *the first part of the literature review revealed* 24 articles that were analyzed in the bibliometric analysis. Through a bibliometric analysis an academic debate or topic can be better understood, as it reveals clusters e.g. journals used for publication or year of publication (Müller & Stölzle, 2012). The bibliometric analysis revealed that the management of lower-tier suppliers, including sub-suppliers or multi-tier management, has increased over the last six years, with a peak in 2018; however, in both 2013/2014 as well as in 2016, the number of publications regarding this topic rose. This is in accordance with the development of the topic in management. *Figure 6* illustrates the distribution of articles with the subject of sub-supplier management or multi-tier management over a span of 15 years.

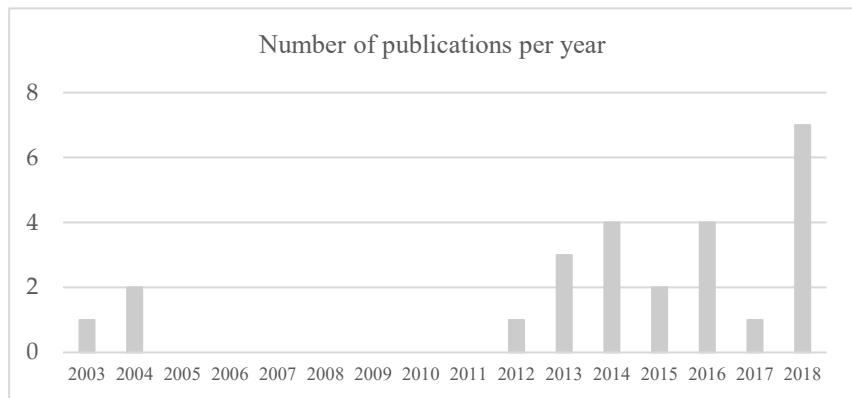


Figure 6: Distribution of publications per year search string I

The 24 articles were published in 18 different journals between 2003 and 2018.

The papers used transaction cost theory, the resource dependency theory, agency

theory, network theory, the theory of critical success factors or the resource orchestration perspective to explain the extension of management beyond the dyad.

The outcome of *the second part of the literature review revealed* 44 articles that were analyzed in the bibliometric analysis. The bibliometric analysis revealed that over a period of more than 10 years the interest in specific investments in the supply chain were high in academic research. *Figure 7* illustrates the distribution of the articles over that time span.

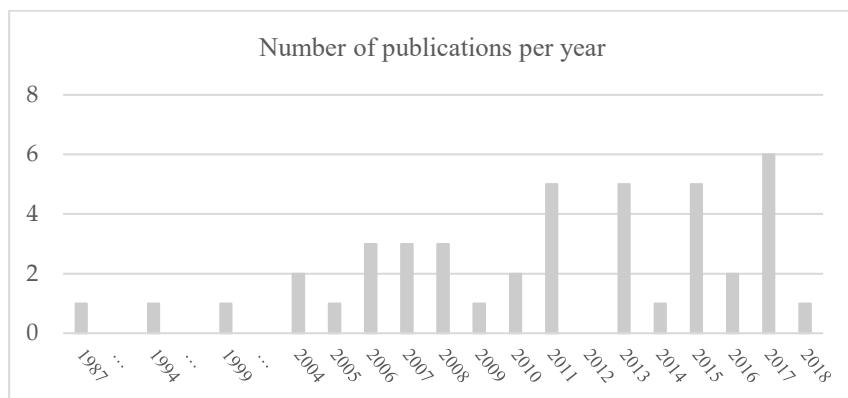


Figure 7: Distribution of publications per year search string II

Along with the interesting distribution of research years, it is worthwhile to disclose which theories have been the basis of research on placing specific investments in the supply chain in the existing research. Most studies have made use of transaction cost theory and relational exchange theory to explain why

firms make use of specific investments in the supply chain.⁸ The following sub-chapter presents the relevant research streams in managing the supply chain beyond the dyad (2.2) and will provide an overview of the existing body of knowledge on placing sub-supplier specific investments beyond the dyad (2.3).

2.2. Relevant research streams of managing the upstream supply chain

Supply chain management is defined as an “integrative approach to dealing with the planning and control of the material flow from suppliers to end-users” (Ellram, 1991). The main idea is to manage and control the various supply chain participants for the benefit of all parties involved (Ellram, 1991). This means planning and controlling material, information flow, as well as logistics internally in the company and externally between companies (Cooper et al., 1997).

⁸ The procedure in the paragraph has already been used in a published article by Burkhardt (2018) and has been slightly adapted for the thesis at hand: “Specific investments in the supply chain – a literature review on the state-of-the-art knowledge with an outlook on safeguarding mechanisms and avenues for further research”, Burkhardt (2018), In: Supply Management Research: Aktuelle Forschungsergebnisse 2018: Bode et al., (2019), Springer Gabler

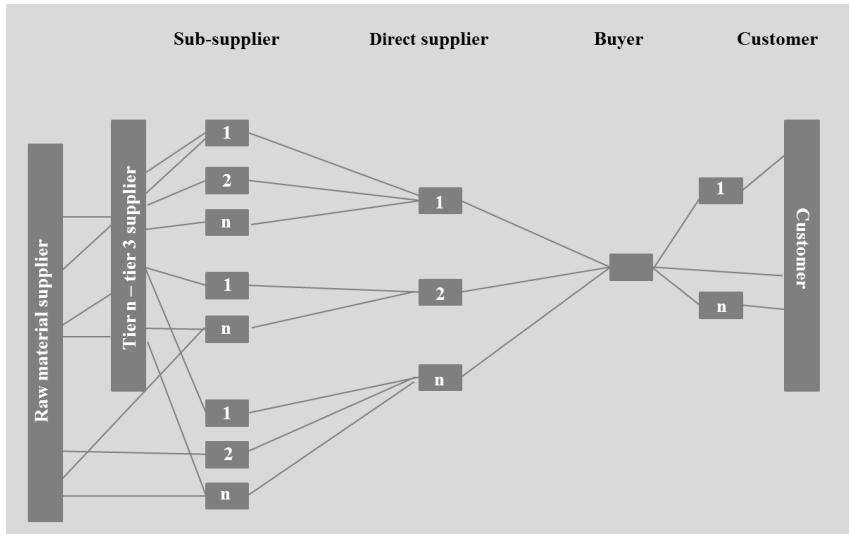


Figure 8: A simplified supply chain network structure

Adjusted in accordance with Lambert & Cooper, 2000, p.68

As Figure 8: A simplified supply chain network structure, following Lambert & Cooper (2000, p.68), illustrates the downstream supply chain including the management of the first tier customers of the focal company toward the end customer. The upstream supply chain includes the management of the first tier supplier toward the raw material producer. In this framework, management also includes the sub-supplier.

Sub-suppliers are all those companies that are situated beyond the direct supplier (tier-1 supplier) of a focal company. In other words: all companies within a supply chain that do not directly supply a focal organization as a supplier, but participate as a supplier's supplier in a supply chain of the focal organization (Grimm et al., 2014, 2016).

Although this implies that supply chain management includes managing more than the relationship between buyer and his direct supplier or between buyer and his customer, the research on managing the downstream or upstream participants beyond the direct level is lacking in scientific research (Homburg et al., 2014; Choi & Hong, 2002). This was also shown by the literature review, which revealed only 24 papers that looked into management beyond the dyad. The first result set of the literature review extracted information about management practices that go beyond the dyadic relationship. From the extracted 24 papers, the following 11 offer concrete insights into the management of sub-suppliers. *Table 3* below presents the 11 papers in more detail. *Table 3* presents the results of research at the Institute of Supply Chain Management, University of St. Gallen that was not conducted exclusively by the author of this dissertation, but rather, was developed by several researchers at the Institute of Supply Chain Management, University of St. Gallen between 2015 – 2018.

Table 3 : Research beyond the dyad in supply chain management⁹

#	Author	Year	Title	Extract and summary of abstract
1	Choi & Wu	2009	“Taking the leap from dyads to triads: Buyer-supplier relationships in supply networks”	“Recognition that supply chains cannot be characterized with connected dyads but rather have to be researched as triads. Building on extended research on buyer-supplier relationships, the authors deduce nine different types of relationships in supply triads and reflect these with structural hole theory as well as balance theory.”(p.263)

⁹ The table depicts the results of research at the Institute of Supply Chain Management. These results were not extracted only by the author as other researchers were part of the process.

2	Mena, Humphries, Choi	2013	“Toward a Theory of Multi-Tier Supply Chain Management”	<p>“In this research, we aim to develop a theoretical development of multi-tier supply chain (MSC) management by adopting an inductive case study research design. Following a multiple case research design, we investigate three-tier supply chains to develop a theory of MSC management.”(p.58)</p>
3	Grimm, Hofstetter, Sarkis	2014	“Critical factors for sub-supplier management: A sustainable food supply chains perspective”	<p>“Fourteen critical success factors (CSFs) for managing sub-suppliers in sustainable food supply chains were identified, influencing sub-suppliers' compliance with corporate sustainability standards are identified. CSFs can be classified into (1) focal firm-related, (2) relationship-related, (3) supply chain partner-related, and (4) context-related CSF.”(p.159)</p>

4	Tachizawa, Wong	2014	“Toward a theory of multi-tier sustainable supply chains: a systematic literature review”	“The authors build a conceptual framework that incorporates four approaches to manage the sustainability of multi-tier supply chains. They also identify several contingency variables (e.g., power, dependency, distance, industry, knowledge resources) and their effect on the proposed approaches.”(p.643)
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5	Carter, Rogers, Choi	2015	“Toward the theory of the supply chain”	<p>“As our discipline has matured, we have begun to develop theories of supply chain management. However, we submit that a major omission of theory development in the supply chain management discipline is that we have failed to develop a theory of what we are managing—a theory of the supply chain. Using a conceptual theory building approach, we introduce foundational premises about the structure and boundary of the supply chain that can serve as the basis for much needed, additional development of the theory of the supply chain.”(p.89)</p>
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6	Yan, Choi, Kim, Yang	2015	“A theory of the nexus supplier: A critical supplier from a network perspective.”	“Introduction of the nexus supplier as contrast to top-tier suppliers. Nexus suppliers are found anywhere in supply chain networks and are critical due to their position in the network and their resulting interorganizational ties. Paper sheds light on how nexus suppliers influence buyers and their performance.”(p.52)
7	Wilhelm, Blome, Wieck, Xiao	2016b	“Implementing sustainability in multi-tier supply chains: Strategies and contingencies in managing sub-suppliers”	“Buying firms must pay increased attention to supply chain sustainability issues, as stakeholders might hold them responsible for non-sustainable supply chain activities. Frequently, sustainability problems occur upstream at the sub-supplier level. Building on the literature on multi-tier supply chains (MSCs), we

				investigated the sustainability management strategies of buying firms in food, apparel, packaging, and consumer electronics with regard to second-tier suppliers and beyond.”(p.196)
8	Wilhelm, Blome, Bhakoo, Paulraj	2016a	“Sustainability in multi-tier supply chains: Understanding the double agency role of the first-tier supplier”	“We employ agency and institutional theory arguments to explore the conditions under which first-tier suppliers will act as agents who fulfill the lead firm's sustainability requirements (i.e., the primary agency role) and implement these requirements in their suppliers' operations (i.e., the secondary agency role). The findings from three in-depth case studies embedded in different institutional contexts highlight the importance for lead firms to

				incentivize each agency role separately and to reduce information asymmetries, particularly at the second-tier level.” (p.42)
9	Hofstetter	2016	“Toward a process framework for sub-supplier management”	“The paper introduces a typology of existing constellations to interact in a triad between buyer – supplier and sub-supplier. Furthermore, it presents a framework for sub-supplier management and a set of business processes.”(p. 1)
10	Grimm, Hofstetter, Sarkis	2016	“Exploring sub-suppliers' compliance with corporate sustainability standards”	“Firms face the challenge of ensuring compliance with their corporate sustainability standards (CSS) in their supply chains, i.e., internally, by their suppliers, and also upstream by sub-suppliers. Supplier management strategies to ensure compliance with CSS in the

				supply chain usually focus on suppliers.” (p.1971)
11	Kim, Park, Ryu	2017	“Do buyers’ supporting efforts for sub-supplier make prime supplier’s performance better?”	“When buying firms execute sub-supplier development in the form of sub-supplier specific investments, it does not improve the performance of their direct suppliers. However, monitoring and information sharing with sub-suppliers leads to an increase in performance at the direct supplier.” (p.195)

As the section of managerial relevance (1.1) underlined, management in the triad is different than management beyond the dyad. Approaching lower-tier suppliers from the buyer's perspective bears challenges that do not exist in traditional supplier management (Grimm et al., 2014). When buyers are confronted with the need to manage their sub-suppliers, they are often not even aware of their lower-tier suppliers (Rauer & Kaufmann, 2015). As no legal constructs exist between buyer and sub-supplier, it is most likely that the buyer does not know who his sub-suppliers are (Choi & Linton, 2011). This is also due to the fact that sub-suppliers tend to be located geographically and institutionally far away from the buying company (Awaysheh & Klassen, 2010). To get to know their sub-suppliers or gain an evaluation of their sub-suppliers, buyers

often turn to their direct suppliers (Dou et al., 2018). This leads to another challenge in managing the upstream supply chain: the exceptional power status of the supplier, who stands between the buyer and the upstream supply chain. In the case of this research setting, the supplier always stands between buyer and sub-supplier and can be in different positions. The supplier, the only one who has contact with both partners, can have the role of a bridge builder between buyer and sub-supplier (Mena et al., 2013). Wilhelm et al., (2016a) refer to the supplier as “the middle man” who has a double-agency role in the supply chain. That means he has to act as an agent when fulfilling the buyer’s requirements and as agent when passing on the requirements to his suppliers (the buyer’s sub-suppliers). Additionally, suppliers have a powerful position. They can end the business relationship with their suppliers without giving notice to the buyer or can block any contact between buyer and sub-supplier. Along with suppliers being powerful, Yan et al. (2015) also shed light on so-called “Nexus”-suppliers in the supply chain. These lower-tier suppliers are critical for a buying company. They can be more powerful than the supplier or buyer, dictating the rules of the supply chain (Yan et al., 2015). Hence, management approaches of less powerful members of the supply chain are ignored by the sub-supplier (Yan et al., 2015). One example of a strong Nexus supplier is the company “Sinar Mas”, a palm oil producer in Indonesia¹⁰. The firm is a sub-supplier for many firms, e.g., Nestlé, and one of the few palm oil producers worldwide. Although NGOs like Greenpeace or Nestlé have approached the sub-supplier to jointly try to force him to produce sustainable palm oil, the company Sinar Mas is too

¹⁰ <http://www.sinarmas.com/en/agribusiness-and-food.html> (accessed, 10.01.2019)

powerful and has not changed its production processes due to the pressure from its stakeholders¹¹. Mena et al. (2013) also indicate that competitive dynamics are different in a multi-tier supply chain in respect to power balance, structure, independence and relationship stability. Rauer und Kaufmann (2015) assert that successful collaboration in the supply chain highly depends on the power that buyers feel they have over sub-suppliers.

The literature review also shows that research has started to look for approaches to manage and approach multi-tier supply chains and in this multi-tier supply chains, manage the triad, consisting of buyer-supplier and sub-supplier. Most research in managing the supply chain beyond the direct suppliers stems from research on sustainability, e.g., Tachizawa & Wong, 2014, Wilhelm et al., 2016a, Meinlschmidt et al., 2017, Grimm et al., 2014, 2016. The literature on managing sub-suppliers concentrates on the question of how management practices of buying firms can lead to sub-supplier compliance with the buyer's requirements (Grimm et al., 2014). As Meinlschmidt et al. (2017) correctly argue, some buying companies manage their supply chain through direct supplier management only, while others strive to contact sub-suppliers directly to achieve supply chain performance (Wilhelm et al., 2016b, Grimm et al., 2016). This is in line with the various approaches found by Mena et al. (2013), Tachizawa & Wong (2014) and Hofstetter (2015).

¹¹ <https://www.greenpeace.ch/publikationen/how-sinar-mas-is-pulping-the-planet-engl/> (accessed, 10.01.2019). Next to the information on the Greenpeace website, the author also got informed about the food producer Sinar Mas during the case studies. All companies that were involved with food production reported about the powerful producer and his business practices.

Research on multi-tier supply chains usually expands the dyadic view and includes the interrelations between the links in the dyad going as far as the triad (Mena et al., 2013). Mena et al. (2013) expand research to the hierarchical triad including the buyer, the supplier and the sub-supplier in their research. They developed multi-tier supply chain structures that help to understand the behavior of the three parties. They refer to “open triad”, “transitional triad” and “closed triad” as theoretical structures for interaction in the triad (Mena et al., 2013). Tachizawa and Wong (2014) expand the approach of Mena et al. and develop a research framework that includes governance mechanisms and contingency variables as factors that influence the behavior of hierarchical supply chain triads. They suggest that the triad can be managed through the structures “direct”, “indirect”, “work with third parties” and “don’t bother”. Hofstetter (2015) adapts the relationship constellations from Tachizawa and Wong (2014) and develops them further, referring to them as “Interacting directly with the sub-supplier together with the direct supplier”, “Interacting directly with the sub-supplier without the direct supplier”, “interacting with the sub-suppliers’ institutional field” and “delegating to direct suppliers”.

Employing the findings in the literature review, the author developed the following options of initiating contact with the sub-supplier from the buyer’s perspective further and renamed the options found in literature. *Figure 9* demonstrates four options for buyers to execute contact with the sub-suppliers.

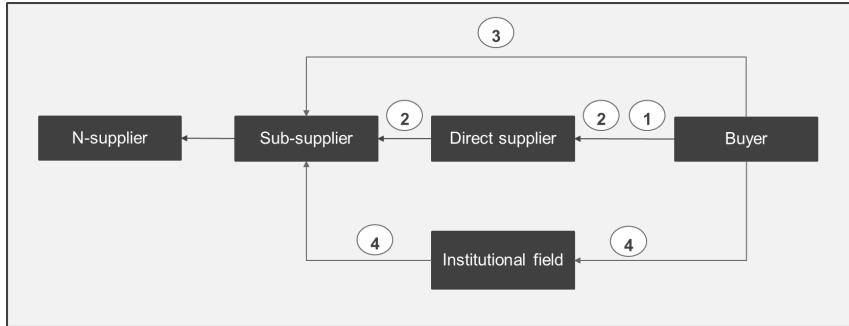


Figure 9 : Options of the buyer to interact in the triad

Own illustration in accordance with Hofstetter, 2016

As *Figure 9* shows, the buyer has four options to interact with his sub-supplier:

- (1) Don't bother, (2) Cooperation in the triad, (3), Circumvention, (4) Institutional field. The four options are examined in depth in the following:

1. **Don't bother:** Delegating all management tasks involving the sub-supplier or any lower-tier activities to the direct supplier. Tachizawa and Wong (2014) named this approach “indirect”. This interaction type is the most common in practice, as most supply chain management is focused on direct suppliers (Pagell et al., 2010). Usually buyers pass clear instruction or guidelines to suppliers, who are responsible for passing the requirements up the supply chain (Wilhelm et al., 2016a).
2. **Cooperation in the triad:** The buyer interacts with the supplier and the sub-supplier to manage the sub-supplier. This is closely related to the “direct” approach of Tachizawa and Wong (2014), but the author, following Hofstetter (2016), enhanced it and includes the supplier as a fully valid member of the management approach. In this management

approach, buyer, supplier and sub-supplier interact with one another to achieve compliance along the supply chain. This does not necessarily mean that all interactions or meetings have to include all three participants, but it does mean that the supplier is aware of management activities beyond him and does not hinder the success of any management practices. Furthermore, the supplier may even actively support management practices at the sub-supplier level. The resulting buyer and supplier could have an arm's-length or cooperative relationship in this constellation.

3. **Circumvention:** Direct interaction between the buyer and the sub-supplier, without the direct supplier. This is also derived but adapted from the “direct” approach of Tachizawa and Wong (2014). In this constellation, the buyer has direct interaction with the sub-supplier, but does not interact with the supplier. This interaction type could have negative implications for the supplier. If he is interchangeable, it could be that the buyer replaces him after directly interacting with the sub-supplier. The resulting buyer and sub-supplier could have an arm's-length or cooperative relationship in this constellation.
4. **Institutional Field:** Buyer uses the institutional field of the sub-supplier to indirectly influence him or even manage him. This approach is comparable to the “third party” suggestion of Tachizawa and Wong (2014). A standard example for using the institutional field are “round tables” of different companies that aim to improve sustainability standards along the supply chain. A classic example are efforts for

producing sustainable palm oil along the supply chain (see previous Sinar Mas example).

Next to the management approaches of sub-suppliers, the literature research also reveals critical factors for successful sub-supplier management (Grimm et al., 2014), strategies and contingency variables that are enablers for managing sub-suppliers (Tachizawa & Wong, 2014, Wilhelm et al., 2016b).¹²

Types of interaction in sub-supplier management

When buyers have decided on their sub-supplier management approaches, the next step is to decide which relationship constellation between buyer, supplier and sub-supplier they aspire to. In his paper, Hofstetter (2016) introduced eight concrete relationship constellation types (“competition”, “certification”, “delegation”, “commitment”, “cooperation”, “parallel”, “bypass” and “back-door”) that show options for managing the triad. *Figure 10* gives an overview of the interaction types in the triad according to Hofstetter (2016).

¹² As this is not the focus of the dissertation, the author will not discuss in detail each of the identified contingencies or critical factors for successful sub-supplier management that were found in literature.

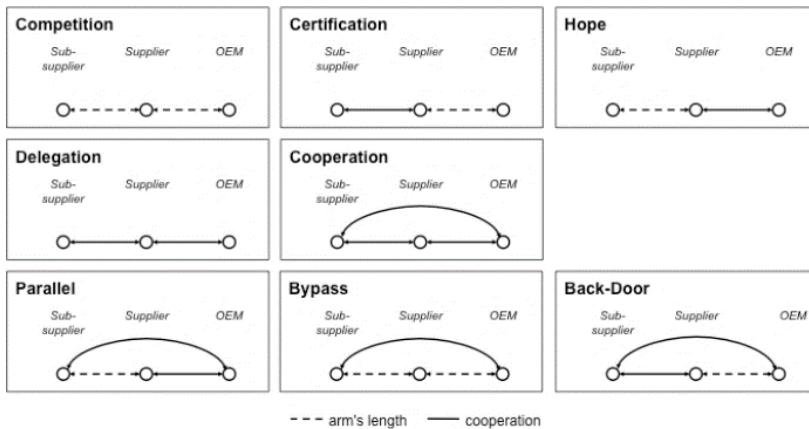


Figure 10: Buyer – supplier – sub-supplier constellations

Hofstetter, 2016

In the following, each of Hofstetter's (2016) constellation type will be briefly described. Hofstetter presents the constellation types in his paper "Towards a process framework for sub-supplier management" (2016, p.9 ff.).

(1) Competition

Arm's-length relationship in the triad. Demands of the buyer are fulfilled through market mechanisms.

(2) Certification

Buyer and supplier are at arm's length, no contact between buyer and sub-supplier. Supplier and sub-supplier cooperate because the buyer demands certifications along the supply chain, and the supplier has to ensure the sub-supplier takes care of them.

(3) Hope

Buyer and supplier cooperate, e.g., to develop “solutions” (Hofstetter, 2016, p. 9), no contact between buyer and sub-supplier. Supplier and sub-supplier are at arm’s length. Buyer expects his supplier to apply “solutions” (Hofstetter, 2016, p.9) at sub-supplier level.

(4) Delegation

Buyer and supplier, supplier and sub-supplier cooperate, but there is no interaction between buyer and sub-supplier.

(5) Cooperation

Each company in the triad is in contact with one another (cooperates) and develops solutions together.

(6) Parallel

Buyer is close to supplier and sub-supplier, whereas supplier and sub-supplier are at arm’s length. Buyer is responsible for drawing the separate solutions between sub-supplier and supplier together.

(7) Bypass

Buyer is only close to sub-supplier. The other interactions in the triad are at arm’s length. Supplier is not relevant for the buyer for developing solutions.

(8) Back-Door

Buyer cooperates with the sub-supplier, and the sub-supplier cooperates with the supplier. Buyer and supplier are at arm’s length.

The relationship constellations play a pivotal role when buyers consider placing sub-supplier specific investments in the sub-supplier, as buyers first have to decide which interaction type they will choose and which interaction types are

applicable to place specific investments in the sub-supplier from the buyer's perspective. The choice of interaction type is also dependent on the question of "what does the buyer want to achieve with his interaction in the sub-supplier". The work by Hofstetter (2016) gives a first overview of existing interaction types in the triad and the author uses his interaction types as a starting point for the development of the interaction types when placing sub-supplier specific investments. Nevertheless, he does not cover all possible interaction types in the triad, as later presented in Chapter 4.3

Process framework for sub-supplier management

The literature also gives a first insight into processes that can be used to manage the sub-suppliers. In his conference submission, Hofstetter (2016) proposed a sub-supplier management framework (see *Figure 11*). The sub-supplier management framework of Hofstetter (2016) is closely attached to the common supplier management processes.

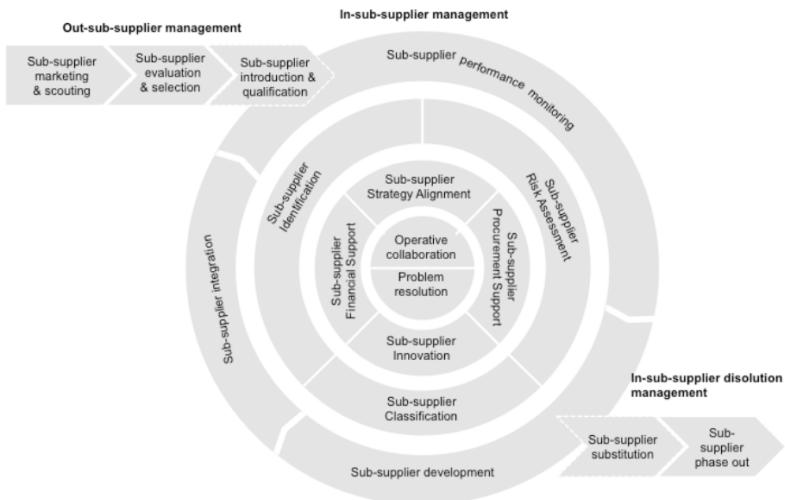


Figure 11: The sub-supplier management framework

Hofstetter, 2016

One of the sub-supplier management processes in *Figure 11* is sub-supplier development. Hofstetter (2016) stated that sub-supplier development should be applied to address “identified performance gaps” of the sub-supplier by helping the sub-supplier to establish changes “that enable the sub-supplier to achieve the targeted performance (Krause et al., 2007, in Hofstetter, p. 17, 2016). As Hofstetter (2016) also noted, these developments can be attained through sub-supplier specific investments. Following the research call by Hofstetter (2016), the author will concentrate the research on sub-supplier specific investments as a development tool for sub-suppliers.

2.3. Body of knowledge on placing specific investments beyond the dyad

The second part of the literature review concentrates on the following questions: “What kind of sub-supplier specific investments conducted by the buyer can be found in the literature? What safeguards are used and which theoretical constructs explain the motivations for placing sub-supplier specific investments?” The second part of the literature review focused on the question regarding which sub-supplier specific investments conducted by the buyer can be found in the supply chain management literature.

Firstly, it is useful to look at the general definition and characteristic of specific investments in the supply chain. In the supply chain literature, specific investments are a key concept for influencing business relationships (Gelei & Kenesei, 2017). The term “specific investments” was coined by Williamson in 1985 during the development of the transaction cost theory. Williamson (1985) defined specific investments as durable investments that are undertaken in support of particular transactions. Relationship-specific investments are the non-recoverable expenditures a firm makes to support a specific inter-organizational relationship with another firm (Williamson, 1985, Wagner & Bode, 2013). De Vita et al. (2009) define specific investments as “non re-deployable investments specifically dedicated to the relationship” (p.657). They are a form of guaranteeing relationship commitment, which is a key driver for the successful future development of a business relationship (Dyer & Singh, 1998).

Specific investments are used to strengthen business performance with business partners, networks or strategic alliances (Kwon, 2011). Furthermore, specific

investments are a “systematic effort to create and maintain competent suppliers (...)” (Wagner & Johnson, 2004, p.724). Specific investments can be used to show long-term commitment and generate value for the partners (Williamson, 1975). Specific investments are not re-deployable and cannot be used in any other transactions (Morrill & Morrill, 2003). Wagner and Bode (2013) conclude that specific investments encourage suppliers to share their innovations with the buyer. Furthermore, bilateral specific investments help to reduce uncertainties in regard to further transaction or cooperation between partners (Chen et al., 2017) and strengthen inter-firm relationships (Lothia et al., 1994). They are already broadly used in dyadic relationships in practice and have been a research object for decades.

Research on specific investments placed in dyadic supply chain settings has been developing since the 80s, as the literature review revealed. Research on placing specific investments from buyer to supplier, supplier to buyer or buyer to customer are broadly found in the literature. However, as mentioned previously, research on specific investments in the triadic setting is scarce. The literature review only detected three papers that looked at specific investments in a triadic setting and only one of the three investigated the hierarchical triad buyer – supplier – sub-supplier. The other two paper focused their research on the triad of supplier – buyer – end customer. Kim, Park & Ryu (2017) investigate how specific investments of the buyer improve the direct supplier’s performance and Gelei and Kenesei (2016) investigate the effect of specific investments on the performance of supplier – buyer – customer triad.

2.3.1. Reasons for specific investments in the dyad

For lack of further material regarding specific investments in the sub-supplier, the author used the literature review to gain an overview of reasons to place specific investments in the dyad, as well as forms and types of specific investments in the dyad and safeguarding mechanisms that are used in the dyad (Burkhardt, 2018). This overview helps to gain an understanding of specific investments in general and lays the groundwork for the development of the concept for placing sub-supplier specific investments.

