

**UNIVERSITY OF VAASA**  
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**STRATEGIC INNOVATION PROCUREMENT: MANAGERIAL PRACTICES  
IN BUYER-SUPPLIER R&D COLLABORATION**

CASE: ABB Oy

Master`s Thesis in  
Strategic Management

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**ABSTRACT**

Increasing competition to satisfy the end-customer needs, fluctuating market conditions and constant technological innovation in the global market place, has made the attainment of competitive advantage more challenging than ever. From Supply Chain Management (SCM) point of view, industrial organizations are simply forced to reconsider their current procurement strategies and processes, optimize supply bases and identify the best practices to enhance supplier, relationship and customer performance.

This study reviews the different types of Supplier Development (SD) practices and their relation to relationship specific dimensions: relational structure, relational capital or trust and relationship learning. The study applies qualitative multiple case study approach to analyze four buyer-supplier R&D collaborations.

My research indicates that the case company would benefit from in-depth analysis of the embedded SD strategies and practices, which are related to relational structure, relationship capital and relational learning. This would yield collaborative advantages in R&D project management. In addition, more attention should be paid to practices, which facilitate relationship learning. My study is one of the first ones to examine different types of SD practices utilized in context of buyer-supplier R&D collaboration. Thus, extends the existing literature on Supplier Development.

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**KEYWORDS:** Supplier Development, Relational structures, Relational capital, Relationship learning, R&D Collaboration



## 1. INTRODUCTION

Increasing competition, fluctuating market conditions and constant technological development in the global market place, have made the attainment of competitive advantage even more difficult, thus has become one of the major management challenges (Das & Teng 2000: 34). Consequently, buyer organizations have modified their supply strategies. In particular, firms have replaced arms-length relationships with multiple suppliers with collaborative relationships with fewer suppliers (Krause 1997). Ergu, Kou & Shang (2014: 883–884) described this phenomenon as supply base optimization.

Turbulent business environment has also increased demand for alternative processes and mechanisms through which companies can leverage their supplier portfolios, select suppliers and further develop relationships with them (Krause & Scannell 2002: 50). Many previous studies (see Dyer 1996–1998), highlight that competitive advantage can be obtained through systematic supplier network management. Therefore, in order to enhance competitiveness companies must establish new long-term competitive advantages together with the suppliers. This does not only mean investing into suppliers manufacturing tools to increase capacity, although it may be part of the change, but the changes need to be strategic in nature.

According to Krause & Scannell (2002: 14–15) buyer organizations seek new ways to manage and develop their supplier relationships to improve product quality, reduce material and administrative costs, shorten delivery-times, reduce defects, increase innovativeness and ultimately gain profit. Krause, Handfield & Tyler (2007) added flexibility and commitment as objectives to be achieved. Moreover, previous studies (see Henttonen, Hurmelinna-Laukkanen & Ritala 2016; Huikkola, Ylimäki & Kohtamäki 2013; Kohtamäki, Partanen & Möller 2013) also indicate that industrial firms are willing to exploit external partners' R&D competence in New Product Development (NPD) projects as complementary resource. For example, ABB Group, who operates in the energy and electricity industry, utilizes external partners' competence in product customization, prototype development, and product testing. With that said, it may be stated that high technology firms find R&D & supplier management as a key functions enabling the development of competitive advantage (Bäck & Kohtamäki 2015).

It is important to mention that cooperative relationships require both human and physical investments from both buyer. Therefore, suppliers should be chosen precisely and further classified into portfolios. (Bensaou 1999.) Krajlic (1983) introduced a model, which has been widely recognized in the SCM literature as well as in real business operations. His model divided purchased material requirements into four categories: *strategic items*, *bottleneck items*, *leverage items* and *noncritical items*. Hence, this model benefit buyer organizations in classifying their material needs and further facilitate in formulation of purchasing strategy.

As well as supplier classification, purchasing strategies can be classified into two categories: *competitive approach* and *cooperative approach*. The former approach assumes that based on competition between suppliers, the buyer organization can reach the lowest possible price for each good. The latter approach focuses on long-term benefits, and also highlight the importance of strategic partnership formulation. (Park, Shin, Chang & Park 2010: 496.) Despite the approach selected, the existing literature also point out that purchasing strategies complemented with Supplier Development (SD) practices and mechanisms. (see Krause & Scannell 2002; Krause, Scannell, Calantone 2000; Krause 1997.) Common supplier SD strategies used by buyer firms are supplier evaluation & feedback, competitive pressure, supplier incentives and direct involvement (Krause & Scannell 2002; Krause 1997).