The literature review revealed that buyers are confronted with the risk of “lock-in” effects (Jap & Ganesan, 2000) when placing specific investments. However, the literature review detected that this effect is willfully created by buyers with the purpose of hindering the business partners from terminating the business relationship (Williamson, 1983). It is considered to be positive and even required to strengthen a business relationship or it serves as proof of the commitment of one party to the other (Ghemawat, 1991). Additionally, the literature argues that buyers gain competitive advantage by getting better market access due to specific investments in the supplier (Ghemawat, 1991). By placing specific investments, buyers extend their networks, which can lead to strategic alliances between businesses (Kang et al., 2009). Strategic alliances help, inter alia, in gaining market access or scale economies (Ring & Van de Ven, 1994). The buyer also demonstrates that he is interested in a long-term relationship when placing specific investments (Williamson, 1985). Especially in times where supply chains are highly complex and span the globe, many buyers want to concentrate on their existing supplier base and strengthen the relationships

they already have (Prahalad & Hamel, 1990). Bensaou and Anderson (1999) discern three main reasons that lead buyers to execute specific investments in their suppliers:

- (1) They state that specific investments by the buyer in the supplier acts as supporting mechanisms to increase interaction between the two firms when manufacturing tasks are complex.
- (2) Specific investments can support building a close relationship between two actors, as cooperation includes sharing information, e.g., company internal information or design specifications.
- (3) Specific investments are used to reduce uncertainty that arises through technological uncertainty or demand volatility.

2.3.2. Forms and types of specific investments

The 45 papers extracted from the literature review on specific investments yield the following forms and types of specific investments. The literature review disclosed that specific investments are classified as tangible and intangible investments (Chen et al., 2017; Williamson, 1985). In an extended literature review by De Vita et al. (2011), seven categories of specific investments (tangible as well as intangible investments) in the dyadic setting were presented: human, physical, site, dedicated, brand, temporal and procedural investments. This categorization of specific investments seems applicable for the author and is therefore used throughout the dissertation project. In the following, the two categorizations “tangible” and “intangible” investments are discussed further.

Tangible specific investments

The umbrella term tangible investments in the supply chain describes monetary investments. As introduced by De Vita et al (2011), they include the following three dimensions of specific investments: “*physical asset specificity*”, “*site specificity*” and “*dedicated asset specificity*” (De Vita et al., 2011, p. 332).

- (1) *Physical asset specificity* refers to the investments tailored to one specific firm or use and have few alternative uses (De Vita et al., 2011). Investments in a key technology that can only be used by one firm for one specific task can be considered a physical asset. Key technology includes tools that are necessary for the production of a specific part of the production or of a specific part of a product (Yeung et al., 2013). IT-adaption between firms is also considered as a physical asset. Investments are mostly executed for one relationship only (Heide & John, 1990) and become irrelevant and useless for any other business relationship (Mahapatra et al., 2012).
- (2) *Site specificity* describes investments in a company’s production facility by locating the company’s production next to a business partner to be able to closely interact (De Vita et al., 2011, Bensaou & Anderson, 2009). This investment can be viewed as a clear signal of the long-term commitment of the actors involved, as it guarantees close exchange, reduces transportation time, enables close collaboration and is highly cost intensive (Joskow, 1987).
- (3) *Dedicated asset specificity* includes all assets that have specifically been spent for the interaction between two partners, e.g., expansion of

production for one specific partner through investment in new machinery or something similar (Joskow, 1987; Lamminmaki, 2005).

Intangible specific investments

The umbrella term intangible investments is harder to quantify than tangible investments and includes the following dimensions of specific investments: “human asset specificity”, “brand capital specificity”, “temporal specificity” and “procedural asset specificity” (De Vita, et al., 2011, p. 332, Williamson, 1985). Intangible investments often aim to create specific organizational knowledge. This includes investments in human asset specificity.

- (1) *Human asset specificity* describes all investments in skills, knowledge and experience from one partner in the other (Zaheer & Venkatraman, 1995). The knowledge is created through employee trainings that aim to increase the skills and knowledge of workers in one specific interaction between business partners and is therefore limited to this business interaction (Lamminmaki, 2005; Ruchala, 1997). The trainings aim to increase the skill of workers regarding technical specifications, component performance requirements, best practice sharing, engineering know-how, information technology or the design of specific business processes or setting up specific machines (Corsten, Gruen & Peyinghaus, 2011; Buvik, 2002, Bensaou & Anderson, 2009). Specific organizational knowledge is also built through the exchange of human resources between business partners, which enables the development of specific knowledge by gaining internal information about the partner (De Vita et al., 2011). Through the exchange of

employees, specific knowledge about each company is shared between business partners. This includes best practice sharing between business partners, general information exchange and know-how exchange, including engineering know-how specific to the given context (Bensaou & Anderson, 2009).

- (2) *Brand capital specificity* involves investments with positive or negative spillover effects between two partners (Levy, 1985; Gatignon & Anderson, 1988).
- (3) *Temporal specificity* refers to adapting business processes to one another (Malone et al., 1987). The usage of Kaizen or the adaption of milk runs or just-in-time production between companies is one example (Bensaou & Anderson, 2009).
- (4) *Procedural asset specificity* refers to routines, workflows or business processes which are expensive to set up together and in the long run difficult to redeploy (Zaheer & Venkatraman, 1995). This could be the adaption of production processes and systems to one another. Furthermore, the execution of specific R&D expenditures are also part of this dimension (Raman & Shahrur, 2008). An example would be that suppliers invest specifically to ensure production is set up for highly specialized parts of the buyer (Stump & Heide, 1996). Another example can be seen in software companies that develop software solutions for certain operating systems for particular firms (e.g. Linux, Mac OS).

The following *Table 4* summarizes the known tangible and intangible investments from literature:

Table 4: Summary of types of specific investments

In accordance with De Vita et al., 2011

Type of specific investment					
Tangible			Intangible		
Type	Example	Source	Type	Example	Source
Physical asset specificity	Investments in key technology	Heide & John, 1990	Human asset specificity	Employee trainings	Lamminmaki, 2005; Ruchala, 1997
Site specificity	Locate production sites next to one another	de Vita et al., 2011	Brand capital specificity	Investments with positive spillover effects	Levy, 1985; Gatignon & Anderson, 1988
Dedicated asset specificity	Expand own production for supply chain partner	Joskow, 1987; Lamminmaki, 2005	Temporal specificity	Investments to adapt business processes to one another	Malone et al., 1987; Bensaou & Anderson, 2009
			Procedural asset specificity	Investments to set up routines or workflows across companies	Zaheer & Venkatraman, 1995; Raman & Shahrur, 2008

2.3.3. Safeguards for specific investments

The last findings of the literature review involve safeguards that are required when buyers place specific investments in a relationship. As for any investment, buyers are confronted with the risk of losing their investment or of their generating high transaction cost as they can be misused due to opportunistic behavior of a (sub-) supplier (Bensaou & Anderson, 1999). As Bensaou and Anderson furthermore assert, “even where there is no opportunism, there is dependence, making it difficult to disengage as circumstances change” (p.461,

1999). Hence, specific investments also come with risks for the buyer. Specific investments have a highly customized character and cannot be redeployed or transferred to another firm without negative consequences for their original value (Takashima & Kim, 2017; Grover & Malhotra. 2003). They lead to a dependence between buyer and supplier, as the return of the investment loses value after being separated from the firm or cannot be returned at all (Alchian & Woodward, 1987). One example offered by Klein would be investments in production equipment, logistic systems or trainings for the employees of suppliers or sub-suppliers (Klein et al., 1978).

All these specific investments are placed to decrease the production costs of the supplier and they increase the dependency between the buyer and the supplier. This leads to a “lock-in” situation for the buyer, as a change of supplier would lead to a loss of the investments of the buyer, who would additionally have new costs resulting from the supplier change (Jap & Ganesan, 2000; Bensaou & Anderson, 1991). The supplier is aware of his position, which could tempt the supplier toward opportunistic behavior. As Kim et al. (2017) state, the buyer is even more vulnerable when he invests in the sub-supplier instead of his direct supplier, as usually buying firms do not have a direct contractual relationship with their sub-suppliers and hence cannot safeguard their investments in a contractual agreement. In the triadic setting the need for safeguards is intensified also because a sub-supplier can terminate his relationship with his supplier and the buyer’s supplier can terminate his relationship with the buyer’s sub-supplier, which results in loss of the investments, as indicated in the supplier literature (Jap & Ganesan, 2000).

As Buvik (2002) noted, investment situations in which partners in the supply chain assume the possibility of opportunistic behavior should be safeguarded. Derived from transaction cost theory, opportunistic behavior and bounded rationality lead to the requirement for safeguards for specific investments (Williamson, 1985). As Williamson argues, the more specific an investment, the higher the resulting transaction costs for the buyer and hence, the more relevant safeguards become (Williamson, 1985). Williamson (1985) furthermore states that the purpose of safeguarding mechanisms “is to provide – at minimum costs – the control and trust that is necessary for transaction partners to believe that engaging in the exchange will make them better off”. As specific investments are characterized by a “durable nature” that justifies a long time planning horizon, prospective expenses to safeguard investments should be taken into account by the buyer (Stump & Joshi, 1999).

The literature review revealed studies that are focusing on safeguards for placing specific investments in the dyad. The most convenient situation is when both partners place specific investments in one another, as this leads to a “mutual hostage situation”, which acts as a safeguard for the investment (Williamson, 1985). However, it is more common that specific investments are only placed by one partner, where the significance of exploitation of the buyer depends on the degree of specificity of the placed investment (Bensaou & Anderson, 2009). In the situation where the buyer invests in the supplier or the sub-supplier, safeguards can be categorized into *formal and informal safeguarding mechanisms* (Rindfleisch & Heide, 1996). The *formal safeguarding mechanisms* include contract and vertical integration (Poppo & Zenger, 2002;

Ouchi, 1979; Joskow, 1987; Levy, 1985; Perry, 1989). *Informal safeguarding* mechanisms include trust, governance mechanisms, relational norms, commitment or relationship age (Suh & Kwon, 2009; Heide & John, 1992; Wagner & Bode, 2013; Noordwier et al., 1990).

Formal safeguarding mechanisms

(1) The *contract* as safeguard is the most familiar formal safeguard. It is a written agreement between two or more parties whose intention it is to legally bind obligations between the parties (Lyons & Mehta, 1997). A contract includes barriers or financial incentives to maintain a relationship between two business partners (Rindfleisch & Heide, 1996; Wagner & Bode, 2013). A contract includes defined roles and responsibilities of partners involved, defines desired outcomes and specifies proceedings for unpredictable incidents (Buvik & Andersen, 2011). The challenge of contracts as safeguard in a triadic setting is that the buyer and the sub-supplier usually do not have a contract with one another and that the supplier as middleman can terminate the relationship with the sub-supplier any time, putting specific investments in the triadic setting at even bigger risk. However, also in dyadic relationships, the literature often argues that contracts are not the optimal solution to safeguard specific investments, as contracts tend to be incomplete (Williamson, 1985; Cannon et al., 2010).

(2) In cases where contracts are not sufficient in dyadic relationships, the literature suggests choosing *vertical integration* as a safeguard (Yu et al., 2006). The literature indicates that vertical integration minimizes transaction costs as it reduces the suppliers' lock-in hazards (Yu et al., 2006). On the other hand,

vertical integration is expensive (Anderson & Weitz. 1986), and Monteverde and Teece (1982) found that vertical integration has a negative effect on the efficiency of suppliers.

Informal safeguarding mechanisms

Along with formal safeguards, informal safeguards have developed and have become a focus in research over the last decades (Yu et al., 2006; Claro et al., 2003), e.g., trust, goodwill, cooperation, relational norms, length of relationship between supply chain partners. Informal safeguarding mechanisms intend to build closer ties between the exchange partners and foster trust building and long-lasting cooperation rather than building complicated contracts (Bensaou & Anderson, 1999). They reduce transaction costs by “replacing contracts with handshakes” (Adler, 2001, p. 219). Hence, manifold informal safeguarding mechanisms have developed over time.

(1) Wagner and Bode (2013) state that the *relationship age* or the duration of a business relationship can act as a safeguard for placing specific investments. They observed that the longer a relationship between two business partners lasts, the more likely it is that the investments are safeguarded, as trust is generated between the business partners. Trust can also be created through information sharing between parties.

(2) *Relational norms*, such as flexibility, information exchange and solidarity, help to reduce the hazard of opportunism (Heide & John, 1992). According to the principal-agent-theory, information asymmetry is a significant reason for opportunistic behavior. The sharing of information reduces information

asymmetry and the likelihood of opportunistic behavior in the supply chain (Noordewier et al., 1990, Wagner & Bode, 2013).

(3) *Normative behavior*, such as goodwill or reputation, act as self-enforcing safeguards (Dyer, 1996). For normative safeguards to work, it is necessary that a long-term relationship be established between the partners, as they need to be built over time (Lee & Johnson, 2010, Gulati, 1995).

(4) *Dependence* of the supplier on the specific investments can serve as a safeguard (Bensaou & Anderson, 1999). Buyers tend to invest more in suppliers when they presume that the investment is of importance for the supplier. This can be seen as quasi integration, which describes the degree of linkage between buyer and supplier (Zaheer & Venkatraman, 1995). The more a supplier chooses to allocate significant portions of its output to one particular buyer, the more likely it is that both will not act opportunistically (Subramani & Venkatraman, 2003). Strengthened ties can be achieved through joint actions and expectations of continuity of the anticipated long-term business relationships (Heide & John, 1988).

(5) Closely connected to dependence is *power asymmetry* in favor of the buyer as a safeguard for his sub-supplier specific investments. Hojemose and Adrien-Kirby (2012) found that the supplier is more committed in situations where he is exposed to power asymmetry and hence, it can be applied as a safeguard.

(6) Wagner & Bode (2014) found out that *cooperation* between two business partners can also act as a safeguard. The more intensively the buyer and supplier work together, the less opportunistic a supplier will behave in the relationship. This is also confirmed in a study by Ghijssen et al., (2010).

(7) *Relational governance*, which emerges from values and agreed-upon processes found in social relationships, reduces transaction costs (Poppo & Zenger, 2002). The expectation of long-term continuity of the relationship protects firms from the pressure of immediate performance measurement. It gives firms the chance to develop long-term solutions. The transaction costs that emerge to develop solutions also act as safeguards against ending the relationship.

The results are summarized in *Table 5*.

Table 5: Summary of safeguarding mechanisms

Safeguarding mechanisms					
Type	Formal		Informal		
	Type	Example	Source	Type	Example
Contract	A written contract between two business partners	Rindfleisch & Heide, 1996; Wagner & Bode, 2013		Relationship age	Duration of the relationship creates trust between partners
Vertical integration	Concentrating business operations in one firm	Yu et al., 2006		Normative behaviour	Goodwill of business partners
				Relational norms	Sharing information between business partners
				Dependence	Dependence on one another
				Power asymmetrie	Buyer is more powerful than supplier
				Cooperation	Long-term cooperation between business partners reduces opportunistic behavior
				Relational governance	Agreed values and processes reduce transaction costs between supply chain partners
					Gulati et al. (2005)
					Poppo & Zenger, 2002

Although specific investments in the dyad or in triadic relationships are accompanied by many risks and require safeguards, companies still use them as a management tool. The following section gives an overview of theoretical explanation approaches that could explain why buyers execute sub-supplier specific investments.

2.4. Theoretical access to the topic of placing sub-supplier specific investments

The following chapter gives an overview of the various theoretical approaches to explain the motivation and antecedents of buyers to start to invest in their sub-suppliers. Furthermore, the theoretical approaches are selected under the consideration whether they promote understanding which safeguards are applicable in the triad.

The dissertation makes use of several theoretical approaches to describe and explain the phenomenon of buyers placing sub-supplier specific investments, as to date no theory alone can explain why buyers place specific investments in their sub-suppliers and how they should be safeguarded. Hence, the dissertation project makes use of an eclectic theoretical framework that enables the merging of different theoretical explanations for the phenomenon (Friedli, 2006). This is also in accordance with Stölzle (1999), who argued the importance of avoiding theoretical fragmentation to make sure that the research phenomenon is regarded from different angles. Also, Gioia and Pitre (1990) emphasize that including several theories helps to comprehend “different worldviews” (p.587). Thus, the selection of theories will help to explain the phenomenon of buyers placing sub-supplier specific investments and the concomitant safeguards (Stölzle, 1999). The theories support an explanation approach to explain and build a concept that includes characteristics, reasons and safeguards for placing sub-supplier specific investments. It is not necessary that each aspect of each theory be used to provide an explanation for the things that happen in the research (Gioia & Pitre,

1990). But for the research at hand, an applicable theory for explaining the discussed phenomenon must fulfill the following prerequisites:

- The theory should offer insights about motivations or antecedents for investing in supply chain/ business partners
- The theory should address insights into relationship constellations between supply chain/ business partners. In particular, it should help to explain possible interaction modes in the triad
- The theory should contribute to explanation approaches regarding safeguards

Additionally, Stölzle (1999) proposed four selection criteria that also support the selection process:¹³

1) Theoretical attractiveness

Theoretical attractiveness is given if a research paradigm is existent.

This is given if the theory is capable of solving scientific problems, if it is generalizable and if it allows a level of precision.

2) Design orientation

With regard to content, design orientation describes the existence of design variables, content related efficiency criteria and determinants related to a theory. The formal guidelines require application potential of the theory, an empirical relevance of the theory and information content of the theory.

¹³ This theory selection process is closely related to other dissertations at the Institute of Supply Chain Management at the University of St. Gallen, namely, e.g., Oettmeier (2017), Martin (2017) or Hänsel (2018).

3) Integrative power

Integrative power is achieved if the theory allows to learn from it and if the options to combine the theory with other theories in the field, exists.

4) Adaptability to the context

Adaptability to the context describes the adaptability of a theory to the context in question. Furthermore, it examines implications for the given context. In other words, it acts as a supplement for the three other selection criteria.

As no theory presently exists that explains placing specific investments in sub-suppliers, the author extracted the theories that she found in the literature review process that are applied to explain specific investments in the dyad. The author intends to test their applicability in the context of the triad. An overview of the collected theories is presented in *Table 6*.

Table 6: Theory collection

Theory	Extracted from:
Transaction cost theory	Huang & Huang, 2018; Lin et al., 2017; Li et al., 2017; Ebers & Semrau, 2015; Wagner & Bode, 2014; Yeung et al., 2013; Suh & Kwon, 2006; Kang et al., 2009; Bensaou & Anderson, 1999; Raman & Shahrur, 2008; Artz, 1999; Claro et al., 2006; Nair et al., 2011; Yu et al., 2006; Buvik & Anderson, 2011; De Vita et al., 2011; Maia et al., 2010; Okongwu et al., 2015; Raskovic & Brencic, 2013; Kwon & Taewon, 2005; Lothia & Krapfel, 1994; Chang & Huang, 2007; Joskow, 1987
Relational exchange theory	Huang & Huang, 2018; Lin et al., 2017; Li et al., 2017; Vázquez-Casielles et al., 2017; Artz, 1999; Claro et al., 2006; Yu et al., 2006 ; De Vita et al., 2011 ; Yen & Hung, 2013 ; Chen et al., 2017
Resource-based model / resource-based view	Chen et al., 2017; Jap, 1999; Okongwu, 2015; De Vita 2015; Nair et al., 2011 ;
Resource dependency theory	Ebers & Semrau, 2015; Nair et al., 2011

(Social)Network perspective/ theory	Huang & Huang, 2018; Lau & Moon, 2008; Chang & Huang, 2007
Social exchange theory	Nair et al., 2011; Wu et al., 2004; Kwon et al., 2005; Chang & Huang, 2007
Relational view	Nair et al., 2011

In addition to the collected theories from the literature research, the author tested whether other theories that have not yet been mentioned in the scanned literature can be found that help to explain the phenomenon of placing sub-supplier specific investments. Previous research has started to investigate which organizational theories could be applied to sustainable supply chain management (Tachizawa & Wong, 2014, p.644; Pagell & Shevchenko, 2013). The paper by Tachizawa and Wong (2014) has a focus on detecting theories that can explain managing lower-tier suppliers in general. Hence, this author analyzes their findings and examines whether they can be applicable in the context of placing sub-supplier specific investments. Tachizawa and Wong (2014) detect 13 different theories that could be used to explain the management of sub-suppliers (p.653-655).

- Agency theory (Eisenhardt, 1987)
- Transaction cost theory (Williamson, 1983) (included in *Table 6* “Theory collection”)
- Information process theory (Simpson et al., 2007)
- Social network theory (Granovetter, 1973, Choi & Kim, 2008 (included in *Table 6* “Theory collection”))

- Balance theory (Cartwright & Harary, 1956)
- Relational view (Dyer & Singh, 1998) (included in *Table 6* “Theory collection”)
- Resource-based view (Barney, 1991) (included in *Table 6* “Theory collection”)
- Stakeholder and institutional theory (Gassmann et al., 2016, Zhu et al., 2008)
- System thinking (Checkland & Holwell, 1997)
- Complexity theory (Crozier & Thoenig, 1976)
- Resource dependence (Pfeffer, 1987; Zhu & Sarkis, 2004) (included in *Table 6* “Theory collection”)
- Path dependence (David, 1985)
- Social embeddedness theory (Granovetter, 1985)

Five of the 13 proposed theories are included in *Table 6* “Theory collection” and hence have already been chosen by the author to be further investigated. As placing specific investments in a partner in the supply chain has a highly cooperative character, the first search for theoretical access can be found in research on cooperation in the supply chain. Cooperation in the supply chain is often explained through inter-organizational constructs (Sarkis et al., 2011). Hence, theories from new institutional theory are often applied to explain inter-organizational phenomenon.

In particular transaction-cost theory (Williamson, 1983) and agency theory (Eisenhardt, 1989) are used to explain inter-organizational cooperation and interaction. Transaction cost theory has been included in *Table 6* “Theory

collection”, but agency theory is missing. Following the research proposal by Ketchen and Hult (2007), organizational theories allow helpful explanations in the supply chain, hence, the author is convinced that the applicability of agency theory should be tested. Agency theory assumes bounded rationality and opportunistic behavior in a relationship between supply chain partners (Eisenhardt, 1989b). The agent (in this case, the sub-supplier) has a knowledge advantage about his innovations or know-how or way of working compared to the buyer (Fayezi et al., 2012). To align interests, the mechanisms of sub-supplier specific investments could be executed by the principal. In regard to aligning interests the author is certain that agency theory should be taken into consideration as well.

Additionally, the author intends to include stakeholder theory from the organizational theories. Stakeholder theory is “an upcoming tool in management research” (Gassmann et al., 2016, p.64). The theory proposes that value creation of a company is influenced by all stakeholders, hence managing stakeholders actively, meaning allocating resources to them, creates competitive advantage and increases the innovation potential of a company (Harrison et al., 2010). As a result, the author will also consider stakeholder theory. The remaining proposed theories are either too focused on sustainable supply chain management (e.g., information process theory) or do not seem applicable in the context of managing sub-suppliers through sub-supplier specific investments. Therefore, they are not considered further.

One theory that has not yet been mentioned but also belongs to the organizational theories and in particular the management accounting stream is

contingency theory. Contingency theory asserts that strategic decisions are situational, depending on multiple factors that are unique to a situation (Flynn et al., 2010). In the author's eyes, this is true for placing sub-supplier specific investments as well, hence the applicability of contingency theory should be considered.

The author is aware that there could be other theories that might be applicable to explain sub-supplier specific investments from the buyer's perspective, but the author is certain that the extracted theories represent a good basis on which to build a theoretical framework that helps to explain the phenomenon of placing sub-supplier specific investments.¹⁴

As not all theories found in the literature are appropriate to explain the phenomenon at hand, it is important to identify the suitable theories among those collected.

Based on the considerations that have been elucidated earlier, the author considered the following ten theories and tested them for their applicability for the given context.

- Agency theory (Eisenhardt, 1987b)
- Contingency theory (Flynn et al., 2010)
- Relational exchange theory (Lambe et al., 2000)
- Resource-based view (Barney, 1991)
- Relational view (Dyer & Singh, 1998)
- Resource dependency theory (Pfeffer, 1987)

¹⁴ Other theories considered included: theory of constraints (Goldratt, 1990), theory of dynamic capabilities (Teece & Pisano, 1994), network perspective, systems theory (Checkland & Holwell, 1997)

- Social exchange theory (Hormans, 1961)
- Social network theory (Granovetter, 1973)
- Stakeholder theory (Freeman, 1994)
- Transaction cost economics (Williamson, 1983)

First, the author will present a short description of each of the above-mentioned theories and will include an initial assessment as to whether the theories fulfill the defined prerequisites. In a next step, the remaining theories will be tested in accordance with the previously introduced selection process developed by Stölzle (1999).

2.4.1. Agency theory

Brief summary of the agency theory:

Agency theory is part of the “new institutional economics.” The focus is the relationship of the principal (e.g., employer) and his agent (e.g., employee) (Eisenhardt, 1989b). The agent is usually hired by a principal to fulfill a task (Jensen & Meckling, 1976). The underlying assumptions are distributing incomplete and asymmetric information between the two parties, mismatch in risk aversion, opposite objectives and different behavior resulting from self-interest (Halldorsson et al., 2007; Pratt & Zeckhauser, 1991). Furthermore, principal-agent theory also assumes bounded rationality and opportunistic behavior from both partners (Fayezi et al., 2012). The main idea is that the agent has a knowledge advantage in comparison to the principal, who usually hires the agent to fulfill a job (Grossman & Hart, 1983). Resulting from these mismatches between principal and agent are “agency costs” (Jensen & Meckling, 1976,

p.308). Agency costs include controlling mechanisms (that include the costs for contractual agreements), implementing information-based mechanisms that enable the principal to gain insight into the transparency of the agent's performance, and incentive-based mechanisms, such as commissions, profit sharing of the principal with the agent (Eisenhardt, 1989b; Ciliberti et al., 2011; Grossman & Hart, 1983). The mechanisms are used to control output or behavior. Agency theory argues that contracts that govern the relationship between principal and agent are incomplete (Eisenhardt, 1989b) hence, governance mechanisms are required to solve this conflict. As Eisenhardt stated, "the domain of agency theory is a relationship that mirrors the basic agency structure of a principal and an agent who are engaged in cooperative behavior, but have differing goals and different attitudes toward risk" (1989, p.59). Carter and Rogers (2008) applied agency theory to explain incentive mechanisms to implement sustainable supply chain management (Tachizwa & Wong, 2014).

Testing fulfillment of prerequisites

Agency theory addresses the problems of choosing a partner without being able to say how they will fulfill their contractual requirements, due to information asymmetry that is expressed in hidden characteristics, hidden action and hidden intention (Fayezi et al., 2012; Inderfurth et al., 2013). These points are also present when a buyer is assessing his options (different sub-suppliers) for placing sub-supplier specific investments. This assumption is applicable in the triad between buyer and sub-supplier. Since they usually do not have any contact, the information distribution is not sufficient between the two parties. Furthermore, agency theory explains how firms strive toward formulating the

Pareto-optimal contract (Kaluza et al., 2003). To keep the status-quo of the Pareto-optimum, agency costs are generated, e.g., bonding costs that should improve trust between the partners (Jensen & Meckling, 1976). This could help in finding an answer to applicable safeguards of sub-supplier specific investments.

Undergoing selection process developed by Stölzle (1999)

Selection Criteria	
Theoretical attractiveness	Very high. Agency theory is widely used in supply chain management research (e.g. Fayezi et al., 2012; Norrman, 2008)
Design orientation	The foundation of the theory is very solid (Eisenhardt, 1989).
Integrative power	Agency theory can be combined with the relational exchange theory to answer the question of how sub-supplier specific investments could be safeguarded.
Adaptability to the context	Aspects of the agency theory could help to find suitable safeguards for placing sub-supplier specific investments (RQ4).

Agency theory and sub-supplier management

Various mechanisms try to align the interests of the agent with those of the principal (Eisenhardt, 1989). Carter and Rogers (2008) use agency theory to explain incentive mechanisms that support sustainable supply chain

management implementations (Tachizawa and Wong, 2014). One immediate output of the theory is the support in drawing conclusions for the drafting of contracts as they are used to weaken the agency problems and reduce agency costs (Narayanan & Raman, 2004). The solutions presented through agency theory, namely incentive-based mechanisms, controlling mechanisms and information-based mechanisms (Fayezi et al., 2012) can also be applied in the context between buyer and sub-supplier. Agency theory helps to answer research question 4, which addresses the various safeguards that can be applied in the triad. Agency theory is used to test which safeguard works in which context. Furthermore, the theory can contribute to research question 3 regarding the interaction types in the triad. By analyzing the relationship between buyer, supplier and sub-supplier in light of the asymmetric information the triad faces, it can help to detect suitable interaction types for successfully placing sub-supplier specific investments.

2.4.2. Contingency theory

Brief summary of the contingency theory:

According to Otley (1980) the basic assumption of contingency theory is “that there is no universally appropriate accounting system which applies equally to all organizations in all circumstances” (p.413). Contingency theory analyzes relations between situational context, organizational behavior and organizational structures and states that firms perform better when they can adapt their structure to situations (Drazin & Van de Ven, 1985). To ensure an efficient organization, the “context and structure must somehow fit together”.

The fit can be seen from an external and an internal perspective (Drazin & Van de Ven, 1985, p.514). As Anderson and Lanen (1999) note, the external and internal perspective both influence executed management practices. The internal fit describes the relationship between structures and the internal process. The external fit pertains to the adjustment of internal structures to the external context (Wolf, 2011). One of the principal elements of the theory is the vital synchronization between context and structure to assure a well performing organization (Drazin & van de Ven, 1985). In sum, the literature states that strategic decisions are situational, depending on multiple factors that are unique in a situation (Gassmann et al., 2016).

Testing fulfillment of prerequisites

Contingency theory postulates that strategic decisions depend on multiple factors. This argumentation could explain why buyers do not place sub-supplier specific investments in each situation, but rather include multiple factors in their strategic decision process when choosing sub-suppliers for their specific investments.

Undergoing selection process developed by Stölzle (1999)

Selection Criteria	
Theoretical attractiveness	Contingency theory is already widely applied in studies in the field of supply chain research (e.g. Flynn et al., 2010)
Design orientation	The potential to use the contingency theory in the present research is high, as it can help to filter the situation in which buyers place sub-supplier specific investments in contrast to deciding against it as buyer (RQ1).
Integrative power	The application of the contingency theory can help to understand, which situational factors lead to a buyer's decision to initiate sub-supplier specific investments (RQ2)
Adaptability to the context	The theory could be applied to find answers to the contingencies that lead to an interaction of the buyer with a sub-supplier. The theory could also be used to determine an interaction type in the triad depending on situation factors (RQ2 + RQ3).