The following relationship dimensions, which influence the buyer-supplier R&D relationship performance have been discussed in many empirical studies: relationship structure (see Huikkola et al. 2013; Kohtamäki et al. 2012; Handfield & Bechtel 2002), relationship capital or trust (see Yang et al. 2007: 602–603; Wagner & Hoegl 2006; Adler 2001), and relationship learning (see Huikkola et al. 2013; Kohtamaki & Bourlakis 2012). Although, many buyer organizations have recognized the significance of the above-mentioned dimensions and formulated strategies with emphasis on enforcing these dimensions, more complementary SD practices are needed to consolidate the buyer-supplier relationship.

Although, it is obvious that most of the SD practices identified by Chen, Ellis & Holsapple (2015), are used till some extent in different industries, it is unclear, whether the SD strategies used by the buyer organizations are consistent when comparing two business units within ABB Group. For this reason, it seems to be appealing subject to examine. Hence, motivation for this thesis derives from author's personal interest to examine the case company's existing R&D collaborations. In particular, the author is

eager to develop fresh insight by examining how ABB organizes and manages its innovation procurement process with mechanical part R&D suppliers and what type of SD practices are utilized to enhance relationship structure, relational capital trust and relationship learning within these R&D collaborations.

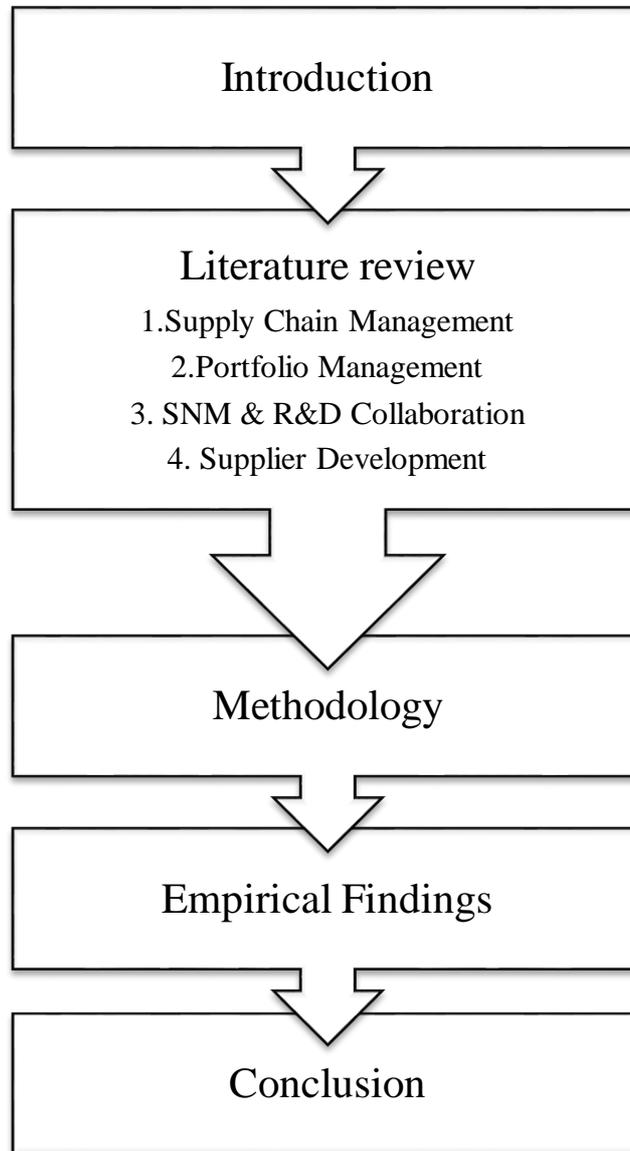
### 1.1. Purpose of the study and research questions

The purpose of this study is to review the roles of relationship specific dimensions in buyer-supplier R&D relationship and also explore what kind of management practices are exploited by buying firms to manage these dimension, thus build a framework, which forms a synthesis and link the prominent parts together. After the creation of a strategic framework, an empirical study is conducted in a form of multiple case study in order to compare how R&D collaborations are managed in real business environment. The study uses following research questions to focus the goal of the study:

1. What are the processes of relational development in different categories of procurement?
2. What are the roles of relationship structure, trust and relationship learning in buyer-supplier R&D collaboration?
3. How are these critical relationship dimensions leveraged and embedded in the case company's supplier development strategies?