2.4.3. Relational exchange theory

Brief summary of relational exchange theory:

Relational exchange theory developed from the marketing literature and focuses on relational exchange in the business-to-business context (Macneil, 1980).

Lambe et al. (2000) point out that the success factor for these exchanges is the “nature of the relationship” (Lambe et al., 2000). They determine that a relationship is characterized by trust and commitment and is one in which relational exchange functions well (Morgan & Hunt, 1994). Macneil makes use of “relational contracts” as governance tools for the relationship (Macneil, 1980). To make this work, relational exchange theory relies on strong cooperation, joint planning activities between partners and being open to adaptions to partners (Hallen et al., 1991, Lambe et al., 2000). As Anderson and Naurus (1984), among others, state, this kind of relationship is a “long-term, evolutionary process” (Lambe et al., 2000, p. 214). Therefore, Lambe et al. (2000) introduce “interimistic” relational exchange, a short-term exchange relationship used by companies to “pool their skills or resources to address a (...) important business opportunity and/or threat” (p.213). These exchanges are characterized by time-pressure, which forces firms to quickly build a functioning relationship (Lambe et al., 2000). One of the variables Lambe et al. (2000), mentions for building trust involve pledges as specific investments.¹⁵ The authors note that specific investments are a clear sign of a strong interest in the relationship (Lambe et al., 2000).

Testing fulfillment of prerequisites

Relational exchange theory could contribute to explaining how safeguarding mechanisms can be established in a relationship between buyer and sub-supplier that, especially in incident-driven cases, requires quick realization of support.

¹⁵ The other variables Lambe et al (2000) mention, are: (1) *prior extraexchange relationship interactions* (positive post interactions contribute to trust building), (2) *reputation for fair dealing*.

As the classic form of safeguard, the contract, is hard to enforce in the triad as buyer and sub-supplier do not have contractual agreements, partners must rely on governance mechanisms, e.g., building trust to safeguard the investments.

Undergoing selection process developed by Stölzle (1999)

Selection Criteria	
Theoretical attractiveness	Relational exchange theory is widely used in marketing research between buyer and seller, however, the theory is transferable to the supply chain management context.
Design orientation	The theory could help to explain the phenomenon, found in the present empirical research, that safeguards for incident driven investments are quickly found and implemented.
Integrative power	Social exchange theory and transaction cost theory are highly compatible. They both concentrate on relational exchange and related governance mechanisms.
Adaptability to the context	Relational exchange theory could support in explaining how informal safeguards, e.g., trust, can be quickly built (RQ4).

2.4.4. Resource-based view

Brief summary of the resource-based view:

The examined literature often points to resource-based theory or the resource-based view (See *Table 6* “Theory collection”). The resource-based view describes the sources of competitive advantage a firm can realize by pursuing them (Hitt et al., 2016). The theory states that these resources, which are hard to imitate, are the key for long term success and hence a competitive advantage (Barney, 1991). However, the resource-based view only concentrates on the internal resources that a firm owns (Kraaijenbrink et al., 2010).

Testing fulfillment of prerequisites

That excludes business models, such as the exchange of specific investments beyond firm boundaries, and hence, the prerequisites are not fulfilled and the resource-based view is not suitable to explain why firms are placing sub-supplier specific investments (Gassmann et al., 2016). Due to the non-fulfillment of the prerequisites, the theory is not further tested with the framework by Stölzle (1999). Dyer and Singh (1998) have expanded the resource-based view with the inclusion of external resources that help firms to generate competitive advantage: the relational view.

2.4.5. Relational view

Brief summary of the relational view

The relational view from Dyer and Singh (1998) proposes that firms share their resources through cooperation to realize an advantage over competing firms that are unwilling to do so. Hence, it explains the competitive advantage firms can

generate by creating relationships and effectively working together with other firms in their network. Dyer and Singh (1998) assert that idiosyncratic inter-organizational cooperation can lead to a competitive advantage and relational rents. Dyer and Singh (1998) clearly state that “a firm’s critical resources may span firm boundaries and may be embedded in interfirm routines and processes” (p.661). They propose four types of cooperation between firms in a network: relational-specific assets, knowledge sharing routine, complementary resources or capabilities and effective governance. Relational-specific assets are specialized assets between two conjunction partners that allow the creation of value generating assets (Knudsen, 2003; Asanuma, 1989). Knowledge sharing is reached through the collaboration with other business partners (Ramanathan & Gunasekaran, 2014; Levinson & Asahi, 1995). Complimentary resources refer to generating relational rents through the utilization of resources and capabilities of another firm (Cao & Zhang, 2011). The last aspect of an effective inter-organization cooperation are effective governance mechanisms as they influence transaction costs as well as the willingness of alliance partners to engage in value-creation initiatives (Williamson, 2010; Dyer & Singh, 1998). The relational view enables the classification of relationship factors into factors that support or hinder the development of interactive collaboration in a buyer-supplier relationship (Touboulic & Walker, 2015).

Testing fulfillment of prerequisites

The relational view identifies factors that help firms to generate sources of relational rents that create a competitive advantage (Dyer & Singh, 1998). As Dyer and Singh (1998) clearly state, “*We define a relational rent as a*

supernormal profit jointly generated in an exchange relationship that cannot be generated by either firm in isolation and can only be created through the joint idiosyncratic contributions of the specific alliance partners”(p.662). This would require that the sub-supplier and the buyer both equally take part in the decision of placing sub-supplier specific investments or in choosing types of investments or interactions. This is not given in the present context; hence, the theory is not applicable and therefore not tested with the framework by Stölzle (1999).

2.4.6. Resource dependency theory

Brief summary of the resource dependency theory:

Resource dependency theory illustrates the linkages between a company and its ecosystem to understand the behavior of the organization (Gassmann et al., 2016; Pfeffer, 1987). Pfeffer (1987) argues that firms are dependent on one another, which makes firm manage external interdependencies, which results in new dependence and effects the intra-organizational power. The degree of interdependence triggers the behavior inside the organization (Davis & Cobb, 2015). The focus on power differentiates the approach from, e.g., the transaction cost approach (Davis & Cobb, 2015). In sum, it can be said that resource dependency theory states that firms need to interact with their suppliers in regard to accessing strategical necessary resources (Zhu & Sarkis, 2004, Tachizawa & Wong, 2014). In the context of the thesis it is assumed that specific investments are placed to develop a sub-supplier and not to access strategically relevant resources, hence, the applicability in this context does not seem to be given.

Testing fulfillment of prerequisites

Resource dependency theory does not include explanations for managing lower-tier supplier or give insights about forming relationships with sub-suppliers. Hence, the theory cannot provide answers to the research questions posed. Due to the non-fulfillment of the prerequisites, the theory is not further tested with the framework developed by Stölzle (1999).

2.4.7. Social exchange theory

Brief summary of the social exchange theory:

Social exchange theory originates from social science. Social exchange theory focuses on the exchange of tangible (goods or money) or intangible (social comfort or friendship) activities between at least two parties (Homans, 1961). The actions are voluntary by individuals who expect positive returns from their actions (Blau, 1964). They act “(...) in terms of anticipated rewards that benefit them (...)” (Cook, Cheshire, Rice & Nakagawa, 2013, p. 63). Each party in the exchange process regularly ranks their social exchanges in terms of social and economic outcome (Lambe et al., 2001). They stay in an exchange relationship if they rate the outcome as more positive in comparison with another exchange partner (Nevin, 1995). Social exchange theory has been widely used in marketing research to explain business-to-business exchanges (Lambe et al., 2000). “Social exchange theory explains how firms are able to develop relationship variables (trust, cooperation and commitment) so that partners can work together and make relational exchange possible” (Lambe et al., 2000, p.214). One form to develop these variables could be interactions between buyer and their exchange partners over time (Dwyer et al., 1987; Wilson, 1995). An

overall positive outcome (socially and economically) leads to an increase in trust and commitment between exchange partners (Lambe et al., 2001). Trust and commitment act as relational norms and are used as governance mechanisms (Heide & John, 1992).

Testing fulfillment of prerequisites

Just as the relational view, social exchange theory is based on the assumption that an exchange between business partners is a “two-sided, mutually contingent (...) exchange” (Emerson, 1976, p.336). Molm also repeats this by stating that reciprocity of the exchange is the key element of social exchange (2010). Since the placing of sub-supplier specific investments is solely carried out by the buyer, social exchange theory is not applicable in this context and cannot support in answering the research questions. Hence, the framework developed by Stölzle (1999) is no longer applied.

2.4.8. Social network theory

Brief summary of the social network theory:

Social network theory, a sociological theory, analyzes relationships and ties between actors (Granovetter, 1973). In social network theory an actor is defined as “node”, while the relationship between actors is defined as “ties” (Granovetter, 1973, p. 1361). As Granovetter (1973) noted, relationships between actors divide themselves in strong or weak ties. He found that strong ties are the exception between actors, making the weak ties even more important, especially in the business context (Granovetter, 1973). Here he noted that several weak ties enabled actors to exchange information in small networks (Liu

et al., 2017). In the end, the exchange in weak ties enabled the exchange between stronger networks, as they became connected through weak ties (Gassmann et al., 2016). Hence, the performance of a firm depends on the supply network into which it is integrated (Tachizawa & Wong, 2014). Social network theory could help to define how a network between buyer and external partners (including sub-suppliers) should be established to increase the success of sub-supplier specific investments.

Testing fulfillment of prerequisites

Social network theory helps to determine the composition of inter organization relationship between business partners. Hence, the theory could generate insights into relationship constellations between buyer and sub-supplier. However, answering the research questions cannot be supported by social network theory and therefore, the theory will be not further investigated with the framework developed by Stölzle (1999).

2.4.9. Stakeholder theory

Brief summary of the stakeholder theory:

Stakeholder theory focuses on all parties that are involved in the value-creation process, including suppliers, employees, customers, investors among others (Gassmann et al., 2016; Freeman, 1994). From this, Freeman (1994) divides them into two groups: a narrow definition includes all stakeholders that are vital to the survival and success of a company and the broad definition includes stakeholders that can affect or are affected by the company (Gassmann et al., 2016). In the context of stakeholder theory, Harrison, Bosse and Philips (2010)

argue that managing stakeholders actively, meaning allocating resources to them, creates competitive advantage and increases the innovation potential of a company. Research even states that firms that consider managing stakeholders carefully will create more value (Freeman et al., 2007, Harrison & Wicks, 2013). Harrison et al. (2010) emphasize that, like value creation, involvement with stakeholders can also increase the innovation level of firms. Furthermore, Harrison et al. (2010) assert that dealing with stakeholders can help to deal with unexpected events.

Testing fulfillment of prerequisites

Stakeholder theory could offer insights into motivation to invest into sub-suppliers in the triad. As Harrison et al. (2010) state, the managing of stakeholders develops trusting relationships, which leads to information sharing along the value chain. Stakeholder theory could help to justify buyers' aspirations to manage sub-suppliers proactively. Furthermore, Harrison et al. (2010) shed light on the fact that the theory explains how managers invest more in stakeholders than necessary. Hence, the theory could help to answer research question 1 and help to understand why firms decide to place specific investments.

Undergoing selection process developed by Stölzle (1999)

Selection Criteria	
Theoretical attractiveness	According to Gassmann et al (2016), the theory is an “upcoming tool in management research” (p.64) and is widely used in business model research.
Design orientation	Stakeholder theory could contribute to discovering buyers’ reasoning for placing sub-supplier specific investments.
Integrative power	Stakeholder theory can be connected with the transaction cost economics of Williamson (Freeman, 1994, p. 415).
Adaptability to the context	Stakeholder theory could be used to answer research question 2, explaining the motivation of buyers to include sub-suppliers in their strategic management.

2.4.10 Transaction cost theory

Brief summary of the transaction cost theory:

Transaction cost theory is part of the “New Institutional Economics” paradigm. Originally developed by Coase (1937), transaction costs are the “costs of running the system” and include costs that accrue before the conclusion of a contract, e.g. preparation or negotiations of contracts. Furthermore also monitoring, after the contract is signed, are cost intensive (Coase, 1937; Rindfleisch und Heide, 1997). Williamson (1985) states that transaction costs

include the direct costs of managing relationships. Furthermore, transaction costs are also generated through governance decisions. Williamson (1975) assumes that human behavior is defined through bounded rationality and opportunistic behavior. Bounded rationality assumes that decision makers have constraints on their cognitive ability and “limits on their rationality” (Williamson, 1975). This results, e.g., from limited access to information. Moreover, he defines two dimensions for transactions: asset specificity and uncertainty. According to transaction cost theory, this becomes a problem as soon as the circumstances of an exchange cannot be specified before the transaction and the degree of fulfillment cannot be easily verified after the transaction (Williamson, 1975). Opportunistic behavior assumes that decision makers try to act according to their self-interest. It is challenging to decide from the beginning, which business partners can be trusted. In such a case, trust is based on “calculated risk” and not on personal trust between parties (Williamson, 1996). Williamson (1985) defines opportunistic behavior as “self-interest seeking with guile” and includes intentional disregard of agreements between business partners. Opportunistic behavior is even more problematic in constellations with specific investments in which values are limited outside the relationship.

Testing fulfillment of prerequisites

In the supply chain context, transaction cost theory can be used to explain motives for entering inter-organizational relationships. Companies strive to reduce their overall transaction costs through cooperation with external partners (Halldorsson et al., 2007). As soon as specific investments are involved, they

lead to a “replaceability” problem. Williamson contends that companies are “locked into their transaction”, as a termination of the relationship only leads to sunk costs. To control the problem of opportunistic behavior, safeguards need to be applied. As the theory does not include contingency variables and only includes the view of one firm, it seems too narrow to be applied here.

Hence, transaction cost theory does not help to answer the research questions and therefore the selection framework developed by Stölzle (1999) will not be applied.

2.4.11 Linking the contributions of the theories to the topic

The search for the appropriate theory showed that no single theory offers a comprehensive explanation why buyers conduct sub-supplier specific investments. The motivation behind using an eclectic approach is that it allows building a framework that can observe the whole phenomenon of placing sub-supplier specific investments without being limited by only one perspective. The author is aware that the different theories cannot be integrated into one theory, especially because they have various different starting assumptions (Friedli, 2006, p.43). Hence, the author considered various theoretical constructs that could help in answering the research questions. Each of the ten theories were explained and the prerequisites were checked before the framework, developed by Stölzle (1999), was tested. After the examination of each theory, four theories remained as they contribute to answering the deployed research questions.

- Agency theory
- Contingency theory
- Relational exchange theory

- Stakeholder theory

All four of the chosen theories build the theoretical groundwork for answering the research questions. The interplay of the theories is presented in *Figure 12*.

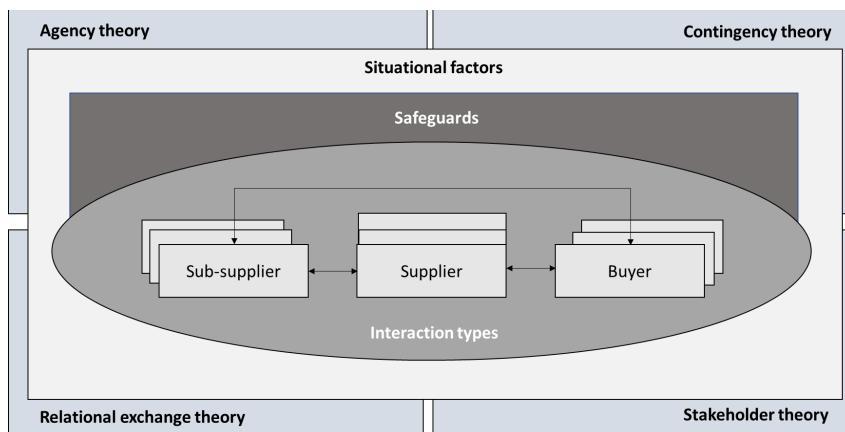


Figure 12: Theoretical framework of the dissertation project

Agency theory helps to develop an answer for research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad?” In a triad the information asymmetry between business partners is intensified, as the probable hidden intentions and actions of two business partners have to be taken into consideration. The application of agency theory can help to find incentive mechanisms for contractual agreements between buyer and sub-supplier or buyer and supplier to safeguard the specific investments placed in the sub-supplier by the buyer.

Contingency theory helps developing an answer to research question 2: “Why do buyers decide to place specific investments in their sub-supplier?”, research

question 3: “How can the buyer, the supplier and the sub-supplier interact in the triad when executing sub-supplier specific investments” and could also support in answering research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad?”. Contingency theory states that each strategic decision is dependent on the given situation. This is given, *inter alia*, through internal and external contingencies that influence decisions (Anderson & Lanen, 1999). Contingency theory can help to explain why buyers risk making incident-driven investments in their sub-suppliers as it posits that firms that are able to adapt to situations can reach higher performance levels than firms that are not able to do so (Drazin & Van de Ven, 1985). The type of interaction a buyer chooses in placing sub-supplier specific investments and the choice for a safeguard are highly dependent on the given context and the situation the triad. Hence, contingency theory is applicable here.

Relational exchange theory offers a perspective on how exchange transactions are governed apart from the classical governance mechanisms derived from transaction cost theory (Williamson, 1975): markets and hierarchy, neither of which governance mechanisms are flourishing today (Joshi & Stump, 1999). As Joshi & Stump (1999) indicate, these new governance mechanisms require commitment between business partners. As specific investments are one tool to create commitment between business partners, they are one antecedent to establish governance mechanisms between firms along with markets and hierarchy (Anderson & Weitz, 1992). Relational exchange theory can therefore be used to answer research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad?” Relational exchange theory states

that relational norms can act as a governance mechanism (Joshi & Stump, 1996). In dyadic relationships, buyers and suppliers develop long-term relationships when governance mechanisms are relational norm-based (Joshi & Stump, 1999). Therefore, relationship building through, e.g., specific investments is important. This theory can also explain governance mechanisms in a triadic setting that is also built on relational exchange.

Stakeholder theory helps to develop an answer research question 2: “Why do buyers decide to place specific investments in their sub-suppliers” (RQ2). The theory suggests that buying firms do more for their stakeholders “(...) beyond what is necessary to simply maintain their willful participation (...)” (Harrison et al., 2010, p.59). This is applicable here, as the buyer becomes involved with his sub-suppliers to improve the overall supply chain performance. It provides explanation approaches for reasons that could lead to sub-supplier management and especially to placing sub-supplier specific investments, although the risks of placing sub-supplier specific investments in the triad is even higher than in the dyad. One of the reasons, as pointed out by Mayer et al. (1995), could be the building of trust between business partners, which eventually leads to sharing sensitive information between business partners. Harrison et al. (2010) provide further suggestions as to why firms would get involved with their stakeholders, e.g., an increase in demand and efficiency, access to innovation and the possibility of dealing with unexpected events. These suggestions could also be applicable in the buyer – sub-supplier constellation. It can support in explaining why buyers start to manage some lower-tier suppliers proactively, although it

would not be necessary and hence, the theory is applied to answer research question 2.

3. Empirical investigation of placing sub-supplier specific investments

Following the approach of applying an iterative research process according to Kubicek, 1977, the second pillar of the research concentrates on empirically investigating the research phenomenon. The following chapter will first give an overview of the conception of the case studies followed by the within case analysis of the conducted cases (3.2-3.6). Chapter 3.7 provides the cross-case analysis and summarizes the findings of the case studies.

3.1. Conception of the case study

A case study is typically chosen to answer “how?” or “why?” questions, thus the case study approach is applicable in a research context where new research is emerging (Yin, 2014). Case study research can be applied to describe, test or generate theory in new research areas (Eisenhardt, 1989). It is broadly used in research to understand complex phenomena (Yin, 2014) and is often seen as an approach that offers more insights than other research techniques could (Rowley, 2002). This is due to the fact that case studies take contextual factors into account, which helps in understanding unstructured topics (Voss et al., 2002). Additionally, case study research makes use of data triangulation. Data triangulation describes the process of several researchers examining the same phenomenon or researchers with different points of view interpreting the same data to assure the validity of the data (Tellis, 1997). The author investigated a “contemporary phenomenon”; thus, it was not possible for the researcher to

manipulate the observed outcomes, which supports the usage of case study for the dissertation project (Yin, 2014). Rowley stresses that the strength of case studies is the help a researcher gets to better understand a phenomenon without using an experimental or laboratory setting (2002). Furthermore, case study research can be used for conceptual development (Meredith, 1993). The companies that were observed or interviewed for the case study all made their sub-supplier specific investments before the case study interview and therefore, have not been manipulated in any way by the researcher (Yin, 2014). The structure of the case study research (research design, case selection, data collection followed by data analysis) follows the approach from Yin (2014). This structure is broadly accepted and also applied by other researchers when executing case study research (e.g. Wilhelm et al., 2016; Thomé et al., 2014).

Research design

As the knowledge and theory base on managing sub-suppliers in the triad is poor, the case studies follow an inductive-explorative multiple-case study approach that does not require propositions (Yin, 2014). Nevertheless, the author knows what she wants to explore. She aims to disclose situational motives and antecedents for sub-supplier specific investments as well as types of specific investments and relationship interactions in the triadic setting with related safeguards. To assure this, the research uses an embedded multiple-case study design, or comparative structure, which has the advantage that the evidence of multiple case studies is more robust and reliable than single-case studies (Herriott & Firestone, 1983; Baxter & Jack, 2008), as the same case

study is executed several times to be able to collect alternative descriptions and explanations on the same case or replicate findings across cases (Yin, 2014). The idea of multiple-case studies is that the researcher can compare similarities and differences across and within cases. The aim is to draw comparisons out of the cases (Yin, 2014).

The single unit of analysis is “specific investments placed by the buyer in the sub-supplier in a triadic supply chain setting”. Qualitative research is often faced with the challenge of ensuring objectivity and reliability (Seuring, 2005), hence, reliability and validity play a pivotal role for resilient research results (Mayring, 2002; Stuart et al., 2002). To ensure reliability, various quality factors compiled by Mayring (2002), Eisenhardt (1989) and Rowley (2002) were applied when data was collected: (1) the case studies were documented, (2) the collected data was triangulated, (3) the research process was structured, (4) the researchers were close to the study item of sub-supplier specific investments, (5) the interpretation of the cases and data that was collected was done by multiple observers to include different perspectives. To further guarantee validity and prove the reliability of the case studies, the author used further measures suggested by Yin (2014). *Table 7* summarizes the measures that have been applied by the researcher to guarantee correct case study design.

Table 7: Case study measures for four design tests

Own illustration in dependence on Yi, 2014, p. 34, & Rowley, 2002

Measures	Execution
Construct validity – choosing the fitting operational measures for the concept being studied (Rowley, 2002)	<ul style="list-style-type: none"> ▪ Multiple interviews were conducted ▪ The interview partners had the chance to review the interview transcripts and some of the interview partners received results from the interviews and workshops as power-point presentations for review purposes
Internal validity – finding suitable causal arguments to argue conclusions of the research (Rowley, 2002)	<ul style="list-style-type: none"> ▪ The researcher made use of triangulation with the help of multiple data sources ▪ Pattern-matching was used when the data was analyzed ▪ Opposing results were addressed with interview partners and re-discussed
External validity – finding a domain to which findings of the cases can be generalized (Rowley, 2002)	<ul style="list-style-type: none"> ▪ Usage of multiple cases to investigate the same phenomenon ▪ Cross-case analysis of the cases ▪ Clear description of the case companies, their context and the situation
Reliability – guarantee that fellow researchers would come to the same	<ul style="list-style-type: none"> ▪ Case studies were protocolled ▪ A case study database was established including interview transcripts, power point

results if they were to repeat the research (Rowley, 2002)	presentations, journal articles, newspaper articles, audio data and further documents
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Case selection

According to Dubois and Araujo (2007), the case selection is “the most important methodological decision” (p.179). Also, Eisenhardt (1989) contends that case selection massively influences the quality of the research and the quality of the research outcome. All cases should be selected with the purpose of collecting data that help to understand the phenomenon better (Yin, 2014). Therefore, the cases should be selected according to the perspective of the researchers aim (Yin, 2014). The aim of the researcher was to find companies that have interacted with sub-supplier management and specifically with placing sub-supplier specific investments, be it incident-driven or proactive investments in a triadic setting. Hence, the researcher chose five companies with the knowledge that all of those companies act as buyer in the supply chain and were confronted with situations that led to the question of whether sub-supplier specific investments would be useful in the triadic setting.

Three of the five firms selected worked closely with the researcher for a period of two years on the topic of sub-supplier management during a CTI project and were therefore to a high degree predestined to be included in the case studies. The close collaboration between the researcher and the practitioners over two years helped the practitioners to open up about their experience and supported the researcher in understanding the actions taken in practice (Baxter & Jack,

2008). The other two companies were chosen because they had already had experiences with sub-suppliers in their supply chain and especially because they had placed sub-supplier specific investments. Furthermore, all the companies agreed to participate in the case study.

As a result of the careful selection of the companies, the researcher was able to address people from the company who had had first-hand experience with managing lower-tier suppliers. They were already aware that sub-supplier management can be conducted by buyers and they were open to the concept of becoming involved in the supply chain beyond the direct supplier. Furthermore, the companies were chosen with a variation strategy, meaning that companies of different sizes and from different industries were included in the case selection (Flyvberg, 2006). This is reflected in the five different firm sizes and the five different industries represented, as summarized in *Table 8* “Overview of the case studies”. Collecting multiple cases supports the call by Eisenhardt and Graebner, (2007) to include a variety of cases to help reveal connections between cases and therefore support robust results.

Table 8: Overview of the case studies

Company	Size	Industry	Interlocutors
Company I	33,000 employees	Transportation	- Head of supply chain - Head of quality
Company II	86,318 employees	Retail	- Head of quality - Head of IT - Sustainability Manager
Company III	2,440 employees	Natural Cosmetics	- Head of procurement - Head of packaging
Company IV	150 employees	Chocolate producer	- COO - Head of procurement
Company V	323,000 employees	Food producer	- Head of procurement

Data collection

As mentioned in the section “Research design”, the data collection followed the various quality factors developed by Mayring (2002), Eisenhardt (1989) and Rowley (2002), meaning that (1) case studies were documented, (2) the collected data was triangulated, (3) the research process was structured, (4) the researchers were close to the study item and (5) the interpretation of results was done by more than one researcher to guarantee validity of the research. In the following, each of the quality factors will be described in more detail.

(1) *The case studies were documented.* The case studies were documented in various forms. The researcher made use of tape recordings and notes in the various workshop sessions. Additionally, the researchers documented all workshops with a protocol and wrote a summary after each workshop for documentation purposes on findings about specific investments by the buyer in the sub-suppliers. Furthermore, the workshops were followed up with power-point presentations of the results.

(2) *The collected data was triangulated:* In case study research, the researcher always acts as an active agent in the process of data collection. He therefore has to be capable of asking the right questions, listening and interpreting the answers correctly and in an unbiased manner (Rowley, 2002). The validity of the data in case studies is secured through a triangulation process (Stake, 1995). A triangulation process requires various data sources that allow alternative explanations (Yin, 2014). The cases make use of data source triangulation, which Denzin (1984) defined as one of the four types of triangulation. In this process, the researcher compares data in different contexts, with the aim for it to stay the same. To support that, the data collection combined multiple methods to attain data triangulation. The main source of data-collection involved semi-structured interviews, followed by workshops, observations, a focus group and open accessible secondary data like newspaper articles or information on the websites of the companies (Yin, 2014). The collection of various data sources supports the validity of the triangulation (Lamnek, 1995). As Yin (2014) asserted, “any finding (...) in a case study is (...) more convincing and accurate

if it is based on several different sources of information (...) (p.98). Apart from one case, the interviews were carried out face to face and were recorded. The advantage of face-to-face interviews is that the interviewer can adapt to all situations and the reliability of the answers becomes stronger. The interview partners were asked to verify the transcripts of records for the interviews that had been recorded.

(3) *The research process was structured:* Each workshop was prepared prior to the workshop and followed an overall project plan that structured the whole project over a period of 24 months. The interview guideline was a semi-structured questionnaire that was used for the interviews with the five different firms. The interview questions are found in Appendix A. The conduction and presentation of the case studies followed a common approach to allow findings to be comparable.

(4) *The researchers were close to the study item of sub-supplier specific investments:* In total, 7 interviews, over 50 workshops with 13 different respondents from 5 companies were conducted between November 2015 and July 2018 in Germany and Switzerland. The interviews lasted between 30 minutes and 1 hour each, while the workshops lasted at least 1 hour up to 7 hours each. To strengthen confidence in the collected data, each interview and each workshop was conducted with two researchers (Eisenhardt, 1989) and also site visits were carried out in teams (Pettigrew, 1988). The workshops were part of

a Swiss-fund-supported project (Innosuisse)¹⁶ that conducted research on the topic of sub-supplier management. The firms that were regularly involved in workshops were the retailer, the cosmetics manufacturer, and the transportation company. The retailer was involved in 22 workshops, the transportation company in 21 workshops and the cosmetics producer in 10 workshops over a period of 24 months (Nov 2015 – Nov 2017).

(5) The interpretation of the cases and data that was collected was done by a team of researchers: The collection of the data for all the cases was collected at all-times by at least two researchers (Eisenhardt, 1989). The team of researchers always shared and condensed their notes after a workshop or an interview to document congruent results. Furthermore, the researchers discussed the information and asked reassuring questions of the interview partners whenever needed.

As presented in 1.3.1. Research scope, the findings were continuously and iteratively reflected by the researcher and thus the actual questions asked in the interview were adapted in the interview process and were used to build new knowledge (Kubicek, 1977). To make sure the collected data is presented the same way for every case study, the following structure will be applied to all case studies to guarantee consistent within-case data analysis.

¹⁶ Innosuisse (former CTI) is a Swiss fund company that funds science-based innovation projects between companies and Swiss-based universities. The project was funded by Innosuisse.

1. *General Information:* Background of the firm and key characteristics: General introduction of the firm, describing the size, market context and products of the firm that are of importance in the context of sub-supplier specific investments.
2. *Activities in the supply chain in general:* Cooperation in the firm with their supplier and sub-suppliers in general.
3. *Forms of specific investments at company:* Background on specific investments that have been conducted by this company in their entire supply chain
4. *Graphic* of one explicit example of sub-supplier specific investment of this firm
5. *What kind of investments were placed in what context?* Explanation of which kind of specific investment has been conducted. Additionally, the motivation and the antecedents of the firm's decision to conduct the sub-supplier specific investment will be discussed. Furthermore, the relationship constellation between buyer, supplier and sub-supplier in the example will be discussed.
6. *Which safeguards were used?* The next section will serve as the overview of the applied safeguards in the specific situation.
7. *Results:* The author will give a short summary of the sub-supplier specific investment situation in the context.