### 1.2. Structure of the study

My study has a linear analytic structure, see **figure 1**. The starting section (Chapter 1) introduces the research problem. The next section (Chapter 2) consist of in-depth literature review. While moving towards the empirical part the study the next section (Chapter 3) explains the research methods. The study continues with presentation and discussion of the empirical results (Chapter 4). Lastly, the conclusions and implications are provided (Chapter 5). According to Sounders et al. (2009: 176) similar study structure is commonly used by the scholars in the academic journal articles as well as in many case studies.



**Figure 1.** Structure of the study

## 2. LITERATURE REVIEW

This chapter of the master thesis focuses on providing an in-depth literature review of the key concepts discussed in previous studies examining buyer-supplier relationship management. The review starts with discussion about the background of Supply Chain Management (SCM), which lays the theoretical foundation for this study. This section continues with review of the concept of Portfolio Management (PM) (Olsen & Ellram 1997; Kraljic 1983) and how it influences to the formulation of purchasing strategy.

Second part of this review emphasise on the Supplier Network Learning (SNM) theme (Dyer & Singh 1998; Dyer 1996), which briefly covers the Keiretsu model and JIT approach (Tezuka 1997: 85). After explaining the main concepts in SNM, the literature review moves on towards the centre of the study, which is R&D supplier relationship management. In particular, this section discusses about the core relationship dimensions: *relationship structure, relationship capital or trust and relationship learning*, which influence supplier, relationship and customer performance. This part will continue with reviewing the main SD practices (Krause 1997). Lastly, at the end of the literature review a theoretical framework is created to provide a holistic view of the supply management and premise for the empirical study.

### 2.1. Supply Chain Management (SCM)

The concept of SCM is widely recognized subject in the business academia due to its strategic importance to corporate performance. Within the past decade, scholars have conducted vast amount of studies on the subject by taking different viewpoints. The most remarkable contributions to SCM literature have so far established the following fields: *Purchasing and Supply, Logistics and Transportation, Operations Management, Marketing, Organizational Theory, Managing Information Systems and Strategic Management*. With that said, it can be argued that the theory SCM has evolved to its current state from numerous academic contributions conducted in several different the fields. (Chen & Paulraj 2004B.)

The term SCM has simply been exploited to illustrate the planning and control of materials and information flow along with logistics activities both internally within the

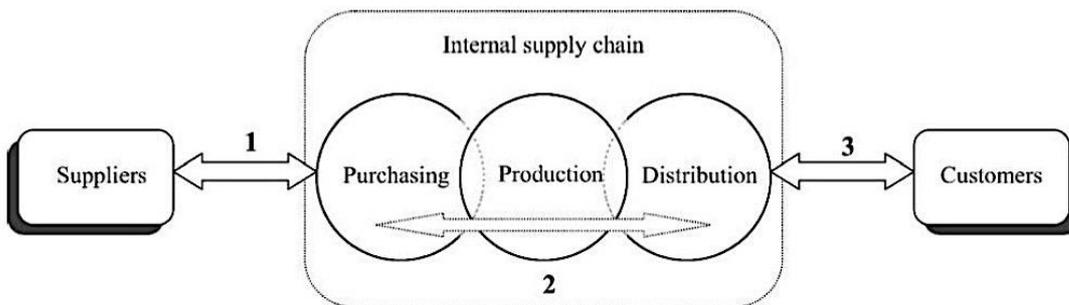
company and also externally between companies. (Chen & Paulraj 2004A: 119–120.) However, from research point of view the term has been utilized as way to describe strategic inter-organizational issues (Harland, Lamming & Cousins 1999), to consider alternative organizational form in which suppliers are integrated into the value network (Håkansson & Shenota 1995) and in similar vein, to identify and define the relationships, which buyer organization formulates with its suppliers (Narus & Anderson 1995). In addition, Morgan & Monczka (1996) used the term to stress the purchasing and supply perspective.

Despite varying viewpoints and descriptions it is evident, that industrial organizations competitive tactic in a global network has shifted to competition between supply chains from raw materials to end-customers from the traditional perspective in which firms' competed against one another at the same level of production process. (Jespersen & Skott-Larsen 2005.) Therefore, increased competition has pushed companies to re-think about their existing SCM activities as well as supply management strategies. It must be noted, that these terms differ in a way that the first one focus on all the aspects of delivering products and services to the end-customer, whereas the latter focus solely on the buyer-supplier relationship management. (Chen & Paulraj 2004B: 134.) As an example of this, Krause (1997) found that buyer organizations have started to modify their supply strategies and replace arms-length supplier relationships with cooperative relationships with fewer suppliers. This has also been referred to as supply base optimization (Ergu, Kou & Shang 2014: 883–884). In similar vein, Jespersen & Skott-Larsen (2005) highlighted that buyer organizations are willing to establish long-term and trust based business relationships with their suppliers and other strategic partners to facilitate resource management.

Krause & Scannel (2002: 14–15) examined the phenomena in more detail and discovered that the fundamental reasons why buyer organizations seek to find new ways to manage and develop their supplier relationships is, because they aim to improve quality, reduce material and administrative costs, shorten delivery-times, reduce defects, increase innovativeness and ultimately gain profit. Similar findings were also perceived by Krause, Handfield & Tyler (2007) with the exception that they added flexibility and commitment as objectives to be achieved. However, the attainment of such goals may become complex and timely if supply chain activities are not strategically planned and coordinated. In other words, buyer organizations need to undertake various initiatives and approaches to manage the critical elements of SCM; supply management, strategic purchasing, supply network coordination and logistics integration. (Chen & Paulraj 2004

B: 134.) Since the focus of this study lies in supplier relationships management, only logistics integration is left out of the review scope.

A typical model of supply chain is illustrated below (see **Figure 2.**). Chen & Paulraj (2004B) depicted supply chain in three parts: *suppliers*, *internal supply chain* and *customers*. In their model suppliers were illustrated as outside partners, who interact with focal firms purchasing organizations. The internal supply chain consists of purchasing, production and distribution departments, which all communicate with each other to satisfy the end-customer. Lastly, customers as well as suppliers are represented as outside partners of the focal firm.



**Figure 2.** Illustration of a typical firm supply chain (Chen & Paulraj 2004B)

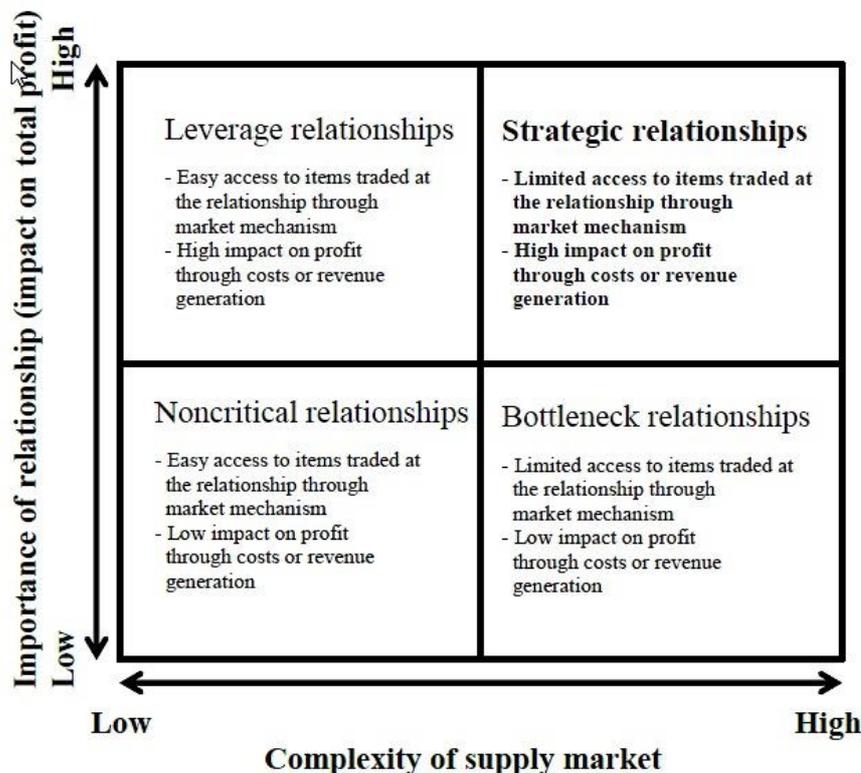
## 2.2. Portfolio Management (PM)

This part of the master thesis will review the concept of Portfolio Management in more detail. PM is widely recognized concept in SCM literature, because of its contribution to purchasing and supplier relationship management. Many scholars in the SCM field argue that the concept of PM saw light when Peter Krajlic (1983) introduced a paper in which he highlighted the important role of purchasing management within the overall supply chain strategy. He argued that purchasing must become SCM. The author also constructed a model referred to as “*Kraljic Purchasing Matrix*”. His model classifies purchased material needs into the following categories: *strategic items*, *bottleneck items*, *leverage items* and *noncritical items*. On the other hand, it can also be argued that his model

classifies supplier relationships into the above-mentioned categories, since most of the material is sourced from external suppliers.