The following case studies are the result of research that was conducted from November 2015 till August 2018.

Data analysis

The first step of the data analysis is the within-case data analysis. Although it is the central point of case study analysis, it is one of the least prescribed processes of case study research (Eisenhardt, 1989a). The aim of the within-case analysis is to get a hold of the amount of data (Pettigrew, 1988). The idea is to become familiar with each case so that the author is later able to identify patterns for each case in order to detect generalized patterns across cases (Eisenhardt, 1989a). One process that is known, but not the rule or recommended as the only way possible, can be applied in this context is using the approach of writing down an explanatory case study (Yin, 1981). For that, each case study is described individually in the following. As Yin (1981) suggested, the explanatory case study should consist of 3 parts:

- 1) The repetition of the facts
- 2) Possible explanation why the company could have acted this way
- 3) Conclusion why the company has acted the way as described

Through describing each case in detail insights are created, as the pure volume of data is reduced to digestible parts (Gersick, 1988). The description of each case allowed the researcher to build deep insights into each case, which in turn, brings insights when it comes to the cross-case search for patterns (Eisenhardt, 1989a).

3.2. Case study I

General information

Switzerland's leading train manufacturer is also the country's state-owned railway infrastructure provider. The company employs around 33,000 employees. The firm manufactures trains, is responsible for the provision of trains, the infrastructure of the train rails and operates cargo services. The consolidated turnover in 2017 was around 399 million Swiss francs¹⁷. The market situation for the train manufacturer is rather good, as they are the market leader in Switzerland and have virtually no competition.

Activities in the supply chain in general

The company is obliged by state law to accurately know where exactly their products come from and which suppliers or sub-suppliers are part of their supply chain. The product life cycles are over 30 years. Hence, before the company brings a new product to market, they know exactly who the participants in their supply chain are, as firms have to go through a public tender when they want to become the firm's supplier. In the public tender, the suppliers have to name their suppliers so that their suppliers can be investigated by the Swiss train manufacturer as well. This is especially important to the Swiss train manufacturer, as former sub-suppliers are likely to turn into direct suppliers for maintenance reasons and fulfillment of aftermarket obligations. The firm has a well-established supplier management in place, but was lacking an integrated

¹⁷<https://reporting.sbb.ch/finanzen?rows=2,17,24,26,33,36,43,50,52,54,59,69,79,108&year=0,1,4,5,6,7&scroll=0>.

sub-supplier management, although the daily working processes included actions that involved the sub-suppliers. The main reasons for becoming involved in sub-supplier management were improving quality, securing access to innovation, decreasing their costs, securing availability and sustainability along the supply chain.

The processes of sub-supplier management are attached to the existing supplier management processes at the firm. The employees are required to become familiar with the topic and in cases where they need to become active, they should know the existent processes and which are relevant for them. Nevertheless, the topic of, e.g., placing specific investments in the sub-supplier should always involve projects and not be considered standard procedure at the company. At the firm, the management was considering including a KPI related to sub-supplier management. The KPI was expected to become part of a bigger, already existent performance scorecard. The results of the scorecard were expected to influence future bonus payments. However, at the end of the Case study, this new KPI was not implemented yet. Compositions of contracts were developed with an eye to sub-supplier management, e.g. the company developed a questionnaire for their direct suppliers that interrogated about their relationship to their supplier (the buyer's sub-supplier) and requested an overview of the sub-supplier base. Nevertheless, the company still faces barriers and resistance in their company regarding sub-supplier management. Many employees do not understand the relevance of spending time or money on sub-suppliers, as they insist that sub-suppliers are solely in the purview of direct suppliers.

The company makes use of external service providers that use software programs to detect possible supply chain failures. This risk management software supports firms in proactively detecting bottlenecks and can also help in finding the sub-suppliers responsible after an incident has taken place. One further challenge in this case are legal constructs that affect the buying company. The buying company is not allowed to interact with the sub-suppliers unless the direct supplier is also involved. The influence on the sub-supplier must always happen through well planned interactions with the direct supplier. This is, on the one hand, due to governmental regulations and on the other hand, powerful suppliers of companies normally include contractual rules stating that the buying company may not interact with the suppliers of the supplier. A further challenge is that the current IT infrastructure does not allow connecting supply chain partners across companies or with congruent ERP interfaces. However, this would be important for successful sub-supplier management and for successful sub-supplier specific investments, as it enables communication and information exchange across firm boundaries.

Forms of specific investments at Company I

Currently, the interactions with sub-suppliers have been mostly incident driven in their nature. The company has the advantage of being powerful in the market and hence, their direct suppliers are delivering good results in managing their direct suppliers (the buying firm's sub-suppliers). However, there have been a few incidents in which sub-suppliers have become insolvent, leading to a stop in production and hence resulting in a breakdown in the supply chain. These

insolvencies led the company to visit the affected companies in person to gather information on the situation. The buying company then supported the sub-supplier with sub-supplier specific investments in terms of training and even financially in order to avoid an extension of the production stop. The sub-supplier specific investments were the solution to ending the chaos, but they were not a lasting investment in a steady supply chain. The site visits or the contact has always been conducted with the direct supplier. In one particular situation the Swiss train manufacturer decided to provide financial support to the direct supplier in its effort to support the sub-supplier. While it was clear that the direct supplier did not appreciate the involvement of the buyer in their field of action, the supplier was dependent on the buying firm's help. However, Company I has also made proactive, strategically motivated specific investments in their sub-suppliers. This example is outlined in detail in the following section and illustrated in detail in *Figure 13*.

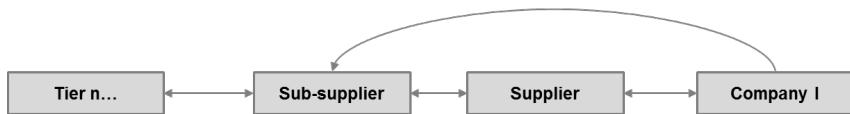


Figure 13: Interaction type “cooperation” in case study I

What kind of investments were placed for which purpose?

One specific case is illustrated in *Figure 13*: Interaction type “cooperation” in case study I. The buying company followed the methodological concept of KAIZEN for their entire production unit. In the implementation process of

KAIZEN along the supply chain, the company also involved several sub-suppliers of the suppliers. The purpose of the KAIZEN workshops was not to optimize the supply chain, but to optimize the interface with the direct supplier. However, when Company I noticed that several sub-suppliers of their suppliers had the potential to be optimized. They became interested and involved them in their workshops. In this specific case, Company I was supported by their direct suppliers, whose sub-suppliers had both: potential and interest. Each of the participants in the supply chain cooperated with one another. Company I provided know-how, coaches and trained all the participants in workshops that lasted up to one week. The aim was to optimize existing logistic concepts, sourcing activities or supplier networks by implementing lean management. This also meant that the companies' processes were adapted to one another. Also, a guarantee of supply and a prevention of supply chain breakdown led to including important sub-suppliers. Hence, it was useful to include the suppliers of the suppliers to adapt interfaces with them as well. For this purpose, Company I made use of a written agreement with the direct supplier that included an agreement that Company I would optimize the interfaces in question over a period of the next, e.g., two – three years. The agreement also determined which departments would be involved in the process. It became clear that the management of the supply chain and the KAIZEN process were only able be done with cross-functional teams. Company I stated that the investments in the supply chain were only placed under long-term considerations and the prospect of long, trustful relationships in the supply chain.

Which safeguards were used?

The buying company drew up a written agreement with their direct supplier that allowed them to interact with the sub-suppliers for a certain period of time. The written agreement clearly indicated how many workshops Company I would have with the sub-suppliers and who should be involved in the training or meetings. The interview partner also stated that Company I already had a strategic relationship with the direct supplier, and hence. They had, to that point, never had a problem with exploitation of specific investments.

Results

The antecedents for the specific investments in question were the optimization of the entire supply chain to reduce failures, improve quality, guarantee availability and reduce costs (lean principles). The specific investments were conducted with an eye to the long-term interests of the relationship between the supply chain partners and they were safeguarded through a written agreement that was highly similar to a contract. During the interview it became clear that Company I could also imagine interacting directly with the sub-suppliers in the future, e.g., receiving deliveries directly from the sub-suppliers. They also anticipate that direct interaction with the sub-suppliers could yield insights into innovation or they anticipated that the direct supplier might be replaced, which would result in a leaner, more cost-efficient supply chain. Disadvantages of such scenarios included a possible increase in complexity. At the moment, the direct supplier acts as a “quality gate”. If Company I directly interacted with the sub-suppliers, this “filter” would be eliminated. In the long run this would mean that

in-house competences regarding technical sub-components would need to be built to make sure that the sub-supplier and Company I could talk face to face.

3.3. Case study II

General information

With around 46,604 employees in retail and another 39,714 in production facilities, the Swiss retailer at the center of case study II is one of the largest retailers in Switzerland, with an EBIT of around 806 million Swiss francs in 2017. The market situation is highly competitive. Customers in retail expect high-quality products at moderate prices. They also increasingly expect sustainable production and fair working conditions along the supply chain in the food and non-food sector. Hence, there is high pressure on the company to deliver the right quality and avoid negative press, which includes poor working conditions or other failures in the supply chain.

Activities in the supply chain in general

Overall, the company has good supplier management and has many long-term and trustful relationships with their suppliers. For some product lines in the food as well as the non-food sector, the company knows their supply chain including all the partners in the supply chain. However, the firm indicated that the majority of their sub-suppliers remain a black-box. The retailer wants to establish the position of “risk engineer”, an individual who is responsible for the management of the sub-suppliers. The risk engineer has to achieve defined KPIs in regard to managing sub-suppliers and he also has to create companywide incentives that will motivate employees to take part in sub-supplier management. He is the

interface between sustainability, procurement and quality department. His aim will be to implement sub-supplier tools, e.g., specific investments, and make sure that quality goals or sustainability goals are achieved within the company. However, a “risk engineer” will be of no value if the company does not have processes in place that allow employees to perform sub-supplier management. Additionally, strategic procurement must become aware of the issue of sub-supplier management. It has to become an operative part of the work in the procurement department. The advantage of that is the opportunity to detect priorities in managing the supply chain. Actions can be better defined and problems will become clearer because the retailer is suddenly in a position to disclose the complexity of the supply chain to the rest of the company. The holistic treatment of the supply chain will lead to better results and avoid supply chain failure or disclosure of unethical supply chain behavior. During the empirical research the Swiss retailer stated that sub-supplier management can be an action that builds trust within the supply chain. Furthermore, working beyond the direct supplier could allow the buying firm to get in touch with so-called “nexus”-suppliers. As mentioned previously, “nexus”-suppliers are powerful players in the supply chain that often have more power than the buying firm itself (Yan et al., 2015). Company II is faced with several “nexus”-suppliers in their supply chain.

Additionally, sub-supplier management generates data, data that can be used to increase supply chain transparency and to understand the whole supply chain better. Data can also be used to generate weekly business intelligence reports.

Such reports can provide support in decisions regarding as though those sub-suppliers might be involved in management activities. This is closely linked to the topic of information flow inside as well as outside the company. Without valid data management, information cannot be used in the best way. This is closely connected to missing IT-infrastructure and bad data management. Company II is aware that the topic of sub-supplier management will have no future as long as top management is not involved, IT-infrastructure and data management is missing or as long as there is no knowledge of sub-supplier management within the company. Company II makes use of external service providers that use software to detect possible supply chain failures. This risk management supports firms in detecting bottlenecks proactively and also helps in finding the sub-suppliers responsible after an incident has taken place. The antecedent for the firm is that the service providers are flexible and understand the topic of multi-tier supply chains and have reliable, valid data. A service provider should understand the challenges that lie in mapping/identifying supply chains, detecting bottlenecks or identifying risks in the supply chain. The challenge of using service providers lies in answering the question of who is responsible for the collected data. Do companies share the data across companies / sectors, even though they may be competing with one another?

The understanding and awareness of proactive sub-supplier management has not yet spread across the company. The degree of awareness is especially different between employees and management. Employees expect the direct supplier to manage their supply chain and pass requirements along the supply chain. One

additional barrier for establishing sub-supplier management is a possible cultural clash between buyer and sub-supplier arising from cultural differences between the buyer and distantly located sub-suppliers. Additionally, the manpower in companies involved in including sub-supplier management is not a given. Monetary resources are scarce, and hence, establishing sub-supplier specific investments or management in general could be rather difficult. All these points would be important for establishing sub-supplier management in the company, especially for sub-supplier specific investments. Also, the initial situation at the retailer has not yet reached its pinnacle and sub-supplier management processes are not the company-wide standard. The retailer reported several situations in which he had placed sub-supplier specific investments either proactively or reactively.

Forms of specific investments at Company II

Although many sub-suppliers remain a “black-box” for the retailer, they have already had several interactions with their sub-suppliers in various forms. They had made both incident-driven and proactive sub-supplier specific investments at several different points of time. The incident-driven involvement with sub-suppliers included problems that were quality driven. The proactive involvement was driven, *inter alia*, by promises made to the end customer for the retailer’s private label. However, not only the statements to customers drive the retailer to give their best in supply chain management, but they also want to ensure the availability of products, good prices for the products and excellent quality. They fear product fraud or product recalls. The retailer has several cases

where they showcased controlling the supply chain and assuring the end customer that they know every step of the production of their end product. Two of the initiatives, one food topic and a non-food topic, will be described in greater detail in the following section and pictured in *Figure 14* and *Figure 15*.



Figure 14: Interaction type “cooperation”, non-food: Sustainable clothing line, in case study II

What kind of investments were placed for which purpose?

The project in the non-food sector of the firm was a showcase project for a sustainable clothing line. It is illustrated in *Figure 14*. It is a proactive approach to managing the entire supply chain and to investing sub-supplier specific investments in the entire supply chain. As this case had such a showcase effect, the suppliers were open to sharing information about their supply chain. If the direct supplier had been against it, he would have been replaced in the showcase scenario. Company II invested along the entire supply chain. They gave trainings at the raw-material producer level in an effort to support farmers in growing cotton. The aim was to grow sustainable, organic cotton. They met with dyers and sewing companies to teach them about sustainable dyeing, fair working conditions and even invested in schools and teaching programs for the workers. The aim was to be able to guarantee fairly produced clothing along the entire supply chain.

Which safeguards were used?

In this case, the company mainly used the close collaboration of all partners as the safeguard for their investments. The efforts to communicate with the entire supply chain, exchange information with the entire supply chain and keep track of it on a regular basis guaranteed the commitment from the buyer's side. This signal of commitment, the relatively long length of the relationship between the actors and the trust that was built over time were sufficient safeguards in this case.

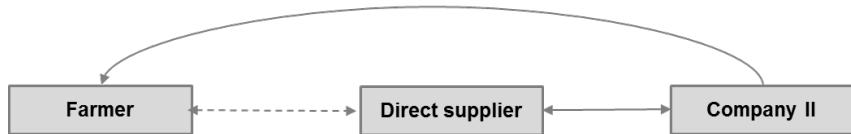


Figure 15: Interaction type: “parallel“. Food: Swiss-made mountain farmer product line, in case study II

What kind of investments were placed for which purpose?

The project in the food sector has been carried out by the retailer for over 10 years. They launched the brand of Swiss mountain farmer products and since then have been supporting Swiss farmers in their development through sub-supplier specific investments, as shown in *Figure 15*. The main focus lies on guaranteeing sustainability in the supply chain and ensuring the quality of the products. Their support of the farmers is manifold. They receive trainings in the optimization of their production, receive support with required manufacturing tools and they are offered an exclusive distribution channel for their products.

The direct supplier is mostly a packaging firm; hence, the direct supplier has no objections to the retailer being directly involved with the sub-suppliers.

Which safeguards were used?

In this example, Company II created a formal safeguard by creating a “lock-in” situation for the sub-suppliers. By supporting them in the production process with trainings or machinery, they obligated the farmers to distribute their products mainly to Company II. The length of the relationship and the trust between the buyer, the supplier and the sub-supplier act as informal safeguard.

Results for the food and non-food specific investments

Although both of the more closely examined sub-supplier specific investments were showcase projects for the firm, they were both driven by the same purpose. The investments are meant to help to guarantee good quality, good prices, and availability of products and guarantee sustainability of the supply chain. The sub-supplier investments were placed with the long-term interests of the firm in mind. None of the direct suppliers in the supply chain were against the cooperation in the supply chain, as the situation each time was rather specific. During the interviews, it became clear that sub-supplier specific investments should remain the exception and should be conducted more for showcase projects or pilot studies. By establishing a “risk engineer”, Company II hopes to avoid placing incident-driven sub-supplier specific investments. It became rather clear that they wanted to choose certain projects and establish sub-supplier specific investments in projects that could be used as “good-practice” examples.

3.4. Case study III

General information

The subject of case study III, a Swiss producer of natural cosmetics and natural medicinal products with a large business unit in Germany employs around 2400 employees and generated an EBIT of 26,000 thousand Swiss francs in 2017. The market for organic or natural cosmetics is experiencing strong growth, and market entries by new competitors have been observed in recent years, leading to stronger competition and, to a degree, struggles in the market. This placed even greater pressure on Company III to bring good products to the market and make sure that their brand promise was not affected by incidents or misbehavior in their supply chain.

Activities in the supply chain in general

Due to strong expectations from end consumers toward the brand and strict internal guidelines, the firm has always had to have a strong relationship with their direct suppliers to assure good product quality. Because the brand name and the brand's promise of the brand would be immensely weakened by a product failure, Company III was compelled several times to work directly with their sub-suppliers and place sub-supplier specific investments. They either had direct contact with the sub-suppliers or gave very clear orders to their direct supplier to guide his sub-suppliers. Especially when the issue was quality driven, they had direct contact with their sub-suppliers. But product availability and sustainability also played a role in directly interacting with the sub-suppliers. The idiosyncratic element of Company III is that they often need very

specialized products or raw materials. Their end product and even their packaging are designed with a focus on keeping the brand promise. One example of their strict specification guidelines involves marigolds, a flower that is required for the production of a hand lotion. Marigolds that are used in the production process for Company III may only be picked on nights with a full moon. These very exact specifications have led to careful consideration of direct suppliers and additionally has mostly led to long-term relationships with the direct supplier. Furthermore, it has also led to getting to know raw material producers when necessary and hence to good relationships with sub-suppliers as well. Despite that, the company also had a “black box” regarding parts of their supply chains and were not able to name all of their sub-suppliers. Products that were not especially critical or did not have strict specifications were sometimes bought on the spot market, especially when the supplier that they knew was not able to deliver the quantity requested.

For the firm, the topic of sub-supplier is in general interesting. In their firm, it is now a cross-functional topic with several departments sitting at one table. The firm has two points of view on the subject. They expanded the topic to include the raw material suppliers and their second focus was the packaging of their products. Both foci were chosen to guarantee good quality, keep their promise to their end customer of being a sustainable company both in terms of the product itself and their packaging. As the credibility of the firm is highly dependent on the fulfillment of their brand promise, the management has a keener awareness of their sub-suppliers in comparison with other firms. The size of the company seems to act as a positive enabler for sub-supplier management

as the cross functional work can be easily done between the different departments, all of which actually work together on one floor and, at times, even in the same office. Cross-functional work is no problem for them. They managed to form a goal for the entire company and ensure that the firm always works together to reach that goal. Besides processes like strategy alignment along their supply chain, they also have also begun developing the sub-supplier through sub-supplier specific investments.

Forms of specific investments at Company III

As already mentioned, the company has several interfaces with their sub-suppliers. In the past, sub-supplier specific investments were carried out to guarantee product availability in the right quality. Sustainability issues also led to a direct interaction with the sub-suppliers. In most instances of direct contact, the direct supplier was involved and also visited the sub-supplier with the company. They mostly made use of the relationship-type cooperation. Examples are manifold. They supported producers of packaging, as well as raw material producers and processors. In all those interactions, the direct supplier was involved and knew that the company was going to approach the sub-supplier and sometimes accompanied the company on visits to the sub-suppliers. For the following example of a sub-supplier specific investment, the author chose a sub-supplier specific investment that served as a lesson for Company III. The exemplary supply chain is presented in *Figure 16*.

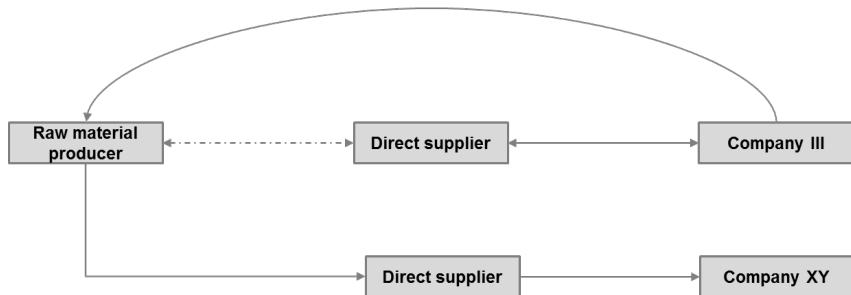


Figure 16: Interaction type “parallel” in case study III

What kind of investments were placed for which purpose?

One concrete situation involved an incident-driven sub-supplier specific investment in a raw material supplier by Company III as pictured in *Figure 16*. The raw material provider was no longer able to deliver the requested quality of a product. The raw material producer grew a special kind of rose that is used in the production of rose oil. For the production of the rose oil, the roses must be of high quality to allow the rose oil to be further processed in one of the company’s high-quality natural cosmetics. As the quality of the roses declined significantly, the rose oil did as well. When Company III confronted their direct supplier, it became clear that he had only ordered the roses and processed them into oil, but was not concerned about quality. The direct supplier was in a “safe” position, as he processed the roses into rose oil and then delivered the rose oil. He did not feel responsible for managing the quality of the raw material producer, so he accepted Company III’s decision to go directly to the raw material producer to develop him with the help of sub-supplier specific

investments. Company III made use of two types of sub-supplier specific investments. On the one hand, Company III executed training sessions with the raw material producer in which he was shown how to treat the cultivation of the special roses, their processing and was taught to recognize the right time for harvest. Additionally, they provided the rose producer with expensive, special seeds that promised an even higher quality of rose.

Which safeguards were used?

Company III knew the raw material producer had been in their supply chain for about two years, but they had never had a close relationship. Nevertheless, Company III waived all possible formal safeguard mechanisms with the raw material producer and concentrated on informal safeguards, e.g., trust between two partners. In this specific case the safeguard did not work. The supported sub-supplier sold the roses that had been produced to another supplier and Company III lost all their investments. Furthermore, they lost the roses they had expected to receive that were required to produce their cosmetics. In other scenarios the safeguard they used involved promises from the company that they would purchase products from the sub-supplier.

Results

Although one scenario of placing sub-supplier specific investments did not turn out as planned for Company III, it was not considered a reason to reject the idea of managing lower-tier suppliers. By placing sub-supplier specific investments and other lower-tier management approaches that they applied (*inter alia*, strategic alignment), the company generated broad know-how in managing

lower-tier suppliers. The company even expanded their involvement in the sub-suppliers, including sub-supplier specific investments. They noted that although they had lost one investment, the return on the other investments was still higher than if they had not invested in the first place.

3.5. Case study IV

General information

The subject of case study IV, a SME Swiss chocolate producer with a focus on sustainable chocolate, has around 150 employees and has generated sales of approximately 50 million Swiss francs in 2017. The brand portfolio includes around 200 different products with three different brands. The company has a strong focus on sustainability. This differentiation criterion of sustainability is important for the firm to position themselves in the highly competitive market of chocolate production.

Activities in the supply chain in general

Company IV understands sustainability as the interaction of three pillars: economic, ecological and social sustainability. The ecological pillar includes raw material as well as packaging material. The social pillar includes the relationships to their suppliers, which they try to configure as fairly as possible. But the social pillar also includes the end-consumer. To keep their brand promise to the customers and to keep the goals they have set for themselves as a sustainable company, the company strongly focuses on having a transparent supply chain. Although the company is rather small, they still try to conduct some audits in the supply chain themselves. The other control tool is cooperation

with fair-trade organizations that is expected to help to guarantee compliance from lower-tier suppliers in the supply chain. Along with the goal of having high-quality products or influencing prices, the company also interacts with lower-tier supply chains to guarantee the availability of critical raw materials in the future. Furthermore, they also focus on sustainable packaging and try to reduce waste. For this purpose, they work closely with their packaging suppliers.

Forms of specific investments at Company IV

The chocolate market competition is very high and their sales have lately been decreasing. The highest growth was realized through niche products like vegan, organic or fair-trade chocolate bars. The company has set their standards high and focuses on buying organic and fair-trade raw materials only (e.g., sugar and cacao). The relationship with the direct suppliers is very intensive and the company did have initial interactions with raw material producers in South America. Those interactions are part of an effort to reorganize the company toward high sustainable goals. The company does not intentionally use sub-supplier specific investments to develop sub-suppliers, but has nevertheless placed specific investments when visiting sites in South America to discuss harvesting with farmers, share their expectations and support with trainings on the farming and processing of the fragile cacao plant. The company was reducing their interaction with the sub-suppliers at the time of the conducting of this study, as their power in the market is very limited since the amount they buy is rather small in comparison to other companies. They are, at the moment, planning projects involving interaction with other SMEs and also bigger firms

with round tables on “cacao production”. This is illustrated in *Figure 17*. The hope of the merger is to create a leverage effect that will influence the farmers and helps all the participants of the round table.

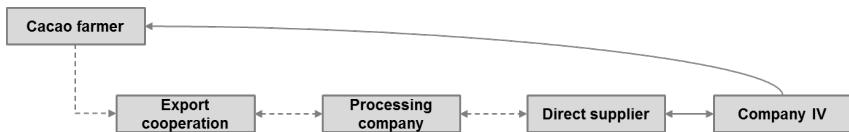


Figure 17: Interaction type “parallel” in case study IV

What kind of investments were placed for which purpose?

Their experience with sub-supplier specific investments was limited to smaller interactions with farmers from South America (Peru) that produce high quality, fair-trade cacao beans, as illustrated in *Figure 17*. They discussed growing techniques, drying procedures and tried to strengthen the relationship with the farmers and the company anticipated their focus on sustainability in the supply chain. They did not require special safeguards, as the sub-supplier specific investments acted as a form of trust and relationship building between supply chain partners. The interaction took place directly with the raw material producers without interaction with the direct suppliers. However, the direct suppliers were not happy about the interaction of the company with the raw producers, as they feared that the company might try to reduce prices or swap the direct suppliers. The concern was unfounded as the company is still highly dependent on their direct suppliers since the direct supplier supplies them with

cacao butter, which is needed for the production of every chocolate product they offer.

Which safeguards were used?

As the specific investments were solely intangible investments in terms of know-how transfer, the chocolate producer did not need to safeguard his investments in a specific form. Rather, he hoped that the attention and the dedication of his time and the accompanying involvement would help to build a foundation for future involvement between the buyer and the raw material producers.

Results

Company IV is a small company that does not have many resources that can be used to invest in sub-suppliers. Nevertheless, the buyer became involved in sub-supplier management through know-how transfer and site visits. It is possible that the time and know-how transfer will later be used as a basis to build deeper relationships and an exchange between the buyer and the sub-supplier.

3.6. Case study V

General information

The subject of case study V, a Swiss food producer has around 323,000 employees worldwide and sales were 89.8 billion Swiss francs in 2017. The company is present in 189 countries and operates over 2000 different brands worldwide. The market competition in the food industry is fierce, customers expect good quality at reasonable prices and the company experience has made

them aware that customers will hold them accountable for practices along the supply chain and demand guarantees of fair practices along the supply chain.

Activities in the supply chain in general

Through the market power of the company, the relationship with the suppliers is existent, however, with most of them, it would not be characterized as a close and long-standing business relationship. The company uses its power more to get what they expect from the market. As the quality and the quantity demands are rather high, the company started broadly investing in sub-suppliers at the raw-material producer level in response to various issues. The company works with almost 165,000 direct suppliers and 695,000 sub-suppliers worldwide¹⁸. Their size gives them incredible leverage in managing the supply chain. This can be an advantage or a disadvantage for the company. They had one unpleasant incident with a non-governmental environmental organization (NGO) that accused them of using unsustainable palm oil in their products. The NGO made the allegation in public and forced them to act¹⁹. In the NGO's opinion the company was so powerful that if they changed their procurement of palm oil, smaller companies would follow and the entire production of palm oil could benefit from it. Now the firm only procures sustainable palm oil, increasing the production of sustainable palm oil and enabling smaller firms to also shift to sustainable palm oil. For Company V "collaboration is key"²⁰ in

¹⁸ <https://www.nestle.com/aboutus/suppliers>

¹⁹<https://www.independent.co.uk/environment/green-living/online-protest-drives-nestl-to-environmentally-friendly-palm-oil-1976443.html>

²⁰ <https://www.nestle.com/aboutus/suppliers>

the entire value chain. They have committed themselves to sustainable sourcing, which means sustainable sourcing along the entire supply chain, leading to traceability of the value chain. For the company this includes making sure human rights are represented, environmental concerns are taken care of and animal welfare is respected during the whole value chain process. The company has different approaches to guarantee that they meet their own sustainable sourcing standards.

Forms of specific investments at Company V

The implementation of the sourcing standards is mostly done through sub-supplier specific investments in various forms. On the one hand, they support farmers directly to increase production outcome and to guarantee themselves availability of the needed products. This is a practice they follow in, e.g., Ivory Coast, where they train farmers in drying coffee beans and harvesting the fields to guarantee that the supply of coffee beans remains steady. The farmers have the advantage of having their production outcome increase through the training and therefore their income increases. On the other hand, the company provides community training on the treatment of different products to raise awareness for the correct handling of the products or raw materials to guarantee the best possible quality. This also includes training of cocoa and coffee farmers in Ivory Coast. One further pillar they use in their responsible sourcing is the work against deforestation with their sub-supplier and supplier as well as investments in education to enable affordable access to education for people working in the supply chain. Along with improving the quality of the product and assuring the quantity of the products as well as improving social conditions for the farmers,

the company wants a guarantee of product availability in the near future. As an example of a sub-supplier specific investment, the investment in Ivory Coast farmers will be further examined. To support that *Figure 18* helps to illustrate the supply chain.