As represented in **Figure 3**, Kraljic's model consist of two dimensions: the first one is profit impact presented on the Y Axis and the second one supply risk or complexity of supply market illustrated on the X Axis. *Profit impact* refers to the measuring instruments such as purchasing volume, share of total costs, impact on quality or items impact on business growth generation. *Supply risk* takes into account the risk of not being able to purchase the item through the markets in the future and is measured based on material availability, substitutability, number of suppliers, total market demand for the item, make or buy decision possibility and storage risk. (Kraljic 1983.)

As **Figure 3** represents Kraljic's Matrix classify purchased items into four quadrants based on strategic importance. In other words, each quadrant facilitate buyer organizations decision making in terms of purchasing strategy formulation. The content of each of the quadrants will are reviewed briefly below.



**Figure 3.** Kraljic Portfolio Matrix (KPM)

*Noncritical relationships:* items have low value and risk. That is, material or service can be easily accessed through the markets and further traded in the relationship. Hence, require considerably low strategic emphasis but are important in terms of ensuring efficient operational performance. *Leverage relationships:* items have high value in terms of profit but low supply risk. Therefore, are easily accessed and traded in the relationship through market mechanisms. It may also be stated that this quadrant favours the buyer organization, because market place offers variety of suppliers manufacturing the same part or similar. For this reason, buyer organization can exploit competitive strategy and let the suppliers compete for the business.

*Bottleneck relationship:* Items have low impact on profit and high supply risk. Buyer organization may face problems in this quadrant, because there is limited number of suppliers offering these specialized products or services. Therefore, in order to avoid conflicts, buying firms should exploit more cooperative strategy in managing these relationships. *Strategic relationship:* items have both high impact on profit and high supply risk. The strategic relationships are the most important ones for the buyer organization, because of they generate the most revenue. Because of the relationship criticality, buyer organizations should allocate their managerial resources accordingly in order to maximize the relationship performance. With that said, buying firms should adopt more cooperative approach when managing this kind of supplier relationship.

In conclusion, the exploitation of Kraljic's Purchasing Matrix may provide substantial benefits in terms of improving the overall supply chain performance. Firstly, it helps the buyer organization to identify the critical and noncritical items. Secondly, it facilitates supplier relationship management, so that the most critical relationships receive more strategic emphasis. Lastly, with this information buyer organization are able optimize their supplier base more precisely and also modify existing purchasing strategies if needed. The next section discusses about the strategic role of purchasing in more detail.

### 2.3. Procurement process management

This section discusses about the different steps of the procurement process such as purchasing strategy formulation, supplier selection process and supplier certification. Each of them have significant impact on the relationship development.

### 2.3.1. Strategic purchasing & purchasing strategy

Purchasing used to have a passive role in the business organization. However, the opinions have changed over time and now purchasing is considered as one of the main strategic functions. In other words, rapidly changing business environment has increased purchasing's ability to influence organizations strategic planning. For instance, companies train their purchasing specialists in cross-functional areas and strategic elements of the competitive strategy. (Chen & Paulrej 2004A.) In addition, purchasing department is now responsible for supplier selection and strategic management of such relationships (Chen & Paulrej 2004B: 134). Along with relationship management Pearson et al. (1996) stressed that strategic purchasing focuses on long-term success and proactivity.

Strategic purchasing also includes purchasing strategy formulation with the chosen suppliers. However, in order to gain economic return, buyer organization must select the right type of approach. According to Park et al. (2010: 496) purchasing strategies can be classified into two categories: *competitive approach* and *cooperative approach*, see **Table 1**. The former approach suggests that the buyer organization can reach the lowest possible price for each good by letting the suppliers compete for the business. By undertaking this approach, companies can gain short-term benefits with the supplier. For example, buyer organization can shift volume between two or more electric cable suppliers in order to receive the best unit price.

Reflecting on Kraljic's (1983) Matrix, it can be interpreted that buyer organizations exploit competitive approach especially in noncritical and leverage relationships. On contrary, the cooperative approach emphasizes long-term strategic partnership formulation (Park et al. 2010: 496). For example, buyer organization may form long-term relationship with computing software suppliers. This type of supplier relationships are often knowledge intensive and for this reason require higher strategic focus.

Terpend & Krause (2015) described the competitive approach as traditional purchasing approach, which has been utilized in arm's length supplier relationships (see Dyer & Singh 1998). On contrary, Park et al. (2010) defined cooperative approach as modern purchasing approach through which firms aim to develop internal and external dynamic capabilities (see Teece et al. 1997) such as learning with the supplier. However, some scholars such as Forker & Stannack (2000) criticize the cooperative approach stating that

it may result in sunk cost, for instance due to supplier evaluation, authorization and supplier training meaning less benefit. Park et al. (2010) suggested that SCM heads should adopt more “fit-for-purpose” approach instead.

**Table 1.** Summary of competitive and collaborative strategies (Park et al. 2010)

	<b>Competitive strategy</b>	<b>Collaborative strategy</b>
<i>Focus</i>	Efficient processing, competitive bidding, short term contract	Collaboration, supplier development, long-term contracts
<i>Purchasing method</i>	Competitive bidding, short-term contract	Project oriented, long-term contract
<i>Relationship</i>	Buyer dominance	Supplier dominance or strategic partner
<i>Key performance</i>	Cost, material flow management, functional efficiency	Long-term availability, cost management, responsiveness, reliable short-term sourcing
<i>Characteristics</i>	Multiple suppliers available	Few suppliers available

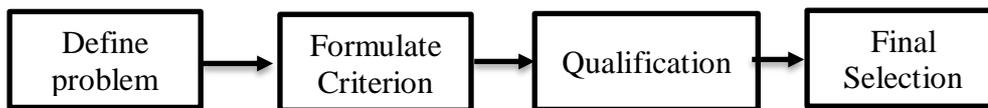
### 2.3.2. Supplier selection process

Supplier selection process has gathered wide recognition in SCM literature and thus is viewed as one of the most important functions of purchasing and supply management (Pearson & Ellram 1995). In similar vein, Chen & Paulrej (2004B: 139) argued that supplier selection decisions are critical, because supply performance has direct financial and operational impact on the business. Historically, the main criteria for supplier selection has been cost, however, according to Ellram (1990) organizations have begun to emphasise more on quality as selection criteria. Similar findings were also conducted by Choi & Hartley (1996) with the exception that they added consistency (quality and delivery) as important criterion.

Moreover, some scholars took a more relational standpoint and highlighted the importance of trustworthiness, integrity and commitment (Chen & Paulrej (2004B: 139). In particular, Dyer (1997) stressed that trustworthiness, integrity and commitment can be measured through supplier’s willingness to share cost, quality and production information in the relationship. To that end, it may be argued all these elements need to be considered

while selecting a supplier, because if one lacks it has immediate impact on supply performance.

Chou & Chang (2008: 2241–2253) define supplier selection process as cross-functional group decision-making problem, which is often handled with a non-programmed decision-making process. It is important to note that multiple parties may be involved in the group decision-making. Namely, Product Managers, R&D, Purchasing and Finance personnel. In support of this finding, Pearson & Ellram (1995) found that cross-functional team approach to supplier selection and evaluation has generated benefits in terms of improved transparency and operational performance. In order to provide more holistic understanding of the supplier selection process, Chou & Chang (2008) created a model in which cross-functional teams decision-making process is divided into four phases (see **Figure 4.**). First the organization needs to define the problem. Secondly step is to formulate the criterion. Third step is the supplier qualification. Last step is to make the final selection based on the evaluation.



**Figure 4.** Structure of decision-making process in supplier selection (Chou & Chang 2008).

Despite the continuing development of selection mechanisms, two types of problems can be identified. One being single sourcing in which the goal is to satisfy the buyers need with one supplier. The latter problem is multiple sourcing in which it is not possible to satisfy buyer's need with one supplier, and thus managers must select multiple suppliers for one part. (Park et al. 2010.) As a result, it may be argued that supplier selection process is a critical process in terms of ensuring efficient supply performance. Therefore, SCM personnel should invest time and managerial resources while executing the process.

### 2.3.3. Supplier certification

Many scholars argue that supplier certification is one of the most critical processes of efficient SCM. According to Chen & Paulraj (2004B: 139) supplier certification helps in ensuring supplier compliance by examining all the aspects of vendors performance. In tandem with this finding, Larson & Kulchitsky (1998) found that by completing supplier certification, buying firms expect to improve relational trust and communication, to enhance product quality, to diminish communication errors and also to reduce inventory and inspection costs.