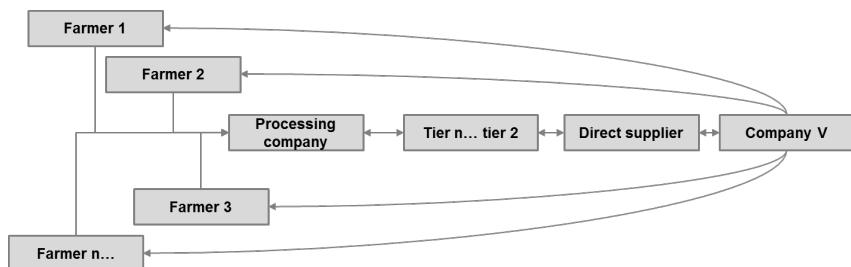


Figure 18: Interaction type “bypass” in case study V

What kind of investments were placed for which purpose?

The sub-supplier specific investment in the coffee farmers in Ivory Coast was made directly to the farmers without involving the rest of the supply chain as depicted in *Figure 18*. The direct suppliers were not or were minimally integrated into the process of choosing the farmers and providing them with training on harvesting or tools for harvesting as investments. Additionally, they provided the farmers with “high-yielding disease-resistant plantlets”²¹ that were developed by the company’s researchers. The company invested in around 147,000 coffee farmers and also held trainings for all of them. The overall goal was to increase the productivity of the farmers and to increase the quality

²¹ Retrieved on 25.07.2018 within the data triangulation <https://www.nestle-cwa.com/en/a-coffee-farmers-story-in-cte-divoire>

delivered. In the long run, they stated that they were trying to ensure the availability of goods that could at some point become rare due to incorrect farming practices or an increase in demand. Through the continuous development and investment in farmers and by ensuring the farmers that they would buy their produced quantity for reasonable prices, the company hopes that they can avoid shortages in the supply in raw materials. Additionally, they are improving their credibility and image for their end customer as they, e.g., are keeping their promises in regard to sustainable sourcing along the value chain. Furthermore, they can improve their relationship with the farmers by providing support in terms of helping them to produce more and, in the end, earn more.

Which safeguards were used?

The company used informal safeguards, e.g., building trust, ensuring commitment and building dependence (pressure) on the farmers even though they did not have long-term relationships. Through the training provided by the company and the provision of special plants, the farmers felt very committed to the company. One of the farmers stated “this is our hope for the future”²². Along with the provision of seeds and training, they also started building schools in the regions they supported to deepen the relationship even more and to build better trust and commitment. Due to the large number of farmers who were supported by the company, the company would likely be able to accept if some farmers

²² Retrieved on 25.07.2018 within the data triangulation <https://www.nestle-cwa.com/en/a-coffee-farmers-story-in-cte-divoire>

did not sell their harvest to the agreed processing firms. However, the pressure on farmers to sell to the agreed processing firms was probably high and if farmers started selling their products somewhere else, they would be excluded from the benefits they could have when selling to company V.

Results

Company V is well aware of sub-supplier management. It is even a significant part of their daily business. The investments in the coffee farmers in Ivory Coast alone was around 350 million Swiss francs²³. The top management of the firm supports the development of the supply chain as the corporate strategy on sourcing is “responsible sourcing” along the value chain. They are a big company that has enough resources to actually influence and change the supply chain. They have the power to pressure their direct suppliers to open up about their sub-suppliers and gain supply chain transparency, which enables them to directly interact with their lower-tier suppliers. They act proactively to get the most out of their commitment and they often choose interaction types that directly connect them with the sub-suppliers. Barriers to sub-supplier management is almost nonexistent, as the commitment to sustainable practices is embedded in the firm strategy. Also, barriers from the sub-suppliers do not seem to be a problem as they probably started with only a few farmers and the positive word of mouth of a few farmers led to voluntary participation of other farmers.

²³ Retrieved on 25.07.2018 within the data triangulation <https://www.nestle-cwa.com/en/a-coffee-farmers-story-in-cte-divoire>

3.7. Cross-case analysis and insights from the case studies

After the description of each case in detail, it is important to compare the explanations of the phenomenon across the companies, hence the within-case analysis is usually followed by the cross-case analysis. The cross-case analysis is used to find patterns and similarities between the conducted cases (Eisenhardt, 1989a, Miles et al., 2014). Its main purpose is looking at the data in various ways to overcome premature conclusions due to biased information processing (Eisenhardt, 1989a). As Eisenhardt (1989a) stated: "people are ...] poor processors of information" (p.549). To solve that Eisenhardt (1989a) offers three possibilities to compare the data:

1. Select categories and look for within group similarities coupled with differences. Hereby the dimensions can be chosen and defined by the researcher.
2. Choose a pair of the cases and list similarities and differences of each pair. The researcher does not assume that this would bring the best output for the research at hand.
3. Divide the data by the various sources. This possibility to compare the data can be used, when several researchers analyze the cases together. The idea is, that one researcher analyses the output for the interviews, another analyses the workshops and a third one looks at the rest of the data.

Since the analysis of the cases has been executed by the researcher alone, the researcher decided to define dimensions to look for similarities and differences

within the cases and to compare the data (Eisenhardt, 1989a, Miles et al., 2014). This is important, as the sole provision of each case on the topic alone is not enough to extract new findings, as the tendency is to quickly draw conclusions if the data is not examined in a variety of ways (Eisenhardt, 1989a). Hence, the author made use of the generated codes from the interviews to allow a cross-case comparison. Data analysis of the case studies is a challenge, as it “is one of the least developed and most difficult aspects of doing case studies”, also for cross-case analysis (Yin, 2014, p.109). The analysis includes categorizing, testing and examining the collected data (Yin, 2014). As the data was collected with semi-structured interviews and individual workshops, it was challenging to compare the interview results 1:1 (Ellram, 1996). Although a semi-structured interview has high flexibility during conduction of the interview, the interpretative strength is later reduced and it would be challenging to test hypotheses with the interviews. However, as the author did not strive for that, in this context, this disadvantage can be ignored.

To be able to analyze the collected data, the researcher made use of theming the data, which was retrieved from the interviews (Barratt et al., 2011). Theming the data is applicable for many research environments but is especially suitable for phenomenological research (Giorgi & Giorgi, 2003). As the research at hand and the research questions at hand addressed getting to know and understand the existing phenomenon from practice, theming of the data seems appropriate as data analysis approach. Theming the data allows to generate a thematic statement, rather than short codes (Urquhart, 2013). This statement is rather an extended phrase that identifies what the unit of analysis is about (Saldana, 2013).

It describes a phenomenon and even interprets it (Boyatzis, 1998). It allows a systematic categorization of findings, without leading the researcher to premature conclusions (Saldana, 2013). Thematic coding allows a summary or a condensation of the core content of collected data (Saldana, 2013). Data in the present case include interview transcripts, field notes, workshops, and websites and so on. The idea of theming the data is that the data is broken down into “manageable segments” (Schwandt, 1997, p.16) and that these segments are provided a name to analyze the data. Themes present ideas of the interview partners, that state why and what is happening (Rubin & Rubin, 2012). This is in accordance with the phenomenological research approach that would like to get a deeper understanding of the phenomenon of placing sub-supplier specific investments. Hence, the author themed the data and derived various categories and sorted the text into the categories. The categories are built through the information that is derived from the data and additionally supported by suggestions from literature (Schwandt, 1997). The author extracted the following five dimensions out of the case study research:

- 1) Reasons and motivations for sub-supplier specific investments
- 2) Interaction types when placing sub-supplier specific investments
- 3) Forms and types of sub-supplier specific investments
- 4) Safeguarding mechanisms for specific investments
- 5) Barriers for placing sub-supplier specific investments

The author used this dimensions look for within group similarities coupled with differences (Eisenhardt, 1989a).

1) Reasons and motivations for sub-supplier specific investments

The cross-case analysis for the motivations and reasons to place sub-supplier specific investments, had a lot of similarities across the cases. Each case stated that they make use of sub-supplier specific investments to increase the quality of the products delivered by the sub-supplier, e.g. “(...) projektbezogen, indem wir an gemeinsamen Zielen, z.B. Nachhaltigkeit oder Qualität arbeiten” (Case Study II). Another similarity that was exploited was the motivation to guarantee availability of the goods received from the sub-supplier, e.g. “(...) es war für uns bezüglich der Versorgungssicherheit für unsere neuen Produkte wichtig (...)” (Case Study III). Furthermore, the companies stated that they place sub-supplier specific investments to guarantee sustainability in the supply chain, e.g. (...) [Die Anzahl der Unternehmen] die auf Nachhaltigkeit Wert legt, wächst und das übt im Kollektiv auf grössere Zulieferer Druck aus” (Case Study IV). Another similarity was, that companies hope to get an insight into the price structure of lower tier suppliers, e.g. “Mit den Vorlieferanten wird auch über Preise gesprochen. Obwohl diese Preise nicht für den direkten Lieferanten transparent sind” (Case Study V). Two aspects that have only been named by two companies are “technology at the sub-supplier” and “stakeholder pressure” that motivate the companies to execute sub-supplier specific investments.

2) Interaction types when placing sub-supplier specific investments

When the author applied the cross-case analysis for the interaction types that are used in the triad, it was astonishing that the answers of the companies were very similar. They all stated that they only execute sub-supplier specific investments, when their direct supplier knew that they placed sub-supplier specific

investments, e.g. “Der Kontakt [mit den Vorlieferanten] erfolgt immer zusammen mit den direkten Lieferanten oder zumindest in Absprache mit ihnen” (Case Study I). Furthermore, four of them made clear, that they only executed sub-supplier specific investments with the involvement of their direct supplier, e.g. “Das geht üblicherweise über den Lieferanten (...)"(Case Study II). One company stated that they use cooperatives to place sub-supplier specific investments, e.g. “wir müssen uns sicher sein, dass das mittel- und langfristige Kooperationen sind, in denen wir mit den Vorlieferanten und Lieferanten” (Case Study IV).

3) Forms and types of sub-supplier specific investments

The thematic coding for the category of forms and types of specific investments showed that companies make use of tangible and intangible safeguarding mechanisms. All of the companies made use of intangible investments in form of trainings or education in any kind of form with the sub-suppliers, e.g. “Wir haben sie unterstützt oder auch Trainings angeboten (...)" (Case Study III). Furthermore three of the companies stated that they make intangible investments in form of developing new ideas at the sub-supplier level, e.g. “Es gibt es immer wieder Situationen, in welchen wir direkt mit dem Lieferanten oder Unterlieferanten zusammen neue Sachen entwickeln (...)" (Case Study V). When it came to tangible investments, only two companies reported to have used them. Two companies stated that they invested into the infrastructure of the sub-suppliers, e.g. “(...) es kommt auch vor, dass wir ganz gezielt in die Infrastruktur investiert haben” (Case Study II). One of the cases even stated that they make

monetary investments in the sub-supplier, e.g. “(...) und sehr viel Geld investieren in den nachhaltigen Anbau (...)", (Case Study V).

4) Safeguarding mechanisms for specific investments

The cross-case analysis showed that companies make use of formal and informal safeguarding mechanism in the triadic relationship between buyer, supplier and sub-supplier. In regards to formal safeguarding mechanisms, three of the five companies stated that they make use of the classic safeguard in form of a contract, e.g. “Das ist ein Schriftstück (...)" (Case Study I) and “Das [Schriftstück] wird unterzeichnet, formalisiert und hat seine Gültigkeit (...)" (Case Study I). Next to the formal safeguard in form of a contract, the case studies revealed that buyers tend to make use of informal safeguarding mechanisms to protect their sub-supplier specific investments. The companies tried to establish norms between the business partners, to show their commitment and bring the same goal to the sub-supplier to guarantee that they don't misuse their sub-supplier specific investments, e.g. “Es geht um einen Invenctivierungmchanismus. Wenn wir den Vorlieferanten erklären, dass Sie oder die nächste Generation profitieren kann" (Case Study II). Another form of safeguard, was creating a “dependence” in the supply chain, e.g. “Wir garantieren eine Abnahmemenge und die Vorlieferanten vor Ort können sich darauf einstellen. Oder wir halten es in einem schriftlichen Vertrag fest" (Case Study III). This guaranteed that the sub-suppliers felt safe and reserved the agreed amount of goods for the buyers. Another factor that was also named by three of the five companies was developing a long-term relationship within the supply chain as safeguarding mechanisms, e.g. “Wir müssen uns sicher sein,

dass das mittel-und langfristige Kooperationen sind (...)" (Case Study IV) and "Man macht es gemeinsam. Das ist die Absicherungsmassnahme die uns die Sicherheit gibt" (Case Study I).

5) Barriers for placing sub-supplier specific investments

The last category of the cross-case analysis was identifying the barriers for placing sub-supplier specific investments. The cross-case analysis showed that the barriers for each company were mostly individual barriers. One barrier that most companies consistently reported was the lack of resources for the topic of placing sub-supplier specific investments, e.g. "... jedes Produkt hat ein Budget was eingehalten werden muss (... und wenn die Zielsetzung nicht erreicht wird, wird das Projekt beendet" (Case Study II). Furthermore, three companies agreed that the complexity increases, when it comes to the topic of sub-supplier management, e.g. "durch Vorlieferantenmanagement wird die Komplexität erhöht und die Risiken nehmen zu" (Case Study I) and "... dadurch braucht man intern ganz andere Kompetenzen" (Case Study I). Two companies reported that some countries are rated as "risk countries", making sub-supplier specific investments less attractive and two company stated that cultural barriers hinder them to use sub-supplier specific investments, e.g. "Kulturelle Schwierigkeiten" (Case Study III). One company stated that there is no common understanding, which can hinder sub-supplier specific investments. The following table gives an overview of similarities and differences of the cross-case analysis.

# of cases with item	Dimensions				
	Reasons and motivations	Interaction types	Form and types	Safeguarding mechanisms	Barriers
in all cases (5)	Quality (I, II, III, IV, V)	Direct supplier knew (I, II, III, IV, V)	Training (I, II, III, IV, V) Education (I, II, III, IV, V)	-	-
in 4 cases	Sustainability (II, III, IV, V) Availability (I, II, III, V)	With the supplier (I, II, III, V)	-	-	-
in 3 cases	Price (I, IV, V)	-	-	Same values (I, II, III) Contract (I, II, III) Establish long-term relationship (I, II, IV)	No resources (I, II, IV) Complexity (I, II, IV)
in 2 cases	Stakeholder (II, V) Technology (I, V)	-	Joint development (I, V) Infrastructure (II, V)	Create dependence (I, II)	Cultural differences (II, III) Risk country (II, V)
in individual case	-	Indirect (III)	Monetary (V) Audits (III)	Commitment (II)	No common understanding (II)

Summary of the cross case study outcomes

The interviewed companies had had the topic of sub-supplier management or sub-supplier specific investments on their agenda for over three years at the time of the study. One homogenous opinion was that a sub-supplier should only be managed if it creates any kind of value for the company. The companies reported consistently that an investment and involvement in lower-tier suppliers could only be executed with the right output and only if the incident or proactive involvement with the sub-supplier positively influenced the performance of the company.

This argumentation is supported by the stakeholder theory. Freeman et al., 2007 clearly state, that managing stakeholders can create value for the company. This is an insight in answering research question 2: "Why do buyers decide to place specific investments in their sub-suppliers?" The consensus is that the management of sub-suppliers should be an exception, not the rule. Companies clearly see their suppliers as responsible for the things that happen in their supply chains. They pass the requirements on to the suppliers and expect them to pass them on and to make sure that sub-suppliers understand them. However, if the circumstances are that their supplier will not forward the information to the sub-supplier or is not able to support the sub-supplier in the required manner, the theoretical approach of contingency theory, can explain why firms nevertheless decide to place sub-supplier specific investments. Through the ability of the firms, to adapt their existing processes to situations, they can increase their performance (Drazin & Van de Ven, 1985). Instead of not being able to reach out to the sub-supplier due to processes and guidelines in the

company, the structures of the firms are so flexible that it allows them, to adapt their strategic decisions to a new situation. This mind-set is supported in regard to the interaction with the sub-suppliers. The consensus among the firms was that the best approach to reach out to the sub-suppliers was through the direct supplier. Either together with the direct supplier (interaction type “commitment”) or if that was not possible, at least the supplier was involved in the establishment of a relationship between buyer and sub-supplier (e.g., he introduced buyer and sub-supplier, the supplier supported in creating transparency, the direct supplier allowed the sub-supplier to interact with the buyer or any other interaction of the supplier in the triad).

The strategic decision of buyers to get involved at all, results out of different situations, the buyer finds himself. This is also explained through contingency theory. A reason to get involved with placing sub-supplier specific investments can either be caused by an incident in the supply chain, where the buyer has to react, or it can be a proactive approach of the buyer to adapt his processes to the business environment. This also leads to answering research question 3: “How can the buyer, the supplier and the sub-supplier interact in the triad when executing sub-supplier specific investments”? It is a result out of the situation, the buyer finds himself in. The motivation to become involved with the sub-suppliers was also very similar among the companies. The companies expect to gain an advantage in regard to innovation access. They strive for improved quality, steady availability, and a decrease in prices or short lead times. Additionally, they aspire to achieve process optimization across companies. Either way, the buyer is able to adapt his structure to the circumstances of the

situation, which is in line with contingency theory that states that strategic decisions are often situational and dependent on several factors (Gassmann et al., 2016).

Another homogenous experience was that the companies reported that the sub-suppliers are generally open to the idea of working together with buying firms. They did not usually perceive the actions of the buyers as a “power play”, but instead were happy that they were involved in the supply chain and the receptor of sub-supplier specific investments. The sub-suppliers even stated that they perceive the sub-supplier specific investments as long-term investment into the relationship. Company II reported that a processor in Turkey recruited a German-speaking employee to improve the relationship with their German-speaking suppliers and focal firms, which proves the commitment in the supply chain even at the sub-supplier level.

Furthermore, all reported that the sub-suppliers felt that the specific investments were a tool to build trust in the supply chain and between the supply chain partners. Especially the sub-suppliers that were contacted proactively valued the interaction and understood it as a long-term investment in the relationship rather than an aggressive tactic. Due to this mutual relationship building, companies are able to safeguard sub-supplier specific investments. As sub-supplier specific investments are seen as strong interest in the relationship, this is explained in relational exchange theory (Lambe et al., 2000). The success of an interaction depends on the relationship between the business partners involved (Morgan & Hunt, 1994). In these relationships, it is possible to make use of informal safeguards as safeguarding mechanisms, e.g. governance mechanisms for

securing the sub-supplier specific investments next to a contract (Macneil, 1980). The strong commitment, through direct interaction with the sub-supplier establishes trust between partners and can result in using informal safeguarding mechanisms. Hence, relational exchange theory helps to answer research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad”. With regard to experiences with safeguards, the general consensus was that an interaction in which the direct supplier was involved and had a good relationship with the buyer was the best safeguard for the investment, as the direct supplier acted as “security” for the sub-supplier specific investments placed.

Furthermore, the direct interaction in the supply chain reduces possible information asymmetry between business partners in the triad. And this can be used to pressure the direct supplier to be even more aware of the performance of his supplier and keeping an eye on reducing possible agency costs. Through an incentive system between buyer and supplier, and supplier and sub-supplier, it can be explained how the partners in the supply chain, fulfil their obligations (Tachizawa & Wong, 2014). This can be written down in contracts that act as formal safeguarding mechanisms, as they reduce agency costs and even reduce agency problems (Narayanan & Raman, 2004). Hence, the principles of agency theory, help to answer research question 4: “How can investments by the buyer in the sub-supplier be safeguarded in the triad”. The companies reported about existing barriers that could hinder direct involvement with the sub-suppliers. The increasing complexity in the triad, compared to the dyad, was a common experience for the interview partners. They noted that additional interfaces

always increase complexity and require new competences for the people that manage the sub-suppliers and the interfaces.

Furthermore, one company reported a lack of support from their top management that resulted in efforts to get the management on board about managing sub-suppliers through specific investments. The approval of additional resources and manpower to develop sub-suppliers through sub-supplier specific investments was only possible with the support of management.

- Many of the companies used service providers that supported them in detecting bottlenecks in the supply chain or used services in revealing supply chain structures.
- One question that was asked across companies was who in the company should actually be responsible for the management of sub-suppliers and which sub-suppliers the company should choose to manage.
- They all suggested an incentive system for successful sub-supplier management.

4. Placing sub-supplier specific investments as a buyer

By elaborating the literature background on sub-supplier management, specific investments and their safeguards in the dyadic context as well as discussing the theoretical background, the thesis lays the foundation for answering the research questions for placing sub-supplier specific investments from the buyer's perspective and explains how buyers can execute sub-supplier specific investments in the triad. In order to build up the knowledge, Chapter 4.1 presents characteristics of sub-supplier specific investments. Chapter 4.2 gives an overview of reasons and motivations to place sub-supplier specific investments. Chapter 4.3 introduces interaction types in the triad, Chapter 4.4 describes forms and types of sub-supplier specific investments. Chapter 4.5 gives an overview of safeguarding sub-supplier specific investments. Chapter 4.6 introduces barriers that can hinder buyer to place sub-supplier specific investments. Chapter 4.7 presents a short risk assessment of sub-supplier specific investments and Chapter 4.8 gives an overview of the implementation process of sub-supplier specific investments.

4.1. Sub-supplier specific investments as tool of sub-supplier management

When buyers are confronted with failures in their supply chain at lower tier level, the first reaction usually is, to get in contact with their direct suppliers, for them to solve the problem. Usually, buyers don't see it as their responsibility to

get in contact with lower tier suppliers, but see their direct buyer in the responsibility requirements (Meinlschmidt et al., 2017). However, through increasingly complex supply chains, higher dependencies in the supply chain and failures down at the sub-supplier level that can't be solved by the direct supplier alone, firms start to get engaged into lower tier management, e.g. through sub-supplier specific investments.

The elaboration of existing literature found that specific investments are a key concept for influencing business relationships (Gelei & Kanesei, 2017). The management tool was introduced by Williamson in 1985 and was defined as durable investment in a business partner that is executed to support particular transactions between business partners. In supplier management they are typically used to support a specific inter-organizational relationship (Wagner & Bode, 2013). Due to their non-recoverable nature, they send a strong signal of commitment to the supplier, which enables long-term and trustful business relationships (Dyer & Singh, 1998; Morrill & Morrill, 2003; Ghemawat, 1991). Ghemawat (1991) even states that firms gain competitive advantage through placing specific investments. The strong commitment that goes along with specific investments can result in a strategic alliance between business partners, which is valuable in today's highly competitive and complex supply chains that span across the globe (Kang et al., 2009; Prahalad & Hamel, 1990). As Benasou and Anderson sum up (1999):

- 1) Specific investments act as supporting mechanisms to increase interaction between firms when manufacturing tasks are highly complex
- 2) Specific investments support building trustful relationships between business partners and are a proof of commitment
- 3) Specific investments are used to reduce uncertainty that arises through demand volatility in the market.

Comparable statements for sub-supplier specific investments were up to this point not existing in the literature. This thesis at hand focuses on closing this gap and sets the focus on sub-supplier specific investments as management tool for sub-suppliers. Hofstetter (2016) started to build the foundation of sub-supplier management through introducing the “sub-supplier management framework” (see his original framework in *Figure 11*). The framework was developed from the supplier management processes that were developed by Moeller et al. (2006) plus introducing new processes that are only required in managing the supply chain beyond the dyad (e.g. supply chain mapping). As the research at hand focuses on sub-supplier specific investments, the following deep dive of the management framework will also concentrate on sub-supplier specific investments. The author of this thesis adapted the existing look of the framework slightly and highlighted the processes, where empirical research detected the usage of sub-supplier specific investments as management tool in *Figure 19*.

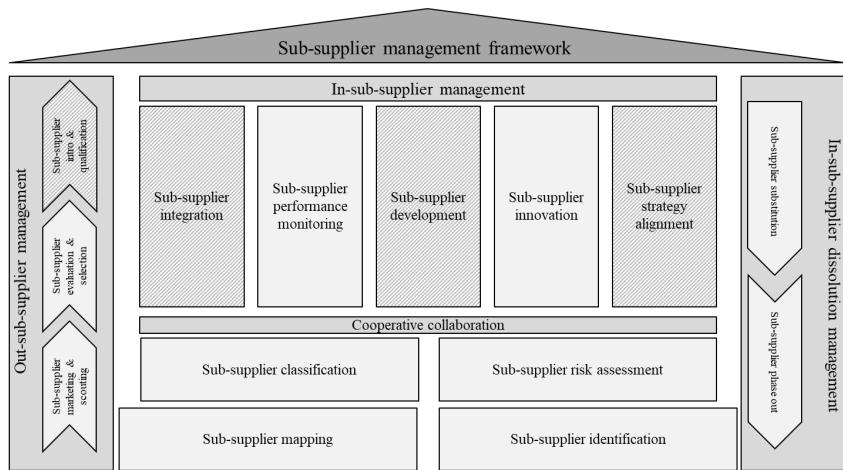


Figure 19: Adapted sub-supplier management framework from Hofstetter. 2016

The management framework from Hofstetter (2016) in *Figure 19* consists of three main stages a buyer and a sub-supplier can interact with:

- 1) Out-sub-supplier management

Includes all processes that are interactions with sub-suppliers that are not yet an integral part of the supply chain of the buyer. This includes pro-actively searching for sub-suppliers that could be an addition to the existing supply chain, evaluating potential new suppliers and qualification of potential new sub-suppliers. The according processes are sub-supplier marketing, sub-supplier scouting, sub-supplier evaluation, sub-supplier selection, sub-supplier introduction and sub-supplier qualification.

2) In-sub-supplier management

Includes all processes that allow the buyer to interact with the sub-suppliers that are already an integral part of the supply chain of the buyer. This includes the four foundation processes that are required to enable sub-supplier management in the first place: sub-supplier mapping, sub-supplier identification, sub-supplier classification and sub-supplier risk-assessment. The other processes can be summarized as interaction management processes. They are used to interact with the sub-suppliers: sub-supplier integration, sub-supplier performance monitoring, sub-supplier development, sub-supplier innovation and sub-supplier strategy alignment.

3) In-sub-supplier dissolution management

Includes all processes that are designed to detach sub-suppliers that are an integral part of the supply chain of the buyer but should not be anymore: sub-supplier substitution and sub-supplier phase-out.

The empirical research at hand revealed that sub-supplier specific investments are applied in several of the presented processes by Hofstetter (2016) as highlighted in *Figure 19*. The research at hand showed that sub-supplier specific investments are used in “Out-sub-supplier management” in the process of “sub-supplier qualification”. According to Hofstetter (2016), sub-supplier qualification is executed by the buyer to support the sub-supplier to achieve a performance level that allows him to become a partner in an existing supply chain.

Furthermore the empirical research revealed that sub-supplier specific investments are used in “In-sub-supplier management”. The sub-supplier specific investments were applied in the processes “sub-supplier development”, “sub-supplier strategy alignment” and “sub-supplier integration”. The process of sub-supplier development includes identifying possible gaps of the sub-supplier with the sub-supplier and eliminate them. The process of strategy alignment informs the sub-supplier about corporate strategy and potential required adjustments, the sub-supplier needs to fulfill. This includes an exchange of long-term plans between the companies. Sub-supplier integration describes the process of aligning governance mechanisms in the triad. This alignment increases the dependence of the partners in the supply chain. The empirical research of this study found out that also in sub-supplier management, sub-supplier specific investments can be labelled as core-concept to generate trust and commitment between business partners.

Moreover, sub-supplier specific investments are unilateral and tied to one transaction between business partners. One of the differences between the “classic” specific investments known from dyadic relationship between buyer and supplier and sub-supplier specific investments, is the field of tension between three parties and the various interaction constellations that can be applied by the buyer to execute sub-supplier specific investments. Retrieved from the literature and the empirical investigation the author developed the following definition of sub-supplier specific investments:

Sub-supplier specific investments are strategic, non-recoverable investments that a buyer places – incident driven or proactive – directly in his sub-supplier, with the aim to increase supply chain performance.²⁴

To sum up the role of sub-supplier specific investments as management tool, the statements from Bensaou & Anderson (1999), for supplier specific investments are also applicable in the triad.

- 1) Sub-supplier specific investments are a supporting mechanisms to increase interaction in the triad, especially when tasks are highly complex
- 2) Sub-supplier specific investments support building trustful relationships in the triad
- 3) Sub-supplier specific investments are used to reduce uncertainty in the supply chain

Altogether it can be stated, that sub-supplier specific investments are used to increase the overall performance of the supply chain.

4.2. Reasons and motivations for placing sub-supplier specific investments

Existing motivations for buyers to get involved in managing the sub-suppliers through sub-supplier specific investments has hardly been invested in the

²⁴ One common citation of performance measurement was developed by Neely, Gregory & Platts (1995): “Performance measurement can be defined as the process of quantifying the efficiency and effectiveness of action”. A positive performance is also achieved if the highest possible output is generated through the lowest input of resources (Gladen, 2003),

existing literature. Hofstetter (2016) introduces five motives that bring buyers to place sub-supplier specific investments: (1) quality issues, (2) cost overview, (3) availability and access to products, (4) sustainability and (5) access to innovation.

Research at hand showed that buyers in general do not see it as their responsibility to develop the lower-tier, but expect their direct supplier to fulfil their communicated requirements (Meinlschmidt et al., 2017). “Den Hauptlieferanten werden unsere Anforderungen bzgl. Produktionsstätten klar kommuniziert” (Case study IV, COO). That buyer nevertheless started to invest into sub-suppliers is astonishing. Coming back to research question 2: “why do buyer decide to place sub-supplier specific investments”, the answer can be supported through contingency theory, as also mentioned in chapter 3.7. The empirical research clearly showed that buyer do not invest in their sub-suppliers in every situation. The decision of investing into the sub-supplier is always strategically driven and only executed if the problem is doubtless found at sub-supplier level. Through the adoption of buyers to this problems at sub-supplier level they are able to situational decide to support the sub-supplier, while in another situation, they decide against using resources to support the sub-supplier level. Hence, if the buyers decide to place sub-supplier specific investments, it is triggered due to a problem (incident driven) or through a concrete project (proactive) “(...) meistens stark projektbezogen (...)” (Case study II, Head of Quality). “Kann (...) qualitätsbezogen sein, (...) wenn es eine Problemstellung gibt. Es kann auch sein, dass wir auf den Vorlieferanten zugehen, wenn wir dort die Ursache für Probleme verorten” (Case study II, Head of Quality).