Moreover, Wisner & Tan (2000: 40) highlighted that supplier certification is believed to increase cooperation between the partners. A certified supplier can be described as follows: a vendor who after intensive examination of its production capabilities, manufacturing operations, technology and personnel is verified to provide materials and components without routine testing of each receipt. In conclusion, it can be stated that supplier certification programs has positive impact on suppliers' productivity and quality. In addition, it shows relational benefits as well such as increase joint-activity between the partners by offering efficient mechanisms for testing supplier's capability and motivation. (Chen & Paulraj 2004B: 139.)

### 2.4. Supplier Network Management: Cooperative relationships

This section of the master's thesis discuss about collaborative supplier relationship, which are the primary focus of this study. In particular, emphasis lies in the concepts of Supplier Network Management (SNM), R&D collaboration and SD.

Increased competition, rapid technological development, and constant demand for innovative technologies and services have increased buyer dependence on their suppliers (Krause, Scannell & Calantone 2000). As a consequence, Dyer & Singh (1998) found that buyer organizations have begun to form cooperative relationships with key suppliers in order to obtain relational rents. The author added that currently collaborative relationships are viewed as strategic advantage. Historically, the concept of supplier collaboration and networks was developed in Japan in the early 1960s and was later imitated in the Western societies (Dyer 1996: 536). In Japan, network of companies was called as *Keiretsu* that means, "order" or system. According to Tezuka (1997) *Keiretsu's*

work as a competitive mechanism in which the lead firm is the key partner of the network. The network consists of layered group of firms that can be suppliers, sub-suppliers and other relevant stakeholders such as distribution companies. In other words, the lead firm outsource large amount of its material supply to external partners (network), so that the hub-firm itself can dedicate its resources into high value-adding activities.

Moreover, Chen et al. (2015) added that the success of *Keiretsu* is grounded in the SD activities initiated by the lead company. For instance, Toyota has implemented two parallel SD teams. First one being operations management team, which emphasise on improving core suppliers' evolutionary capability. Another one is purchasing management team that is responsible for fixing short-term problems and as well as long-term capability enhancement. These two teams' together help Toyota construct a competitive supplier network around the world. To that end, it may be concluded that lean management approach has laid the antecedents for supplier collaboration, which is nowadays exploited by many industrial organizations in attempt to create and sustain competitive advantages.

## 2.5. Buyer-supplier R&D collaboration

According to Huikkola et al. (2013) R&D collaboration is a relationship in which partners offer and exchange complex services such as feasibility studies, product design, usability analysis, prototype service, product testing, product customization and manufacturability analyses. Bäck & Kohtamäki (2015) found that high technology firms have begun to exploit R&D collaboration networks as a resource to obtain complementary technical competence. For instance, through collaboration partners can obtain shared benefits such as knowledge resources and technical capabilities, thus are better positioned in terms of developing more innovate products and services. In similar vein, Yan & Dooley (2014: 59) stressed that many industrial buyer organizations depend on their supplier's innovative technologies, manufacturing capability, engineering skill and financial support in order to improve innovation work.

In different vein, Wagner & Hoegl (2006) found some operative benefits as well, namely shared cost, improved risk sharing, increased time to market and enhanced product performance. Moreover, Dyer & Singh (1998) stressed that in order to achieve satisfying results from supplier involvement, firms must establish systematic routines and processes

together with the partner. In other words, collaborates need to implement support mechanisms for cross-functional team communication, knowledge creation and collective knowledge transfer in order to achieve benefits.