The empirical investigation further showed that making use of sub-supplier specific investments sends a strong signal to both the sub-supplier as well as the supplier. The explanation approach to invest into a partner a buyer does not have to invest into can be found in stakeholder theory. As Harrison, Bosse & Philips (2010) argue, this allows firms to unlock potential in the supply chain at sub-supplier level. The empirical research confirmed that the application of sub-supplier specific investments is positively linked to the performance in the supply chain, which results also out of unlocking innovation potential at the sub-supplier level but also at the direct supplier level. Through adapting existing processes, it is possible for buyers to increase their performance level in the supply chain. Just as in the dyadic relationship, it is positively linked to the performance of the actors in the triad (Dyer & Singh, 1988). This is true if the investments are not economically viable for the company, the buying firm will dissociate from the consideration of placing sub-supplier specific investments and will think about other methods to manage the sub-supplier or solve the specific situation, e.g., replace the sub-supplier or try to produce in-house (Kim et al., 2017; Norrman & Jansson, 2004). The combination of the theoretical groundwork and the empirical investigation regarding reasons and motivations of placing sub-supplier specific investments gave the author a good overview of possible reasons and motivations to place sub-supplier specific investments. The starting point for buyers to become active in managing the lower-tier suppliers can be divided into two scenarios.

- 1) *Incident-driven sub-supplier specific investments:* Buyers are forced to react to an incident in their supply chain involving sub-suppliers.

- 2) *Proactive sub-supplier specific investments:* Buyers implemented a department or project groups in their company that proactively managed the supply chain beyond the direct supplier.

Incident-driven sub-supplier specific investments

80 % of supply chain failures take place before the first tier supplier (Denning, 2013). Failures in the supply chain can occur in various dimensions. The lower-tier suppliers can deliver the wrong quality of the products ordered, they may be facing demand and supply fluctuation, they could violate sustainability requirements along their supply chain, and they could have a breakdown in production due to a fire or a natural disaster (hurricane) (Norrman & Jansson, 2004).²⁵ Several examples of incident-driven sub-supplier specific investments were detected during the case study research.

Germany: Production of roses

Case study III revealed one incident-driven approach by the buyer to support his sub-suppliers through sub-supplier specific investments. The company produces natural pharmaceutical products and natural cosmetics and was confronted with a shortage of high quality roses, which are required for several of their products. The company was, on the one hand, confronted with an availability problem, and the roses that were delivered were of low quality, which led to a halt in production. The production stop led to empty shelves in the supermarket for the end consumer, which led to a loss in profits at the buyer's side. When they faced

²⁵ The references to possible supply chain failures is not complete and are only meant to give the reader an idea of possible failures in the supply chain.

these severe availability and quality issues in their procurement of roses, a consultation with the direct supplier quickly led to the realization that the quality bottleneck could be traced back to a raw product producer.

This scenario serves as proof how various occurrences with sub-suppliers can be. Due to the fact that the company was able to adjust their internal processes, they were able to find a solution for the existing problem. To overcome this quality issue, the company interacted directly with the sub-supplier by making use of sub-supplier specific investments. This was a strategic decision, based on a rating regarding the value of this decision. As contingency theory (Otley, 1980) stated, the company that can adapt their internal processes, can perform better in comparison to the firms that are not capable to do so. This was clearly shown in the present scenario. The company provided the sub-supplier – a farmer – with special, rare seeds to guarantee the quality of roses. This solution is very unique and highly dependent on the circumstances the company is confronted with, but it is not a universally appropriate solution for the delivery of bad quality roses (Otley, 1980). Hence, the ability of the company to be so flexible to react to the circumstances, allowed them to adjust the performance and react to the occurrences in the supply chain. Furthermore, they provided training sessions and enhanced the sub-supplier's knowledge of rose cultivation. Due to the sub-supplier specific investments, the quality of the roses increased significantly.

This is only one example of buyers becoming involved in the management of the lower-tier supplier to shorten and terminate an already existing production

stop. Comparable to motivations for placing specific investments in the dyad, incident-driven sub-supplier specific investments in the triad are an attempt to control damage or risks in the supply chain. When buyers are confronted with an incident down in their supply chain that is caused by lower-tier suppliers, they usually ask their direct supplier to solve the problem (Pagell et al., 2010). However, our empirical research has shown that in some situations, the supplier is powerless and asks the buyer for help. This is due to various reasons. One reason that was already found by Grimm et al., (2014) and was proven again in this research at hand is that the direct supplier does not possess the capabilities to develop his supplier (Grimm et al., 2014). Another reason is that that he may have too few resources (e.g., capacity or financial resources) to support his supplier and therefore needs the buyer's resources. This was also confirmed again in the research at hand for the triad. Furthermore, the sub-supplier may be much more powerful than the direct supplier or even the buyer (nexus supplier) (Yan et al., 2015).

In all of these scenarios, it is likely that the supplier will turn to his buyer for help in supporting his supplier. Research at hand has shown and confirmed that a supplier will ask his buyer earlier for help with managing the sub-supplier when he, as a supplier, is not easily replaceable for the buyer. In being irreplaceable, the supplier is in a very powerful position. Briefly summarized, it can be stated that incident-driven sub-supplier specific investments are motivated by the attempt to reduce the impact of incidents in the supply chain and solve failures that have already occurred (e.g., quality problems, shortages, production breakdowns) at sub-supplier level.

Proactive sub-supplier specific investments

Besides being “forced” to execute sub-supplier specific investments due to an incident in the supply chain the interviews with the companies revealed that companies execute proactive sub-supplier specific investments. They are used as proactive strategic investments to strengthen and develop strategically important sub-suppliers, just as strategic investments are used in the dyad (Kang et al., 2009). Hence, deciding to place sub-supplier specific investments proactively is a conscious and strategic decision for the buyer to become more active in the supply chain than necessary. Firms that consider placing proactive sub-supplier specific investments are aware of sub-suppliers and sub-supplier management and furthermore, decision to become involved in sub-supplier management are supported by the top management. Through the execution of sub-supplier specific investments, buyers expect to increase the value for their company. This phenomenon is explained through stakeholder theory and proofs that value is created, when organizations come together (Freeman et al., 2004, p.364). “An integrated, well-coordinated global supply chain is difficult to duplicate and so plays an important role in competitive strategy” (Meixell & Gargeya, 2005, p. 534). Hence, the motivations for becoming active in managing the lower-tier suppliers are manifold. Practical examples of firms that place specific investments proactively in sub-suppliers can be found across industries. In the following, one example of the company in case study V will be presented.

Company V, one of the largest food producers worldwide, uses sub-supplier specific investments to tie sub-suppliers to the firm. They support farmers around the world with specific investments. The company pursues two goals with their specific investments:

1. They try to satisfy their stakeholders, including end consumers, who in the past have often blamed Company V for their behavior in the supply chain (e.g., deforestation of the rain forest). Hence, Company V uses the specific investments to prove their commitment to their end customers and their engagement in developing and supporting lower-tier suppliers (establishing a positive reputation).
2. The investments fulfill a strategic role. With placing sub-supplier specific investments around the world, they guarantee themselves long-term accessibility to certain resources. Furthermore, they ensure the availability and accessibility of raw materials. Knowing that climate change and an increase in competitors around the world could harm their access to resources, they become active to prevent any possible scarcity regarding access to raw material.

By developing sub-suppliers through sub-supplier specific investments, Company V can improve their image and present their involvement as creating a sustainable supply chain. It shows that they voluntarily cooperate with sub-suppliers to increase the performance of each supply chain member. An explanation approach is stakeholder theory that can explain this phenomenon (Harrison et al., 2010). Company V is, e.g., active in developing cocoa farmers in Ivory Coast through sub-supplier specific investments with trainings and

tools. They proactively look for farmers to include in their development program and quickly implement sub-supplier specific investments on-site.

Regardless of whether sub-supplier specific investments are executed through an incident, hence being a reaction to a situation, or proactive, the research at hand derived six motives for buyers to execute sub-supplier specific investments. Five of them confirm the research of Hofstetter, 2016 and expand one of his motives. Furthermore the research at hand adds “Obligation to stakeholders” as one further motivation of buyers, to execute sub-supplier specific investments.

- (1) *Quality improvement:* One reason for placing proactive sub-supplier specific investments in the triad is the improvement of the quality of the products delivered by the sub-suppliers. By developing sub-suppliers, the overall product quality can improve. Case study II, a food producer from Switzerland, e.g., became involved with farmers in the Swiss mountains for one of their product lines. By placing specific investments in the farmers, they were able to increase the productivity and the quality of the product.²⁶ The empirical investigation at hand confirmed the findings from Hofstetter (2016) in this aspect that the sub-supplier specific investments of buyers can improve the quality of the products/ raw materials purchased in their supply chain.

²⁶ For more information visit: <https://www.coop.ch/de/labels/pro-montagna.html>, visited inter alia 10. October 2018 or see transcript of the interview in the appendix.

- (2) *Cost improvement:* Another strategic driver for placing sub-supplier specific investments is the possible disclosure of cost structures in the supply chain and therefore the possibility of eliminating unnecessary cost drivers in the supply chain. As the development of sub-suppliers reveals processes at lower level suppliers, buyers have the chance to optimize their processes to decrease production cost and then overall decrease prices for the products. This point from Hofstetter (2016) is also confirmed. This emphasizes the possible reservations of direct suppliers about allowing the buyer to directly contact the sub-supplier. If as a result of the management of lower-tier suppliers their margins decrease or they themselves may even be replaced by the sub-supplier, it is understandable that suppliers may try to thwart such business relationships. By managing the supply chain beyond the direct supplier, the buyer is able to discover the existing supply chain structure. The buyer can determine which tier adds what amount of margin on their products and can pressure them to minimize the margin.
- (3) *Availability of the products:* The available resources of products of the right quality are limited in today's world. Demand, especially on the raw material, level is steadily increasing. For products like coffee or cacao, for which the worldwide demand is expected to increase over the course of the next several years, it is important for firms to ensure supply as early as possible (Torcasso, 2018)²⁷. Placing sub-supplier

²⁷ Torcasso, D. (07.09.2018) Accessed 23rd 2019,
<https://www.handelszeitung.ch/unternehmen/tencent-und-alibaba-kampfen-um-die-kaffee-vorherrschaft#>

specific investments sends a strong signal of long-term commitment to supply chain partners, just as in the dyad (Kwon, 2011, Hofstetter, 2016). Hence, the placement of sub-supplier specific investments is used to create long-term relationships or lock-in effects with sub-supplier, just as in the dyad (Ghemawat, 1991). These lock-in situations are well described in the example with Nestlé. Through the support of farmers with training, seeds and tools to improve their harvest, they reinforce the sub-suppliers motivation to only sell their products to Nestlé. Through the dependence created with the sub-suppliers, they secure the availability of products in the long run. This is of special importance for strategic products that have high demand around the world. Some buyers invest in sub-suppliers that produce a rare or high-demand product. Through their sub-supplier specific investments, they can on, the one hand, support the sub-supplier in improving the production process, which could lead to a higher output of the product. Hence, the sub-supplier will do his best to make sure the buyer is always provided with the requested product.

- (4) *Innovation access:* Research at hand also confirmed the point of Hofstetter (2016) that buyers place sub-supplier specific investments to get access to innovation at lower-tier level. Many buying firms have observed that innovations in their supply chain are not driven by their direct suppliers, but are developed by lower-tier suppliers. Through specific investments in selected sub-suppliers, a buying company gains access to new innovation. “Es könnte hinsichtlich von Innovationen

Vorteile haben. Wahrscheinlich werden in dem Fall Innovationen bis zu uns durchgereicht” (Case study I, Head of Supply Chain). This confirms the findings of Ahuja (2000), who asserted that the connections in the supply chain have a positive impact on the firm’s access to innovation. The buyer would like to gain access to lower-tier suppliers that he considers to be drivers of innovation in the supply chain. Through sub-supplier specific investments, he proves his commitment or can support the sub-supplier in the innovation phase.

- (5) *Sustainability*: Hofstter (2016) also mentioned the aspect of sustainability. By supporting sub-suppliers with specific investments, the buyer provides the sub-supplier with support in achieving the sustainability specifications set by the buyer. To add to this, research at hand also showed, that hand in hand with increasing sustainability, buyers were able to reduce risks in the supply chain, e.g. child labor or exchange of critical raw material in the supply chain.
- (6) *Obligation towards stakeholders*: The motivation of “obligation towards stakeholders” is a new result from the research at hand. The exposed position of the buyer in the supply chain toward the end customer becomes more relevant in a complex and interconnected world where information on failure or misbehavior is shared across the globe. This generates pressure on buying firms to control the supply chain in any way possible. Many companies have been confronted about their supply chain practices; hence, the focus of the buyer on compliance with the buyer’s requirements along the supply chain

increases. An involvement in the supply chain through sub-supplier specific investments helps firms to avoid accusations by end consumers or customers of inappropriate (or even unethical) practices in the supply chain and can support buying firms in showing commitment along the supply chain. Greenpeace often openly accuses producing firms of misbehavior along the supply chain. One example is their “detox-campaign”, in which they blame buying firms for their production sub-suppliers’ actions, e.g., Asian textile productions that pollute local waters. By managing critical sub-suppliers through sub-supplier specific investments, buyers can avoid such situations. Another example would be accusations from politics or customers, when buyers don’t support sub-suppliers in critical business situations, which could even result in insolvency of the sub-supplier and in worst case to unemployment of workforce resulting from that. Being exposed in the supply chain, the buyer will try to control any damage in the supply chain to avoid a bad reputation and rather decide to make use of sub-supplier specific investments to support.

The six motives are illustrated in *Figure 20: Motivation diamond to place sub-supplier specific investments.*

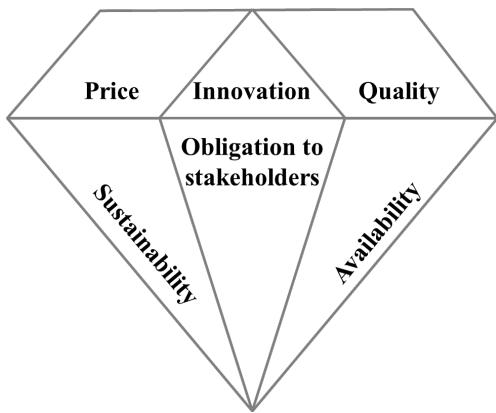


Figure 20: Motivation diamond for buyers to place sub-supplier specific investments

Summary reasons and motivations for placing sub-supplier specific investments

When buying firms decide to place sub-supplier specific investments, the decision is influenced by several considerations and expectations. First of all, research at hand proved that executing sub-supplier specific investments is dependent on various factors and the ability of the firm to adapt their strategy and processes, to changing business environments. When businesses were confronted with incidents in the supply chain that could be solved through placing sub-supplier specific investments, the solution was only available, if companies were able to adapt their processes to existing contingencies. This is supported through contingency theory, that states that firms that are able to adapt their processes, are the ones that are able to increase their performance. On the other hand, empirical research also revealed that buyers start to proactively place

sub-supplier specific investments. Buyers only execute sub-supplier specific investments, if this adds value for their supply chain. As stakeholder theory postulates, that engaging with stakeholders can create value for the company (Harrison et al., 2010). This can be confirmed for getting engaged in sub-supplier specific investments as well. Empirical research at hand revealed that sub-supplier specific investments are seen as trust building and commitment to long term relationships from buyer side. Hence buyers use it with firms that are of strategic interest for them. They want to increase their innovation potential and increase the value in their supply chain.

4.3. Interaction types in the triad to execute sub-supplier specific investments

When buying firms decide to place sub-supplier specific investments, be it incident driven or proactive, they are confronted with the question, how they can approach the sub-supplier. As stated in chapter 4.2., one of the reasons to place sub-supplier specific investments is to improve existing relationships, create networks or increase supply chain performance. The triadic context makes placing sub-supplier investments more challenging than specific investments between buyer and supplier. Usually, buyer and sub-supplier don't have contact with one another (Grimm et al., 2014), which increases the risks of generating sunk costs, when firms decide to place sub-supplier specific investments. In a triad, the supplier acts as middleman that connects the missing link between buyer and sub-supplier (Wilhelm et al., 2016). This goes so far that the role of the supplier in the triad includes the communication to the buyer and to his own

supplier (the buyer's sub-supplier), increasing the power and the dependency on the supplier from the buyers perspective in the triad (Wilhelm et al., 2016).

Empirical research proofed again, that often there is no contact between buyer and sub-supplier, which makes identifying the correct interaction between buyer and sub-supplier more complex (Norrmann & Jansson, 2004). As Grimm already stated, buyers that want to interact in the triad, are faced with increasing complexity and they are often dependent on their direct supplier for support (Grimm et al., 2013). As empirical research has shown this support could be that suppliers support buyers in identifying their sub-suppliers and act as communication middleman between buyer and sub-supplier. Research at hand has shown that buyers consider their role with the direct supplier before executing sub-supplier specific investments as all Cases mentioned that they include their direct suppliers when discussing sub-supplier specific investments. "Der Kontakt zum Vorlieferant findet immer zusammen mit den direkten Lieferanten statt oder zumindest in Absprache mit Ihnen" (Case I, Head of Supply Chain). The supplier's relationship with the buyer and his connection to the sub-supplier influence the interaction options available to the buyer to execute sub-supplier specific investments. Especially, when buyers decide to place proactive sub-supplier specific investments, it is crucial for them to ask themselves "Who are my strategic suppliers?" and how can I support their supply chain (their supplier) to increase overall performance of the supply chain. Placing sub-supplier specific investments requires the direct interaction of the buyer with the sub-supplier – either with active – or without active involvement of the direct supplier. The choice of an interaction type is dependent on the

situation the buyer is in. Is it an incident-driven or a proactive investment? Furthermore, it is dependent on the relationship situation a buyer has with his direct supplier and how open the direct supplier is to the buyer investing in his sub-supplier. “”Was für uns die Konsequenz hat, dass wir mehr Vorlieferanten suchen müssen (...), aber das organisiert auch wieder unser direkter Lieferant” (Case III, Head of Procurement). As stated, choosing an interaction type in the triad is rather complicated.

Existing research mentioned some possibilities for the buyer to get in contact with the sub-supplier. Mena et al., (2013) developed a structure to understand behavior in multi-tier supply chains. Tachizawa and Wong (2014) developed a framework that includes governance mechanisms and contingency variables which lead to different interactions in the supply chain. Hofstetter (2016) developed this further and even introduced eight concrete relationship constellations that act as options for buyers to explain the interaction with the sub-supplier in the triad. From this eight interaction types, four types are direct interactions between buyer and sub-supplier. In case of placing sub-supplier specific investments, it is crucial that the buyer and the sub-supplier have a direct interaction. Hofstetter (2016) presented four types of interaction types in the triadic relationship that included a direct interaction between buyer and sub-supplier. The four interaction types are “cooperation”, “parallel”, “back-door” and “bypass”.

Hofstetter’s presented interaction types only include relationship constellations where buyer and sub-supplier have a cooperative relationship (2016). Cooperative relationships in the triad are characterized by close and trustful

interaction between buyer and sub-supplier. Just as in the dyad, cooperative relationships “(...) allow the formation of long-term bonds between supplier and buyer” (DeYong & Pun, 2015, p. 1) and cooperation between business partners has a positive effect on the performance of the buyer (Corsten & Felde, 2004). However, the empirical investigation in this study shows practices where the buyer and the sub-supplier had an arm’s length relationship and were forced into an interaction to ensure production for the buyer. Arm’s-length relationships in the dyad are characterized by “minimal information exchange” (Dyer & Singh, 1988, p.661) and a low level of interdependence between firms (Dyer & Singh, 1988, p. 661), which is also applicable in a triadic relationship. Arm’s-length relationships in the triad are also characterized by a minimal information exchange, by low interaction between the actors and no trust between the buyer and the sub-supplier. The statement by Dyer and Singh that arm’s-length relations are characterized by not investing in asset specifics is, however, not applicable in the triad (Dyer & Singh, 1988), although it is true that a buyer would never voluntarily invest in a sub-supplier with whom he only has an arm’s-length relationship. However, in certain arm’s-length scenarios between buyer and sub-supplier, the buyer can be forced to execute sub-supplier specific investments.

Although it is counterintuitive, research has observed that buyers place sub-supplier specific investments in the sub-supplier although they are only at arm’s length. Hence, it was necessary for the researcher to expand the existing interaction types in the triad from Hofstetter (2016) and build on them, when it comes to placing sub-supplier specific investments. Therefore, along with the

four already known constellation types, the researcher developed four additional constellation types: “double-agency”, “single soldier”, “ambush” and “forced venture”.

The results from this research show that the choice of one of the interaction types is highly dependent on various context factors in the triad. As previously outlined, the first question that arises is whether the sub-supplier specific investments by the buyer are incident-driven or proactive. In an incident-driven scenario, possible interaction types are determined by the circumstances that a buyer encounters. The buyer may find a cooperative business environment, but it is also likely that the buyer will be confronted with a supplier and a sub-supplier that had have no interaction with one another whatsoever, but the sub-supplier has asked the supplier for support or has had an incident in the production that has caused the rest of the supply chain to collapse. Hence, very few interaction types are left to form a basis for interaction with the sub-supplier. This is also true for the direct interaction between buyer and supplier. If it is an open relationship, the interaction types to choose from vary compared to having a distant relationship with the direct supplier. The buyer faces even more challenges when he is confronted with a nexus sub-supplier in his supply chain. These few examples are meant only to give a brief overview of the factors that, in the end, influence the decision and opportunities from which a buyer can choose with respect to an interaction type for the triad. The various interaction types developed from the literature (inter alia Hofstetter, 2016), and the empirical research at hand are presented in *Figure 21*

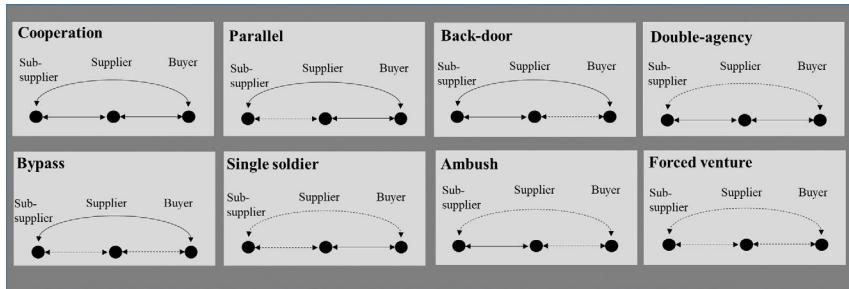
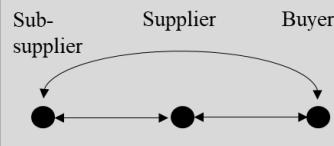


Figure 21: Interaction types in the triad

As previously mentioned, each of the interaction types can be chosen either when placing incident-driven or proactively driven sub-supplier specific investments. The choice of one specific constellation type depends on the contingencies of the situation. The eight interaction types presented are described in more detail in the following:

Constellation type “Cooperation”

Cooperation

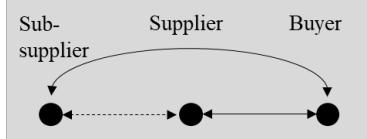


Placing sub-supplier specific investments in a cooperation describes the direct cooperation between buyer – supplier and sub-supplier. They are most likely sitting at the same table and taking decision together in the triad. In this scenario the buyer, the supplier and the sub-supplier have a long and trustful relationship (Hofstetter, 2016). This represents a strong relationship. The supplier is not

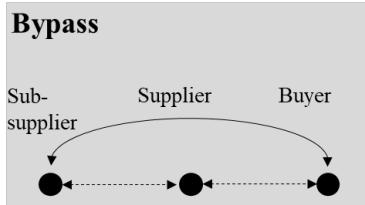
replaceable by the sub-supplier and is therefore open to exchange. In fact, this can develop to the point where all three parties are making an interconnected attempt to improve the whole supply chain. All interaction participants are cooperative and expect a positive return on their involvement in the triad (Hofstetter, 2016). Williamson (2010) found that the most resource-intensive approaches are the most effective when striving to reduce risks at the lower-tier level.

Constellation type “Parallel”

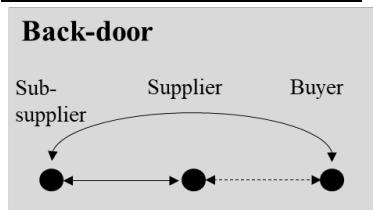
Parallel



Placing sub-supplier specific investments in the constellation type “parallel” means buyer and supplier, as well as buyer and sub-supplier have a cooperative interaction. The supplier only orders standard parts from the sub-supplier; hence, it is not required that they have a close or intensive relationship (Hofstetter, 2016). The buyer and the sub-supplier need a good relationship to guarantee the quality of the parts or even develop products together. The supplier is safe in this constellation type as well. He is not replaceable and adds value to the product that he delivers to the buyer (Hofstetter, 2016).

Constellation type “Bypass”

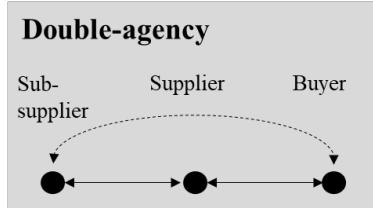
Placing sub-supplier specific investments in a “bypass” situation can develop when the supplier is not replaceable in the supply chain. The supplier is not interested in becoming more involved in the supply chain and also does not mind that the buyer has direct contact with the sub-supplier as he is assured that his position in the supply chain is safe. He is irreplaceable (Hofstetter, 2016). One example is a supplier that is a processor that refines products from the sub-supplier. In such cases, the buyer can have a close interaction with the sub-supplier to discuss product requirements to improve the quality of the product and discuss future options of the product.

Constellation type “Back-door”

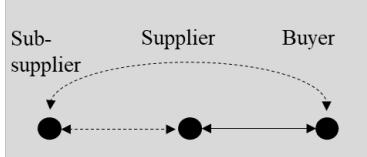
Placing sub-supplier specific investments in the “back-door” situation means that the buyer places the investments without the support of the direct supplier, as they do not have a close collaboration. However, the supplier is irreplaceable in the situation and does not hinder the buyer from contacting the sub-supplier.

The connection between supplier and sub-supplier is close. They could even belong to one company or be located in the same area or develop parts of the product together (Hofstetter, 2016).

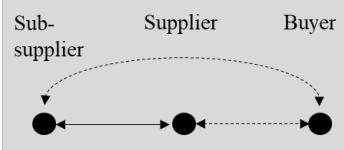
Constellation type “Double-agency”



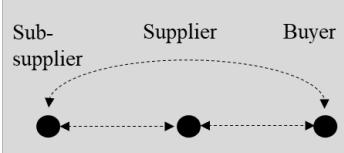
Placing sub-supplier specific investments in the “double-agency” situation means that the buyer places the investments with an arm’s-length relationship with his sub-supplier. They do not have close contact. However, the buyer and the supplier, as well as the supplier and the sub-supplier, have close interaction. In this scenario, the supplier must fulfill a double-agency role as the agent between buyer and sub-supplier. This scenario exists if the supplier asks the buyer to develop the sub-supplier through sub-supplier specific investments. Moreover, the buyer and the sub-supplier do not need to have close contact or further interaction. As the buyer has such close collaboration with the supplier, he relies on and trusts the supplier in managing the sub-supplier closely, including possible sub-supplier specific investments. It is enough for the buyer to have an arm’s-length relationship with the sub-supplier.

Constellation type “Single soldier”**Single soldier**

Placing sub-supplier specific investments in the “single soldier” situation describes the cooperation relationship of the buyer with his direct supplier. The buyer and his direct supplier both only have an arm’s-length relationship with the sub-supplier. This type of constellation situation should be avoided. However, in the case of an incident-driven sub-supplier specific investment, it may be unavoidable. The sub-supplier could be located far away (geographically, making interaction challenging) or he could be a nexus sub-supplier, meaning that he is quite powerful and hence does not care for interaction with the rest of the supply chain. In a scenario where the sub-supplier requires help on the one hand, but on the other hand, does not want close collaboration or the buyer does not want close collaboration, it can still lead to a sub-supplier specific investment from the buyer. This setting should be limited to incident-driven cases, as it is not recommended to place proactive sub-supplier specific investments in this scenario.

Constellation type “Ambush”**Ambush**

Placing sub-supplier specific investments in the “ambush” situation means that the buyer has an arm’s-length relationship with his supplier as well as with his sub-supplier. The supplier has a cooperation with the sub-supplier. This could be due to historical connectedness and can be often found when the supplier and the sub-supplier have one parent company. The investment is only executed to avoid a production stop. This setting should be limited to incident-driven cases, as it is not recommended to place proactive sub-supplier specific investments in this scenario.

Constellation type “Forced venture”**Forced venture**

The constellation type “forced venture” describes the scenario where all partners in the triad have an arm’s-length relationship with one another. This is the worst possible scenario for placing sub-supplier specific investments and should always be avoided if possible. In this scenario, sub-supplier specific investments are only placed to avoid production stops and only if no second source can be

found. Hence, it is the last resort. If the buyer fears losing his investments in this scenario, he should avoid executing the investment.

4.4. Forms and types of sub-supplier specific investments

When buying firms decide to place sub-supplier specific investments they have to decide, what kind of specific investments they want to place. Extracted from the literature review, specific investments are characterized through their uniqueness and the problematic that they can't be reassigned to an alternative use (Williamson, 1985). In the dyad they are one of the key aspects for improving existing relationships, creating networks or strategic alliances (Kwon, 2011).

In the context of the empirical research at hand, the investments are executed between the buyer and the sub-supplier. The triadic context makes placing specific investments more complex, as buyer and sub-supplier usually don't have any contact (Grimm et al., 2014) and hence, the risks of generating sunk costs through sub-supplier specific investments is quite high. When the buyer decides to place sub-supplier specific investments, he is confronted with the question of which kind of investments the sub-supplier should receive. Drawn from the literature review, it can be stated that known specific investments can either be tangible or intangible investments (Chen et al., 2017; Williamson, 1985). The research at hand revealed that also in the triadic setting, buying firms choose between tangible and intangible investments. Whether a buyer chooses an intangible or a tangible investment depends on the cause, for which he places the sub-supplier specific investment. The research at hand shows, that it was not

dependent on the interaction type between buyer, supplier and sub-supplier, but the buyer chose the kind of sub-supplier specific investments, which led to the outcome, the buyer desired (e.g. improve of quality at sub-supplier level or strengthen sustainable production processes at sub-supplier level). The presented dimensions of De Vita et al., (2011) of specific investments are used to categorize specific investments in the triad.

Tangible sub-supplier specific investments

Just as in the dyad, the term “tangible sub-supplier specific investments” describes monetary investments a buyer places into his sub-supplier. De Vita et al., (2011) presented three dimensions for specific investments in the dyad: (1) physical asset specificity, (2) site specificity, (3) dedicated asset specificity.

- (1) The physical asset specificity describes monetary investments that are tailored to one specific firm and have few alternatives uses. De Vita et al. (2011) name e.g. key technologies that are bought for one specific firm, to execute one specific tasks that are used in production. These investments are only useful in one business relationship and become irrelevant for other business relationships. The empirical research at hand proved that physical asset specificity is also found in a triadic relationship. In Case study II, the head of quality described that their sub-supplier specific investments were only useful for the sub-supplier “(...) ganz gezielt in die Infrastruktur investiert” (Case study II, Head of Quality). Improving the infrastructure of the sub-supplier was only helpful for the interaction in this triad. The direct supplier did benefit from receiving the parts faster and in improved quality, which allowed

- him to continue sending the finished product to the buyer. Just as in the dyad, the investments can't be transferred to another business relationship. Another example was also found in the empirical research. Also Case study V reported that they invest into key technology at sub-supplier level to increase the overall quality and availability of products in their supply chain. "Deshalb passiert es (...) relative häufig, dass wir mit den Unterlieferanten direkt zusammenarbeiten (...) und ihnen helfen gewisse Spezifikationen einzuhalten (...)" (Case study V, Head of Procurement). The investments in key technology were not transferrable to any other company, just as in the dyad (Williamson, 1985). Furthermore, the empirical research at hand also confirmed, that physical asset specificity is, also in the triad, used to improve quality, availability or even in general: overall performance of the supply chain (Dyer, 1996).
- (2) Site specificity describes investments in a company's production facility by locating the buyer's production close to the suppliers to be able to interact closely (Williamson, 1985; De Vita et al., 2011). In dyadic relationships, these kind of investment is seen as strong signal for a long-term commitment between buyer and supplier, as it is highly cost intensive and increased the dependency between buyer and supplier (Joskow, 1987). In the triad, it would be quite unusual for buyers to move their company closer to the sub-supplier, although many firms have departments around the world to work closer with their suppliers. However, in the triad, the site specificity rather

describes investments into aligning the infrastructure in the triad. If the buyer is using one specific IT-Tool, he will implement it up the supply chain, to be sure, that each member of the supply chain is also using the tool. This also makes communication in the triad much easier and the direct supplier also has an advantage from the sub-supplier specific investments. One example from the empirical research was the implementation of a KAIZEN circle including the sub-supplier. Through implementing IT-Infrastructure and processes across the triad, the buyer had much better control in his supply chain. The buyer stated that the sub-supplier and the direct supplier received this investments as clear signal for a long-term interest of the relationship.

- (3) *Dedicated asset specificity* describes the investments that are specifically spent for the interaction between two partners. In the dyad, this could be an investment in machinery of the supplier, to produce parts for the buyer (Lamminmaki, 2005). The empirical investigation showed, that these investments are also applicable in the triad. The research found that dedicated asset specificity in the triad is especially used to avoid any production stop in the supply chain. These investments can be described as “spot” payments in the sub-supplier, that help to reduce any possible problem at sub-supplier level that could lead to a production stop in the supply chain. These investments could include monetary attention that can be used to repair broken machinery or it could be a monetary contribution to support the sub-supplier in continuing his business. Through this dedicated assets, the buyers

supports the sub-supplier and the supplier and avoids any disruptions in the supply chain.

Intangible sub-supplier specific investments

Just as in the dyad, “intangible sub-supplier specific investments” describes investments that are hard to quantify and often aim to create specific knowledge between two organizations (Williamson, 1985). De Vita et al., (2011) introduce 4 dimensions: (1) human asset specificity, (2) brand capital specificity, (3) temporal specificity and (4) procedural asset specificity.

- (1) *Human asset specificity* describes all investments in skills, knowledge transfer and experience from one business partner to another (Zaheer & Venkatraman, 1995). It describes investments in knowledge sharing and training (Dyer & Singh, 1988). The interaction between two companies increases competences on both sides, supports in building relationships between firms, reduces possible communication errors and increases time to market (Asanuma, 1989; Williamson, 1985). This is also applicable in settings between the buyer and the sub-supplier. “Das wir vor Ort sind und Trainingsmaßnahmen durchführen” (Case study II, Head of Quality). Just as in the dyad, the exchange of knowledge can lead to an innovation exchange between buyer and sub-supplier (Von Hippel, 1988). It can even be stated that placing sub-supplier specific investments leads to strategic alliances. Strategic alliances are created with the purpose of knowledge exchange between supply chain partners. Grant (1996) defines knowledge-sharing as an interaction between firms that allows the transfer, recombination, or

creation of specialized knowledge” (Grant, 1966). Through sub-supplier specific asset specificity the sub-supplier learns how the supply chain is functioning and also gets closer to the specifications or knowledge that are known at the supplier level. Hence, each member of the supply chain profits from these investments.

- (2) *Brand capital specificity* describes investments that can lead to positive spillover effects between two partners. This is very interesting in the context of the triad, as this sometimes even means that buyers have an “indirect” reward for placing sub-supplier specific investments. They directly invest into e.g. farmers, but they are aware that they will not directly purchase the product from one farmer, as the distribution of the products runs via traders. “Es gibt sehr viele indirekte Bemühungen, um sicherzustellen, dass der Kakao, den wir häufig von Tradern kaufen, (...) so nachhaltig wie möglich hergestellt wird” (Case study V, Head of Procurement). In particular intangible specific investments in raw material producers in developing countries improve the buyer’s credibility and hence pay off well for the buyer, as the quality that is delivered to their direct suppliers increases, the overall quality of the products from the supplier increases.
- (3) *Temporal specificity* refers to the adaption and know-how exchange of certain business processes between two business partners. Empirical research showed, that buyers start to expand their site visits down to sub-supplier level to better understand the structure of the supply chain. Through generating an overview, buyers start to generate transparency

in their supply chain. Temporal specificity can be one-time investments into the sub-supplier, e.g. supporting the sub-supplier with logistics infrastructure to quickly get products that could cause business disruption.

- (4) *Procedural asset specificity* describes the adaption of routines and business processes that are expensive to set up and in the long run difficult to redeploy (Zaheer & Venkatraman, 1995). It is the next step from temporal asset specificity as the aim is, to adapt business processes in the supply chain in the long run. The particularity is, that buyers not only adapt the business processes between them and another partner, but adapt business processes along the supply chain, including the supplier and sub-supplier. By integrating the sub-supplier in the alignment of business processes, buyers generate a substantial advantage compared to competitors, as the communication between firms improves. Hence any disruption can be quickly communicated along the supply chain and solutions can be found together. Furthermore, the alignment of processes increases the productivity at each stage of the supply chain, increasing the overall performance of the supply chain. This was also used in case study III “Wir haben Trainings mit den Landwirten [als Vorlieferant] durchgeführt” (Case study III, Head of Procurement). Through the inclusion of the raw material producer, the supplier knew when and of which quality the deliveries from the sub-supplier will arrive. They were better able to

plan their production and it was easier to communicate with the buyer with concrete knowledge.

The empirical research at hand revealed that each of the known types of investments is applicable in the triad. Each has been used in practice and showed to be relevant in the triadic setting. The choice of which of the presented types of investments is chosen by the buying company is dependent on the circumstances with which the buyer is confronted in each investment decision. In the triad and in the interaction between buyer and sub-supplier, the present research revealed that intangible investments are more common than placing tangible investments. This can be explained with the high risk of placing specific investments in the triadic setting. Placing sub-supplier specific investments in a triadic context with partners that are not legally bound to the buyer is more critical than placing specific investments in the direct supplier. The risk of sunk costs is very present, as the connection between sub-supplier and supplier lies outside the scope of the buyer, who places the sub-supplier specific investment. To protect his investments nevertheless, buyers also make use of safeguards in triadic relationships. Applicable safeguards for investments in the triad are presented in the following section.

4.5. Safeguarding mechanisms of sub-supplier specific investments

Just as with specific investments in the context of the dyad, specific investments in the context of the triad are accompanied with the risk of losing the investment, because specific investments can be misused due to opportunistic behavior of

the members in the supply chain (Benasou & Anderson, 1999). But “Even where there is no opportunism, there is dependence, making it difficult to disengage as circumstances change” (Bensaou & Anderson, p.461, 1999). This emphasizes the risks that come with placing specific investments in general, and especially in the triad, where the buyer always finds himself confronted with more than one potential opportunistic opponent: his supplier and his sub-supplier.

As discussed, specific investments, be it into the supplier or the sub-supplier, are highly customized, and can’t be transferred to any other relationship, without losing value (Takashima & Kim, 2017). They increase the dependence in the supply, going so far, that they could lead to a “lock-in” situation between buyer and supplier, and also sub-supplier. If one of the partners in the supply chain would leave the triadic setting, the investment in the sub-supplier (and maybe the supplier) would be lost, and additionally, the buyer is confronted with additional costs, resulting from changing the supplier or sub-supplier (Jap & Ganesan, 2000). As Kim et al. (2017) state, the buyer is even more vulnerable when he invests in the sub-supplier instead of his direct supplier, as he usually had no direct contact with the sub-supplier before. This raises the question even more, how buyers can safeguard their executed specific investments in the sub-supplier.

In the tension field of the triad, the buyer is confronted with the uncertainty whether the supplier terminates his relationship with the buyer, furthermore, the supplier could terminate his business relationship with the buyer’s sub-supplier, which, in both cases leads to a loss of the investment into the sub-supplier, as indicated in the literature (Jap & Ganesan, 2000). Due to the risk that comes

with placing specific investments, it is necessary to apply safeguarding mechanisms in the triad. The literature review revealed that there are no specific safeguarding mechanisms for placing specific investments in the triad, hence the author tests, whether the known safeguards can also be applicable in the triadic setting. The safeguarding mechanisms found in the literature that are used for the dyad can be classified in formal and informal safeguarding mechanisms (Rindfleisch & Heide, 1990).

Formal safeguarding mechanisms for sub-supplier specific investments

For specific investments that are executed in dyadic relationships literature introduces mainly two formal concepts of safeguards: (1) the contract and (2) vertical integration (Poppo & Zenger, 2002; Ouchi, 1979). The empirical research at hand, tested whether these known formal safeguards can be applied in the triadic setting.

- (1) A contract is the most familiar safeguard for specific investments. It is a written agreement between two or more parties whose intention it is to legally bind obligations between business partners (Lyons & Mehta, 1997). A contract clearly defines the roles and responsibilities that result out of transferring specific investments to one business partner. It defines the desired outcome and specific proceedings, if unpredictable incidents occur in the business relationship (Buvik & Andersen, 2011). The challenge of contracts as a safeguard in a triadic setting is, that the buyer and the sub-supplier usually have no contractual business relationship (Hofstetter, 2016). Furthermore, in triadic setting, the buyer is confronted with his supplier as middlemen

between himself and the sub-supplier. Even when he has a contractual relationship with the sub-supplier, this does not assure the continuation of the business relationship between his supplier and his sub-supplier. Although this field of tension is known in the business environment, and a contract is not even seen as safe option in the dyad, due to its incomplete nature (Cannon et al., 2010). The empirical research at hand showed that the buyer nevertheless chooses the contract as formal safeguarding mechanisms for his sub-supplier specific investments; “Dort existieren Verträge” (Case study II, Head of Quality). Furthermore, specific investments are often executed through geographical distance and the buyer hope that a formal written contract, can increase the pressure to avoid opportunistic behavior in the supply chain, as it is a known concept between two business partners (Williamson, 1985). “(...) gut funktioniert es immer, wenn (...) Berührungen zu westlichen Märkten vorhanden sind. Wenn diese fehlen, ist es schwierig” (Case study II, Head of Quality).

- (2) Literature suggest to apply “vertical integration” in cases where contracts are not sufficient (Yu et al., 2006). During the empirical research at hand, the researcher did only find companies that make use of contracts as formal safeguard, but never companies that use “vertical integration” as their formal safeguard. It is assumed by the researcher that “vertical integration” is too expensive and to time consuming as a safeguarding mechanisms in the triad. The criticality of a sub-supplier

in a supply chain is not assessed to be so critical that buyers consider to apply “vertical integration”.

The empirical research showed, that the only applicable formal safeguarding mechanisms in the triad is the contract. This contract is only valid between the buyer and the sub-supplier and does not include the supplier. However, the contract solely includes the sub-supplier specific investment between buyer and sub-supplier and does not include obligations from the sub-supplier to the supplier or from the supplier to the buyer. The existing contracts between the three parties remain valid.

Informal safeguarding mechanisms for sub-supplier specific investments

For specific investments that are executed in dyadic relationships literature introduces different informal safeguards. Informal safeguarding mechanisms have become a focus in research over the last decades (Yu et al., 2006; Claro et al., 2003). The informal safeguarding mechanisms include: (1) relationship age, (2) Relational norms/governance and (3) dependence of a business partner. None of these safeguarding mechanisms have been tested for their applicability of safeguarding sub-supplier specific investments yet.

- (1) Relationship age between two business partners can act as safeguarding mechanism. As Wagner and Bode (2013) found out, the longer a relationship between two business partners last, the more likely it is that trust develops between the two business partners. Furthermore, relationship age leads to an increasing information sharing between two business partners. Information sharing and trust generates a feeling of commitment between business partners (Wagner & Bode, 2014).

The closer the business partners work together, the less likely it is, that one of the partners will act opportunistically (Ghijssen et al., 2010). The empirical investigation indicates that, just as in the dyad, the length of a relationship between the business partners is an applicable safeguard in the triad for sub-supplier specific investments (Rob & Yang, 2010). “Bisher hat es sehr gut funktioniert, weil man spezifische Lieferanten angeht, mit denen wir bereits eine strategische Partnerschaft und demnach eine gute Beziehung hatten” (Case study I, Head of Supply Chain). Having long-term relationships between buyer, supplier and sub-supplier is associated with mutual trust and appreciation between business partners. The empirical research also indicated, that the closer the buyer and his direct supplier, the more likely that the relationship between buyer and sub-supplier can evolve and a long-term relationship can exist.

- (2) Relational norm describes mechanisms to reduce the hazard of opportunisms, e.g. information sharing, concordant values between firms or establishing agreed-upon processes (Poppe & Zenger, 2002; Heide & John, 1992). Reducing information asymmetry in relationships, reduces the desire of business partners to act opportunistically (Noordewier et al., 1990). The empirical research at hand showed that this is also applicable in the triad. “Indem wir den Vorlieferanten eine Abnahmegarantie geben, auf die sie sich einstellen können” (Case study III, Head of Procurement). Through placing long-term purchasing agreements with them, they feel secured and will try

to perform accordingly in the supply chain. Another point that the empirical research at hand revealed to also be applicable in the context of the triad, was creating the same values. “Man muss die [Vorlieferanten] auf einen gemeinsamen Nenner bringen. Das ist auch nicht immer ganz leicht” (Case study II, Head of Quality). If each member of the supply chain strives for the best possible outcome, it safeguards sub-supplier specific investments. “Den Vorlieferanten zu erklären, dass sie entweder mehr rausholen für sich selbst oder auch für die nächste Generation” (Case study II, Head of Quality).

- (3) The literature review also detected dependence between business partners as possible safeguards for specific investments (Bensaou & Anderson, 1999). They even showed that buyers tend to invest more, when they presume that their investment is of importance for the supplier. This dependency between two business partners can be maximized through joint actions with the partner (Heide & John, 1988). If the business partners are dependent on one another, they will make an effort to maintain the relationship and will make sure that the specific investments are not lost (Wagner & Bode, 2014). Empirical research showed that this is also applicable in the triad. The more closely firms are interconnected with one another, the harder it is to dissolve the business relationship (Subramani & Venkatraman, 2003). Firms could have coordinated business processes, which makes abusing sub-supplier specific investments very unlikely (De Vita et al., 2011). The observed dependence in the supply chain was existent

between buyer and supplier and supplier and sub-supplier. This safeguard worked well, when the sub-supplier was producing a requested raw material that was processed by the supplier and delivered to the buyer.

The choice for formal or informal safeguarding mechanisms for specific investments is always complicated for the buyer, and it becomes even more challenging, when the buyer has to choose safeguarding mechanisms in the triadic context for his sub-supplier specific investments. The choice for a safeguard highly depends on his standing in the triad, on his contact with his direct supplier and on the experiences he has made with the sub-supplier so far. If the investments are incident driven, e.g. due to an insolvency at sub-supplier level, it is likely that the buyer will only execute sub-supplier specific investments that is safeguarded through a contract between the buyer and the sub-supplier. However, if the buyer decides to execute sub-supplier specific investments to increase the quality at sub-supplier level, it is obvious that he strives for a long-term commitment in the triad. Through trainings, or adoption of processes along the supply chain he increases the relationship age and the dependency of his supply chain partners, using two informal safeguards to protect his sub-supplier specific investments. Just as in the dyad, the perfect safeguard does not exist, and it is dependent on various situational context factors, which safeguards are applicable in which situations for the buyer, when placing sub-supplier specific investments.

4.6. Barriers to placing sub-supplier specific investments

During the empirical research, the author disclosed many barriers that prevent buyers from considering sub-supplier specific investments. Although the barriers to placing sub-supplier specific investments were not the main scope of the research, the author will present the findings in the following section. Throughout the research project it became clear that buyers are confronted with external and internal barriers that hinder the buyer from placing sub-supplier specific investments. Barriers to placing supplier specific investments are also existent in the dyad, but have not yet been discussed for the triad.

Buyer's internal barriers:

- *Lack of top-management support:* If the management of a buying company is resistant to managing the supply chain beyond the direct supplier, the process to change the attitude of the management will be quite challenging. Top management can have several reasons to be defensive toward sub-supplier specific investments. It requires a lot of resources, the outcome is mostly not quantifiable, and management does not see the buyer as being responsible managing the sub-supplier, as they have a supplier in the supply chain.
- *Resource shortage of the buyer:* Placing sub-supplier specific investments (incident driven or proactive) requires available

resources at the buyer site that buyers are willing to spend to develop the sub-supplier.

- *Transparency on sub-suppliers:* Be it an incident-driven or a proactive investment in sub-suppliers, the buyer must always be aware of who the sub-supplier is. Often he does not have this information. “Ohne dass wir uns mit diesem Thema auseinandersetzen, kenn ich vielleicht 10 Vorlieferanten” (Case study I, Head of Supply Chain). “[Mir sind] ca. 5-10% [der Vorlieferanten bekannt]” (Case study II, Head of Quality). To detect the sub-suppliers, buyers can make use of service providers, e.g., providers that help the buyers to map the supply chain. If the buyer or a service provider is not able to identify sub-suppliers in the supply chain, the buyer has no opportunity to invest in his sub-suppliers.
- *Resistance of the employees:* A proactive involvement of buyers in the supply chain on the sub-supplier level is not obvious for employees. They are rather overburdened by the prospect of additional tasks and working hours without obvious results. Avoiding risks that have not taken place yet is counterintuitive for many employees. As a result, employees can react with resistance to additional tasks. An additional aspect could be that sub-suppliers are often located in an international context. This could cross the comfort line of many employees, as working in different cultural zones

with different backgrounds can be intimidating for them. They may also react with resistance.

External barriers:

- *Supplier or sub-supplier block working together with the buyer:* An extreme barrier could be, for example, if a supplier tries to prevent any attempt by the buyer to contact their sub-supplier. This situation arises when the supplier is afraid that an interaction between buyer and sub-supplier will lead to a loss of his relevance in the supply chain and that he could be replaced with the sub-supplier. “Lieferant muss gewillt sein” (Case study IV, COO). Another reason for the supplier to block the connection between buyer and sub-supplier could be that they are trying to prevent the cost composition of their product from becoming questionable. Sub-suppliers could also block an interaction between buyer and themselves. If the sub-supplier is a nexus-supplier, he is probably so powerful that he does not care about the attempts by the buyer (Yan et al., 2015). Furthermore, the sub-supplier may not see the relevance of receiving help from the buyer and will refuse to receive sub-supplier specific investments.
- *Cultural distance between buyer and sub-supplier:* Just as in the dyad, cultural distance can act as a barrier to placing sub-supplier specific investments in the triad. “(...) da gab es kulturelle Schwierigkeiten (...)” (Case study III, Head of

Procurement). “Dort [beim Vorlieferant] ist es nicht zwingend, dass die Qualität, die geliefert wird, auch die ist, die erwartet wird” (Case study II, Head of Quality). “Das Sicherheitsdenken, das wir haben, ist dort in der Regel nicht vorhanden” (Case study II, Head of Quality).

- *Geographical distance between buyer and sub-supplier:* As previously mentioned, it is likely that sub-suppliers will be located around the world. This increases the complexity of placing sub-supplier specific investments and could even hinder specific investments. ”(...) weil es länderspezifischen Ausprägungen gibt. (...), wenn wir (...) in China (...) Nummer 25 oder 26 in der Prioritätenliste der Unternehmen [sind] (...)" (Case study I, Head of Supply Chain). Many sub-suppliers are located outside the buyer's country, which could be used to hold up investment in the sub-supplier. However, Shan and Hamilton (1991) found that the exchange of firm and country-specific information or knowledge results in more valuable and harder to imitate information than the exchange of information that is exchanged within one country.

Generally speaking it can be stated that the extracted barriers must be taken into consideration when placing sub-supplier specific investments. The successful implementation of sub-supplier specific investments is dependent on being aware of possible existing internal and external barriers. Before a buyer

considers to make use of sub-supplier specific investments, or sub-supplier management in general, it is necessary that he checks whether internal barriers could hinder the successful implementation. E.g. if top-management support or awareness for the topic of sub-supplier management is lacking, it is unlikely that the buyer will get resources to manage his sub-supplier base. If a company is open to the topic of sub-supplier management and does not face internal barriers, the company has to consider external barriers that complicate the management of sub-suppliers.

4.7. Risk considerations of the interaction types to place sub-supplier specific investments

When buyers decide to place sub-supplier specific investments, be it incident driven or proactive, they face several options, as outlined in chapter 4.2. – 4.5. They have to consider which interaction type is applicable in their situation, they have to choose a type of investment and due to the nature of specific investments they should choose a safeguarding mechanisms to protect their sub-supplier specific investment in the triad. To give a better overview of the different possibilities a buyer faces, the author summed up the different variations in the following *Table 9*. The *Table 9* includes each possible type of interaction in the triad, with the according possibility of making use of tangible or intangible investments and gives recommendation of whether to apply formal or informal safeguarding mechanisms. Furthermore the author categorized the resulting risk for placing sub-supplier specific investments for each interaction type. The degree of risks depends on the type of cooperation in the supply chain in

combination with using tangible or intangible investments plus the according safeguard, and will be further evaluated in the following.

Table 9: Overview of interaction types in combination with the decision of safeguard

Type of interaction	Visualization	Type of investment	Suggested safeguard	Risk of sub-supplier specific investment
	Arm's length Cooperation			
Cooperation		Tangible Intangible	Informal Informal	Low risk
Parallel		Tangible Intangible	Formal Informal	Medium risk
Back-Door		Tangible Intangible	Formal Informal	Medium risk
Double-Agency		Tangible Intangible	Formal Informal	Medium risk
Bypass		Tangible Intangible	Formal Informal	Medium risk
Single Soldier		Tangible Intangible	Formal Formal	High risk
Ambush		Tangible Intangible	Formal Formal	High risk
Joint Purpose		Tangible Intangible	Formal Formal	High risk

Risk of placing sub-supplier specific investments on the one hand includes the risks of losing the investment (sunk costs) and it includes the question, whether the usage of sub-supplier specific investments leads to the desired outcome of placing sub-supplier specific investments.

(1) Low risk for placing sub-supplier specific investments

Low risk is present when the degree of cooperation in the triad is strong. This matches the interaction type “cooperation”. All three actors in the triad cooperate with one another. A cooperation implies trust, information exchange or long-term relationships between the supply chain actors, hence, the risks of sunk costs when placing sub-supplier specific investments decreases, as informal safeguards can be applied. Empirical research at hand has shown that in the interaction type “cooperation”, companies consider it to be enough to make use of informal safeguards as a buyer, as each interaction partner in the triad is interested in keeping the relationship and has already invested significantly.

(2) Medium risk for placing sub-supplier specific investments

In the relationship constellations “parallel”, “back-door”, “double-agency” and “bypass”, the choice of a safeguard is more complicated. Buyers have to consider all aspects of their existing interactions in the triad, and have to check whether the sub-supplier specific investments are of tangible or intangible nature. The closer the relationship between the buyer and the sub-supplier, the more likely that informal safeguarding mechanisms will be used, as a cooperation between buyer and sub-supplier reduces information asymmetry and hence reduces the risk of sunk cost. The degree of interaction between buyer and supplier and supplier and sub-supplier also influences the safeguard chosen. But since none of the interaction types are interaction types

where all three members of the supply chain interact closely, it is recommended by the author that tangible sub-supplier specific investments are secured through using formal safeguards.

(3) High risk for placing sub-supplier specific investments

In the relationship constellations “single soldier”, “ambush” and “forced venture”, the buyer recommended to make use of formal safeguards when placing sub-supplier specific investments. The interaction types only result from incident-driven investment situations and therefore, the relationships are mostly at arm’s length. Especially in incident-driven interaction situations that are required to keep the supply chain running, the risk of losing the investment is more critical, in contrast with well-established relationships between the supply chain members. Independently if the buyer makes of tangible or intangible investments, it is recommended to only use formal safeguarding mechanisms to safeguard the investments.

In summary, it can be stated that the type of interaction in combination with the kind of specific investments (tangible or intangible investment) determines the applied safeguards. The closer the relationship in the triad (cooperation between buyer – supplier and buyer – sub-supplier, as well as between supplier and sub-supplier) in combination with an intangible investment is, the more likely it is that applying an informal safeguard can act as safeguarding mechanism in the triad. In contrast, the more distant the relationship in the triad, with a tangible investment, the more likely that buyers will apply formal safeguards, such as a contract or a written agreement, to safeguard sub-supplier specific investments.

In cases where a contract is the only applicable safeguard, the buyer should review his chances in the triad regarding the safety of his investment. If the buyer is sure that the contractual agreements will be violated by the sub-supplier, he should reconsider placing sub-supplier specific investments in general and should look for an alternative sub-supplier for his supply chain if possible.

4.8. Implementation of placing sub-supplier specific investments

After the author identified the reasons and motivations for sub-supplier specific investments (Chapter 4.2.), identified interaction types in the triad (Chapter 4.3.), evaluated types of sub-supplier specific investments (Chapter 4.4.) and described according safeguarding mechanisms for sub-supplier specific investments (Chapter 4.5) the author would like to introduce a concept for buyers, how to execute sub-supplier specific investments in a business environment. This concept shall support buyers in the implementation of sub-supplier specific investments in their organization. The concept is illustrated in the following *Figure 22*.

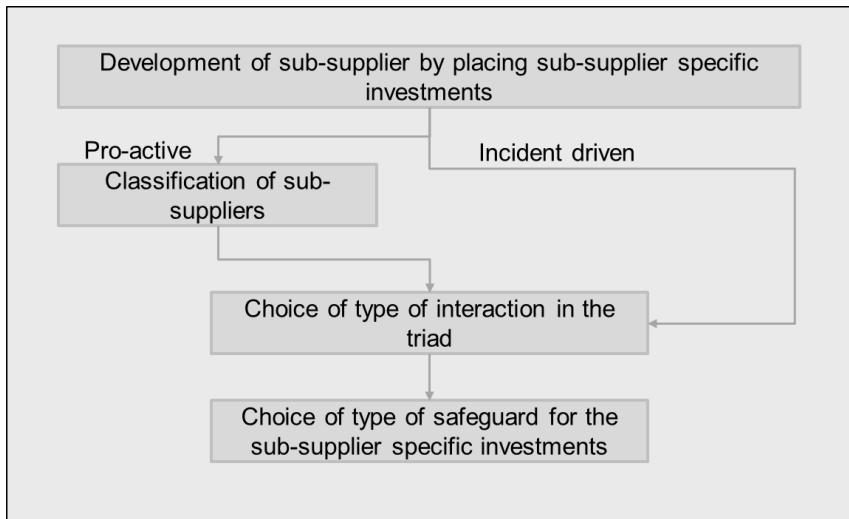


Figure 22: Concept of placing sub-supplier specific investments

As mentioned in chapter 4.2. the buyer can have two motivations to place sub-supplier specific investments. He is either forced to place sub-supplier specific investments, due to an incident in the supply chain, or he would like to proactively develop the sub-supplier or his supply chain, through placing sub-supplier specific investments. If the buyer places incident driven sub-supplier specific investments, he does not have many things to consider. In incident driven scenarios, placing sub-supplier specific investments is only executed to secure the supply chain. It often is the “last resort” to keep the supply chain from disrupting. If the buyer is in a lucky position, the interaction in the triad existed before the incident took place, if not, he is even faced with interaction types, where the relationship between the supply chain partners is, in the worst case, only at arm’s length. Hence, the buyer will try to minimize his risk of sunk costs,

and will choose a formal safeguarding mechanisms, independent from whether he placed tangible or intangible investments in the sub-supplier. This is also presented in *Table 9* that summarizes the risks. Incident-driven sub-supplier specific investments do not allow the buyer much consideration. They are placed to develop one predefined sub-supplier that is causing bottlenecks in the supply chain with the aim to prevent decreasing operational performance and hence to reduce costs at the buyer level or avoid reputation loss.

As the process shows, in contrast to incident driven sub-supplier specific investments by the buyer, the buyer can proactively chose to place sub-supplier specific investments as development tool. When the buyer is motivated to place specific investments as a development tool for sub-suppliers, he is confronted with the question of which sub-suppliers he should develop. In the process figure this is describes as “classification of the sub-supplier”. Due to that consideration that identifying the right sub-supplier is crucial, a buyer must be able to classify his existing sub-supplier base. This process is also named in the sub-supplier management framework of Hofstetter (*Figure 11*). To execute this process, the author adapted the existing purchasing portfolio matrix by Kraljic (1983) and applied it for classifying suitable sub-suppliers. This was also one of the outcomes, resulting from the case studies that have been executed for this research at hand. The classical literature on supplier classification points to criteria like procurement volume, order volatility or material criticality or risk (Kraljic, 1983, Hallikas et al., 2005). The author follows the classical literature and uses “criticality of the sub-supplier” as one dimension and “probability of success” as the other. Assigning sub-suppliers according to that matrix supports

buyers in the decision process regarding which sub-supplier to choose when placing proactive sub-supplier specific investments. The matrix is presented in the following *Figure 23 Classification of sub-suppliers for placing sub-supplier specific investments*.

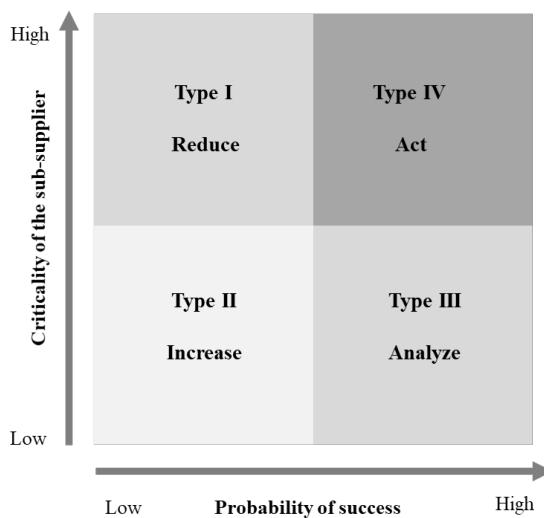


Figure 23: Classification of sub-suppliers for placing sub-supplier specific investments

The criticality of the sub-supplier

As Choi and Kim (2008) state, the performances in the supply chain are dependent on the performance of each supplier. Hence, when one sub-supplier performs poorly, the performance of the first-tier supplier is impaired as well. The conducted empirical investigation at hand points to four factors that add up to the criticality of a sub-supplier in the supply chain.

- A sub-supplier becomes critical if he is strategically important for the buyer or the supplier. Supply chains are rated as critical: “whose members are strategically, operationally, and technologically integrated” (Hult et al., 2004). In the context of sub-suppliers this would mean that the sub-supplier has a substantial impact on a buying firm’s profit or their risk exposure in the supply chain (Yan et al., 2015, Kraljic, 1983). The buying firm must be aware of this sub-supplier to assess his value in the supply chain. Strategic importance can result from the criticality of the products that are delivered or is due to technological advantage required at the supplier or buyer level (Borgatti & Li, 2009) that the sub-supplier is providing. A sub-supplier that produces highly innovative, complex technology is likely to become a single source. A (sub-) supplier and hence becomes strategic to the supplier or buyer. Just as in the dyad, the more complicated it is to replace the sub-supplier, the more strategically relevant he becomes for the buyer.
- A sub-supplier is a nexus supplier. A nexus supplier is characterized by a consolidation of various supply chain nodes at one supplier and hence influences various firms in the supply chain (Yan et al., 2015). It may be that the nexus supplier as a sub-supplier delivers components to various direct suppliers of the buyer and hence becomes very strategic for the buyer. If this sub-supplier were to perform poorly, it would affect multiple suppliers of the buyer and thus result in multiple performance gaps in the buyer’s supply chain (Yan et al., 2015).

- A sub-supplier that contributes by offering a unique and innovative technological component however is critical because of the technology that they offer for the supply chain and not their structural position. Nevertheless, these components are often not connected to the primary function of the product the buyer distributes, e.g. a car, but it improves the overall performance of the finished good (Yan et al, 2015).
- A sub-supplier could also become of strategic importance when he opens a specific market or culture for the supplier or the buyer (Hitt et al., 2000). Connected to that, sub-suppliers can also become critical due to the culture they are implemented in. Countries with political instability can suddenly change their trade agreements and thus, endanger demanded supply. Some markets are highly protected and having a good relationship with someone present in the market, can allow the buyer to get an overview and access to the market. This also supports buyers in generating new business. If sub-suppliers are located in cultural different markets, they can introduce the buyer to cultural characteristics.

The probability of success describes the rate of probability that the specific investments placed in the sub-supplier lead to the results that the buyer intended. The empirical research at hand revealed that the probability of success is dependent on five contextual factors that are presented in the following.

- First, the relationship with the direct supplier is a key factor. The relationship of the buyer with his direct supplier influences the type of interactions that are possible in the triad. When the buyer wants to

expand his management down the triad through sub-supplier specific investments, he must involve his direct supplier, and they need to reach consensus regarding which type of interaction will be useful. The more intense and trustful the relationship between the buyer and his supplier, the more likely that sub-supplier specific investments can be executed, as the partners in the supply chain can choose an interaction type with open communication between the three parties. The supplier does not feel threatened by the buyer, and the buyer does not need to fear that the supplier will end the relationship with his direct supplier (the buyer's sub-supplier), which would turn executed investments into sunk costs. Here, the empirical investigation at hand also showed that cultural and regional closeness between buyer and sub-supplier positively influences the results of the sub-supplier specific investment.

- If the buyer has identified a nexus supplier, he can assume that managing the nexus supplier is rather complicated. A dependence on the buying firm is mostly nonexistent; however, the buying company is dependent on the nexus supplier, as the nexus supplier is strategic due to their nodes in the supply chain (Yan et al., 2015). Hence, they do not see a need to form long-term relationships with buyers. The probability of success in managing these sub-suppliers is therefore relatively low. Furthermore, in this constellation, buyers are always confronted with the fact that their sub-supplier specific investments will benefit other buying firms as well. Thus, buying firms would rather wait until other buyers start investing.

- By contrast, the more dependent the sub-supplier is on the buyer, the more likely that placing sub-supplier specific investment will lead to the results the buyer intended. The more dependent a supplier or a sub-supplier is on the buyer, the more likely that sub-supplier specific investments will not be abused by one of the supply chain partners and hence will not be lost.
- Probability of success is also dependent on whether or not it is a first-time investment by the buyer into a sub-supplier. The more frequently a buyer invests in lower-tier suppliers, the more likely that the outcome of the sub-supplier specific investments will be positive for him. If the situation of placing sub-supplier specific investments, including reaching out to sub-suppliers or involving suppliers in the considerations, becomes routine, it is more likely that sub-supplier specific investments will result in a positive outcome.
- A last point that positively influences the probability of success of a specific investment is the strategic alignment between buyer, supplier and sub-supplier. The more evolved the strategic consent in the triad regarding business orientation, the higher the probability of success for the placed investment.

After determining the probability of the success and the criticality of the sub-supplier, buyers can place their existing sub-suppliers' base in the matrix. The classification matrix, as presented in *Figure 23*, is segmented into 4 quadrants:

Type I: Reduce

Type II: Increase

Type III: Analyze

Type IV: Act

In the following section, the four quadrants will be discussed in more depth.

Type I: Reduce

Sub-suppliers in this quadrant must be carefully considered by the buyer when he considers to place sub-supplier specific investments. The buyer is confronted with a strategically or financially important sub-supplier, maybe even a nexus supplier. Therefore, it makes sense for the buyer to emphasize his commitment, but the probability of success is limited, as the buyer either does not have a strong relationship with his direct supplier, the sub-supplier or the sub-supplier is blocking interactions (e.g., he is too powerful: nexus supplier).

Recommendation for action:

In this quadrant it should be the priority for the buyer to reduce the criticality of his sub-supplier. This implies that the buyers tries to build a second source sub-supplier to reduce the criticality of the one sub-supplier. Through this action, he would move the sub-supplier to quadrant II. This is quite cost intensive for the buyer. When the sub-suppliers are in quadrant II, it is, in a second step, recommended to work on the probability of success to develop the sub-suppliers to be prepared, in case they ever become critical (long-term: move them to quadrant III). In case it is not possible to reduce the criticality of the sub-supplier in an adequate time, it is necessary for the buyer to attempt improving the relationship or establishing a strategic alignment with his supplier and his sub-

supplier to increase the probability of success in placing sub-supplier specific investments. In this case, the sub-supplier is moved to quadrant IV.

Type II: Increase

The sub-suppliers in this section are not critical and the probability of success is low. Possible risks originating from sub-suppliers in this quadrant are low, however in case they become more critical, a buyer would not be able to successfully place sub-supplier specific investments in them.

Recommendation for action:

Buyers should include noncritical sub-suppliers in returning observations to make sure that the situation is not becoming critical through, e.g., political instability in a country or through a natural disaster. This includes observations of the whole supply chain and observation of market developments, which could influence the role of the sub-supplier. Furthermore buyers should consider to increase the probability of success long-term to be prepared, if the sub-suppliers should ever become critical for their supply chain (slowly move them to quadrant III).

Type III: Analyze

The probability of success for placing sub-supplier specific investments is very high in this quadrant, but the sub-suppliers in this quadrant are not critical for the buyer. Hence, there is no need for the buyer to activate sub-supplier specific investments in a sub-supplier that is not important for the buyer, be it strategically or economically.

Recommendation for action:

In this quadrant, it is necessary that the buyer analyses how much resources (time and money) he currently spends on maintaining the relationship between himself and the supplier and the sub-supplier. If this evaluation shows that the good relationship only originates through disproportionate resources from the buyer, he should try to reduce the amount of effort invested in the supplier or the sub-supplier without significantly decreasing the probability of success. The sub-supplier should remain in quadrant III, in case he ever turns critical, the buyer already has a high probability that his sub-supplier specific investments turn out the way the buyer intends.

Type IV: Act

Sub-suppliers in this quadrant are highly critical for the buyer and the probability of success for successfully placing sub-supplier specific investments is high. The sub-supplier is financially, strategically or economically important and the probability that sub-supplier specific investments will lead to the expected outcome are high. Furthermore, if the buyer did not invest in the sub-supplier in this quadrant, it could also have a negative impact on his supply chain as the sub-suppliers in this quadrant have a high impact on the supply chain of the buyer.

Recommendation for action:

In this quadrant the buyer has two options. He could try to reduce the criticality of the sub-supplier, by trying to build up second sources long-term. If this is not possible, the buyer should initiate contact with the sub-suppliers in this quadrant

and decide with them how they could ensure that their criticality does not negatively affect the supply chain of the buyer in the future. One tool to assure that are placing sub-supplier specific investments. In fact, quadrant IV is the only quadrant, where it is recommended to make use of sub-supplier specific investments as a proactive sub-supplier management approach. As the relationship between buyer and supplier is strong, the buyer may gain access to innovation through sub-suppliers in this quadrant and they might develop potential innovations together.

After the buyer has made the process step “classification of the sub-suppliers”, the proactive process for placing sub-supplier specific investments comes together with the incident driven process of sub-supplier specific investments again. The next process step for buyers is to choose an interaction type. As described, the involvement of three parties makes the choice for an interaction type very complex. A buyer has to rate his relationship with his direct supplier and the sub-supplier, when he chooses one of the eight proposed interaction types from chapter 4.3. In incident-driven scenarios, placing sub-supplier specific investments is the buyer’s last option to keep the supply chain running. If the buyer had alternative options, e.g., replacing the sub-supplier or replacing the supplier, he would not start investing in his sub-supplier. In incident-driven scenarios, sub-supplier specific investments are the last option for buyers. The type of interaction in the triad is predefined from the context and depends on the circumstances of the investment situation. Worst case types of interaction the buyer can be forced into are “single soldier”, “ambush” and “joint purpose”. If the process followed a proactive approach, the classification of sub-suppliers

already led to an interaction of the buyer with his direct supplier to get to know his sub-suppliers and to obtain an assessment of the sub-suppliers with the support of the supplier. This can support the buyer in identifying the buyers that are willing to increase the productivity of the supply chain through sub-supplier management. The interaction with the direct suppliers then influences the type of interaction that the buyer chooses for placing the sub-supplier specific investments. When placing proactive sub-supplier specific investments, a buyer would strive for the interaction type “cooperation”, but also the interaction types “parallel”, “back-door”, “double-agency” and “bypass” would be considered.

The next step in the process is the decision for the types of sub-supplier specific investments. The choice of an investment is highly dependent on the outcome the buyer wants to achieve through his sub-supplier specific investments. The case studies and the experience from practice have shown that if the buyer develops a raw material supplier, he more often concentrates on intangible investments, whereas a sub-supplier in the technological sector receives tangible investments from the buyer. Supporting farmers in increasing their production performance and the quality of their material is done through teaching, e.g., tilling the soil, dealing with plants, harvesting at the right time or emphasizing the identification of ripe products and choice or use of pesticides. One interview partner noted that the support at the farmer’s level helped to increase the harvest outcome between 30%-50% (Case study IV). In contrast, technological companies tend to have processes in place and require tangible investments to be able to improve their performance. The support provided by investing in new

machinery or in building plants close to one another improves their performance.

The last process step is choosing a safeguard for the sub-supplier specific investments. The choice of safeguard is highly dependent on the relationship in the triad and the according risks that is derived for the buyer. A suggestion for choosing a safeguard is depicted in *Table 9*.

5. Conclusion of the research of placing sub-supplier specific investments

This following chapter condenses the theoretical and managerial implications of the present thesis. The development of the concept of placing sub-supplier specific investments was possible through the combination of theoretical background and empirical research. The focus of the research were sub-supplier specific investments conducted by the buyer in the sub-supplier. The research at hand revealed motives and context factors, types of specific investments, interaction types and safeguards for sub-supplier specific investments, as well as barriers that could prevent buyers from executing sub-supplier specific investments. Furthermore the research at hand gives recommendations for implementation of sub-supplier specific investments. Chapter 5.1 reflects on the managerial implications resulting from the research process and will give an overview of potential tools a buyer can use when considering sub-supplier specific investments. Chapter 5.2 discusses the theoretical contribution of the research process. The researcher's contributions to existing research on sub-supplier management as well as to theoretical constructs of agency theory, contingency theory, stakeholder theory and relational exchange theory will be presented. Chapter 5.3 will give an overview of the limitations of the present research and give an overview of possible further research in the area of managing lower-tier suppliers and in particular developing sub-suppliers by placing sub-supplier specific investments from the buyer's perspective.

5.1. Managerial implications

The initial starting point for the research process was a phenomenon from practice, namely buyers that placed specific investments in their sub-suppliers. Just as in dyadic relationships, they are a form of relationship building investment and they are unilateral and difficult to transfer once executed (Wagner & Bode, 2013). The triadic context makes executing sub-supplier specific investments even more complex, as buyer and sub-supplier usually have no contact, which increases the risks of generating sunk costs (Grimm et al., 2014). The contact is usually generated through the direct supplier, who acts as middleman, who connects sub-supplier and buyer (Wilhelm et al., 2016). The research at hand, discloses eight interaction types that are applicable for buyers when executing sub-supplier specific investments. With that the research at hand expanded the known interaction types by Hofstetter (2016) and adds four possible interactions types in the triad to the existing 8 interaction types that have been proposed by Hofstetter. Namely the research at hand developed and added the interaction types “Double-agency”, “Single Soldier”, “Ambush” and “Joint Purpose” to explain interaction types in the triad, when executing sub-supplier specific investments from the buyer’s perspective. This presented interaction types also answer the research question 3: *“How can the buyer, the supplier and the sub-supplier interact in the triad, when executing sub-supplier specific investments?”*

Another question that arose was what kind of forms and types of sub-supplier specific investments exist in the triad. The empirical research at hand proofed, that also in the triad, specific investments are either tangible or intangible. The

research at hand demonstrated that the purpose of the sub-supplier specific investments influences whether the buyer places tangible or intangible investments. The observed tangible investments from research included (1) physical asset specificity, e.g. investments into the infrastructure of sub-suppliers, (2) site specificity, e.g. implementation of IT-tools across company boundaries along the supply chain and (3) dedicated asset specificity that describe short term “spot” payments that avoid a disruption in the supply chain. The observed intangible investments include (1) human asset specificity, e.g. investments into training, (2) brand capital specificity, e.g. investments in raw material producers that generate a positive spill-over effect for the entire supply chain, (3) temporal specificity, e.g. site visits at sub-supplier level to understand the structure of the supply chain, (4) procedural asset specificity, e.g. adaption of processes along the entire supply chain.

Another question that was raised, was how buyers can safeguard sub-supplier specific investments in the complex environment of the triad, where no legal construct between buyer and sub-supplier exists. Just as in the dyad, specific investments in the context of the triad are accompanied with the risks of losing the investments, due to opportunistic behavior of the supply chain members (Bensaou & Anderson, 1999). Just as in the dyad, the research at hand observed that buyers make use of formal and informal safeguarding mechanisms, when they executed sub-supplier specific investments in the supply chain. The only observed formal safeguarding mechanism that was observed in the triad was the contract. Although the contract is not even the safest option in a dyad, the empirical research showed that buyers nevertheless chose the contract as formal

safeguarding mechanism for placing sub-supplier specific investments. Next to the formal safeguard, the research at hand also disclosed that buyers make use of informal safeguarding mechanisms for their sub-supplier specific investments. The applicable informal safeguarding mechanisms in the triad include (1) relationship age, e.g. the longer the relationship between buyer and supplier, and supplier and sub-supplier and buyer and sub-supplier, the more likely that the relationship is trustful and committed, reducing risks of opportunistic behavior, (2) relational norm, e.g. building coherent values between firms to counteract opportunistic behavior and (3) dependence between business partners. Research showed that the buyer invested more, when he thought that his specific investments were of value for the sub-supplier. This also answered research question 4: "*How can investments by the buyer in the sub-supplier be safeguarded in the triad?*"

Additionally the research at hand deduced internal and external barriers that could hinder that buyers get involved in sub-supplier specific investments. The internal barriers include "lack of top management support" or "lack of resources", while external barriers include "cultural differences between buyer and sub-supplier" or "dis-interest of the sub-supplier to get involved with the buyer". Next to the barriers, the research at hand carried out considerations, which interaction constellations in the triad generate what kind of risks for the executing buyers and gives recommendations for safeguards for each interaction type. Finally the research at hand gives implementation recommendations for buyers that plan to execute sub-supplier specific investments and supports them in the classification of their existing sub-supplier base.

5.2. Theoretical contribution

The research contributes in generating new insights about managing lower-tiers in the supply chain, especially developing the sub-supplier by placing sub-supplier specific investments as a buyer. The existing body of knowledge is rather scarce and the research at hand follows the calls by Hofstetter (2016) and Tachizawa and Wong (2014) for research on supply chain management to consider sub-suppliers. As Grimm et al. (2014) argue, approaching the sub-supplier from the buyer's perspective bear challenges that do not exist in traditional supplier management. The research contributes in transferring the known concept of specific investments in the dyad to the triadic setting and discusses whether and how it is suitably implemented in the triad. As a result, it helps in answering the research questions 1 – 4.

RQ1: "How can buying firms execute sub-supplier specific investments?"

RQ2: "Why do buyers decide to place specific investments in their sub-suppliers?"

RQ3: "How can the buyer, the supplier and the sub-supplier interact in the triad when executing sub-supplier specific investments?"

RQ4: "How can investments by the buyer in the sub-supplier be safeguarded in the triad?"

To be able to answer the research questions, the research at hand, made use of well-known theories that have already been used in supply chain management, namely the following four: (1) *agency theory*, (2) *contingency theory*, (3) *relational exchange theory*, and (4) *stakeholder theory*.

Agency theory: Agency theory offers explanation approaches regarding how contractual agreements between two parties have to be designed to control hidden actions and intentions of business partners. This is a central question in the relationship between buyer and sub-supplier, as there is usually no contractual agreement or relationship of any kind between the two parties. Observing the phenomenon from the agency perspective makes it possible to answer research question 4: “*How can investments by the buyer in the sub-supplier be safeguard in the triad*”. The assumptions of agency theory, e.g., incomplete and asymmetric information, mismatch in risk aversion, opposite objectives and different behavior resulting from self-interest (see chapter 2.4.1), were also found in the relationship between buyer and sub-supplier, as well as between buyer and direct supplier during the empirical research. Considering that buyers want to avoid losing their sub-supplier specific investments, it is crucial to find incentive mechanisms and control mechanisms that motivate the sub-supplier not to misuse the specific investments (Carter & Roger, 2008). Agency theory therefore provides guidance in drawing up contracts, as it draws the attention to possible pitfalls between two business partners and helps to extract conclusions, resulting out of the existing information asymmetry between buyer and sub-supplier, when developing contracts. By carefully analyzing the relationships in the light of the asymmetric information present in the triad, the buyer can evaluate how precise the written contract with the sub-supplier needs to be, and furthermore, what incentive mechanisms the buyer should provide his sub-supplier to avoid sunk costs. Depending on the existing relationship between buyer and sub-supplier, the buyer is able to analyze the risk

of opportunistic behavior by the sub-supplier. Being in a relationship with “minimal information exchange” (Dyer & Singh, 1988, p.661) results in a high risk of opportunistic behavior by the sub-supplier or the supplier. Thus, the buyer can demand formal contracts between himself and the sub-supplier with incentive mechanisms that reduce the temptation for the sub-supplier to engage in opportunistic behavior.

Contingency theory: Contingency theory states that decisions are dependent on situational factors and the success of the firm is dependent on whether firms are able to adapt their processes to new situations. The integration of contingency theory as an explanatory approach allows answering research questions 2, 3 and 4.

As to research question 2 “*Why do buyers decide to place specific investments in their sub-suppliers?*” the present empirical research confirms that the decision to place sub-supplier specific investments also depends on situational factors. These factors stem from the two different scenarios in which sub-supplier specific investments are used: incident driven and proactive. Contingency theory can help to answer why firms decide to place sub-supplier specific investments in incident driven scenarios, where the buyer is forced to react to a disruption in his supply chain. In this scenario, the buyer only uses sub-supplier specific investments as a last option. In this incident-driven scenario, the buyer normally has one of two goals: 1) to reduce the impact of the incident in the supply chain (first situational factor); 2) to resolve failures that are already in place (second situational factor) e.g. a production breakdown or

quality problems that cannot be solved through the direct supplier alone. The decision of investing into the sub-supplier is always strategically driven and only executed if the problem is doubtless found at sub-supplier level. Through the adoption of buyers to this problems at sub-supplier level they are able to situational decide to support the sub-supplier, while in another situation, they decide against using resources to support the sub-supplier level. Only the ability to flexible adapt to a situation, allows the buyer to solve the disruptions in the supply chain. The situational factors for sub-supplier specific investments involve inter alia the desire to improve product quality at the sub-supplier level or the buyer's desire to gain access to innovation at the sub-supplier level.

Furthermore, contingency theory can be applied in answering research question 3: "*How can the buyer, the supplier and the sub-supplier interact in the triad when executing sub-supplier specific investments?*" The interaction between buyer – supplier and sub-supplier is either incident driven or proactive. And be it incident driven or proactive, various situational factors still do influence the choice for each interaction type in the triad. If the relationship or the trust between the partners in the triad is well developed, they will probably tend to choose "cooperation" as their interaction type. If the interaction is the result of an incident and the supply chain partners scarcely know each other, it is likely that the partners in the triad will choose a "joint purpose" as their interaction type.

Lastly, contingency theory allows answering research question 4: "*How can investments by the buyer in the sub-supplier be safeguarded in the triad?*"

Depending on the circumstances, the strategic relevance of the interaction, the interaction type and the amount of sub-supplier specific investment, the buyer will choose a suitable safeguard for his executed investment. Depending on whether the investments are incident driven or proactive, the buyer will chose between formal and informal safeguards. As previously stated, incident-driven sub-supplier specific investments are the buyer's last option to regain control of the supply chain. There tends to be no established trust or business relationship between him, the supplier and the sub-supplier. In this scenario, the buyer will always choose a formal safeguard, like a contract, to safeguard his investments in the sub-supplier. However, when he decides to proactively invest in the sub-supplier, the chosen interaction type between himself, the supplier and the sub-supplier will have an influence on which safeguards he applies in the end. If the relationship between buyer and supplier is at arm's length, and the relationship between the buyer and the sub-supplier as well as the relationship between the supplier and the sub-supplier is cooperative (interaction type "back-door") (Hofstetter, 2016), the decision by the buyer to apply formal or informal safeguarding mechanisms will depend on the amount of the investment. The research at hand shows that the rules of contingency theory also apply in the triadic setting. The choices of the buyer are dependent on each situation and his ability to adapt to situations, increases his overall performance.

Relational exchange theory: Relational exchange theory is applied to answer research question 4: "*How can investments by the buyer in the sub-supplier be safeguarded in the triad?*" As proposed by Macneil (1980), Lambe et al. (2000) and Hallen et al., (1991), especially when proactive sub-supplier investments

are applied, empirical research revealed that the triadic relationship makes use of “relational norms” that rely on cooperation or joint planning of activities to guarantee the commitment of the partners in the triad. When the sub-supplier specific investments are incident driven, the empirical research at hand observed that the “interimistic” relational exchange introduced (Lambe et al., 2000) allows a quick building of a basis for a functioning relationship for the time required. This can be found in particular in the interaction types “single soldier”, “ambush” and “joint purpose”. The outcome of the present research process shows that relational exchange theory can also be used in the triadic setting between buyer – supplier and sub-supplier.

Stakeholder theory: As presented in Chapter 2.4.9, stakeholder theory offers insights into research question 2 “*Why do buyers decide to place specific investments in their sub-suppliers?*” explaining why buyers invest more in stakeholders than necessary. As Harrison, Bosse & Philips (2010) would argue, proactive sub-supplier specific investments allow firms to unlock potential in the supply chain at sub-supplier level. The empirical research confirmed that the application of sub-supplier specific investments is positively linked to the performance in the supply chain, which results also out of unlocking innovation potential at the sub-supplier level but also at the direct supplier level. Through adapting existing processes, it is possible for buyers to increase their performance level in the supply chain. It also shows that stakeholder theory can be applied in the triad between buyer – supplier and sub-supplier, as sub-supplier specific investments strengthen and develop trusting relationships throughout the triad and result in improved information sharing along the supply chain.

The research at hand has contributed and enhanced the existing theoretical knowledge about placing sub-supplier specific investments. The results are answers which interaction types are applicable in the triad, what types of sub-supplier specific investments exists and how sub-supplier specific investments can be safeguarded. This answers the subordinate research question 1: "*How can buying firms execute sub-supplier specific investments?*" It adds to the existing knowledge of management practices in the triad and enhances the constellation types between buyer, supplier and sub-supplier developed by Hofstetter (2016).

5.3. Limitations and further research

Although the research has been carefully conducted, it is not without limitations that offer potential for further research. The research makes use of the well-established research methodology of case study, which was in this study the right choice, as the research topic is rather new and not well developed in research (Yin, 2014). However, while case studies can be used to gain in-depth insights, the number of data points is clearly limited and hence, the generalization of the results could be limited (Eisenhardt, 1989a). Further research should be used to confirm the results of the proposed concept for placing sub-supplier specific investments. Although the interview questions in the case studies focused on sub-supplier specific investments and their safeguards, it cannot be ruled out that the interview partners did not mention all the sub-supplier specific investments and safeguards that they have used in the past or are presently using.

A further concern about case study research is pointed out by Guba and Lincoln (1981): Case studies are confronted with “unusual problems of ethics. An unethical case writer could select from among available data that virtually anything he wished could be illustrated” (Guba & Lincoln, 1981, p.378). Hence, the author and the reader of a case study should be aware of possible biases that could affect the final product of the research. However, to address this limitation, the author made use of a cross-case analysis to avoid possible biases and generate a comprehensive and valid overview of the concept of sub-supplier specific investments.

Additionally, the cases were only collected in the German-speaking DACH region and are therefore geographically limited. The case studies were only conducted from the perspective of the buying company and did not include the opinions and views of the supplier or even the sub-supplier. The cases were also only conducted with companies that have had first-hand experience with sub-suppliers and sub-supplier specific investments and who were open to sharing their experiences. Hence, the pool of companies to choose from for the case studies was limited to companies that fulfilled these criteria.

Moreover, research in this area should in the future include the perspective of the whole triad or conduct interviews with all members of the triad. Future research should seek to develop theoretical approaches for sub-supplier management. The barriers to placing sub-supplier specific investments presented in this study were not the core of the research process but rather a by-product. Hence, it is important that further research adopt this field of research

and closely examine possible barriers to placing sub-supplier specific investments from the buyer's perspective.

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Appendix

Interviewleitfaden für die Case Studies

Ablauf:

- 1) Erklärung des Autors, was spezifische Investitionen in den Vorlieferanten beinhaltet.
- 2) Fragen durchgehen

Abfragen:

Firmengrösse

Umsatz

Wie ist die Marktsituation bei Ihnen? (kompetitive, Single Player etc.)

Was stellen Sie her?

Wie sieht ihre typische Supply Chain aus? Wo beziehen Sie Ihre Rohstoffe her? (Weltweit, etc)

1. Wie ist ihr Verhältnis allgemein zu ihren direkten Lieferanten?
2. Gab es in der Vergangenheit bereits einmal Probleme bei Ihnen in der Supply Chain mit Vorlieferanten?
3. Falls ja, wie haben Sie dieses Problem gelöst?
4. Haben Sie schon einmal Kontakt mit Ihren Vorlieferanten gehabt?
5. Falls Nein: Was wäre ein Anlass für Sie Kontakt mit Ihren Vorlieferanten aufzunehmen?
6. Haben Sie schon einmal spezifische Investitionen in Ihren Vorlieferanten getroffen?
7. Falls Nein: Warum nicht?
8. Welche Art von Investment haben Sie in Ihren Vorlieferanten getroffen?

9. Was war der Anlass für diese Investitionen (Situationen, die erklären, wieso man spezifische Investitionen in den VL trifft: Failure in der Supply Chain, Proaktives Management, Vorlieferanten kam auf Sie zu, Qualität verbessern, sonstiges...)
10. Hat ihr Lieferant Ihnen den Zugang zum Vorlieferanten ermöglicht?
11. War Ihr Lieferant in den nachfolgenden Prozess der spezifischen Investitionen involviert? Falls ja, sowohl bei Ihnen als auch beim Vorlieferant / nur beim Vorlieferant / nur bei Ihnen?
12. Haben Sie das Investment in irgendeiner Form abgesichert?
13. Stört es Sie, dass Sie mit Ihrem Investment evtl. auch Ihren Konkurrenten helfen, da ein Vorlieferanten üblicherweise mehrere Lieferanten hat

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