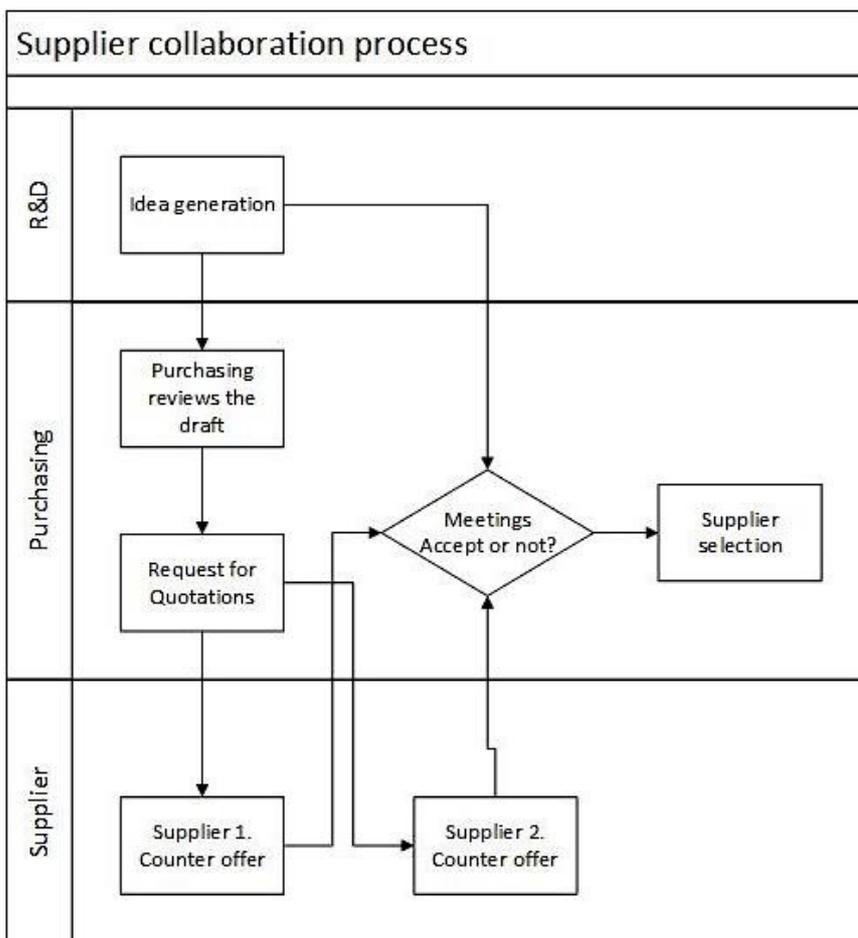
On the other hand, there is also evidence that some authors have critiqued supplier involvement in NPD project. Hence, claim that joint-development projects can be more costly and less effective in the means of reaching the market slower and also add substantial managerial complexity. (Littler, Leverick & Wilson 1998.) For example, if the R&D collaboration is poorly managed, it may cause problems for both partners. Lack of managerial capability may also cause trust issues such as information leaks to other competitors. Henttonen et al. (2016) added that R&D collaboration may also result in situation in which both parties' waste effort and resources without joint-benefits.

Considering suppliers perspective Stjernström & Bengtsson (2004) found that in many buyer-supplier R&D collaborations the suppliers' opinion is that they could improve their participation in the product development processes. However, there are certain factors that hinder participation. For example, buyer organizations are constantly pushing suppliers for price reductions, benefits are not equally shared, at times buyer organizations also set restrictions on suppliers, so that they are not allowed to do business with competing companies, and lastly partner's may have conflicting expectations and targets for collaboration goals. As a solution, at the beginning of relationship formulation buyer and supplier should collectively identify potential opportunities and challenges in order to have clear vision and platform for their R&D collaboration efforts. Furthermore, Henttonen et al. (2016: 146) stressed the importance of establishing knowledge protection mechanisms namely, contracts, intellectual property rights, concealments, and patents to prevent from opportunistic behaviour.

In conclusion, in order to achieve relational benefits from R&D collaboration buyer firms must first identify what type of R&D capability they need. After that firms should do careful analysis of both existing and new potential suppliers, and further select the right partner who can provide complementary resource to fulfil project needs (Ylimäki 2015; Wagner & Hoegl 2006). However, it is important to note that the process may not always be easy, because all of the important elements influencing managerial decision-making such as suppliers strategy, technical capability, joint agreement on performance measures, confidence in other parties capability and collaboration competence in the means of relational thinking needs to be aligned with the partners strategy. As guidance Petersen, Handfield & Ragatz (2003) stressed that the success of R&D collaboration lies on three

themes: First, understanding the capabilities and design expertise of the partner along with the technical risks involved. Second, exchanging proper information related to technology and cost, and third partner needs to be involved in the design teams.

**Figure 5** depicts a typical process of supplier collaboration formulation. This figure is modified from the original process description created by (Rosell et al. 2014: 247). The first phase of the process is the idea realization in which R&D identifies a need for a specific product or service. In the second phase purchasing function sends request for quotations to selected suppliers. In the third phase supplier sends counter offer and comments on product manufacturability. In the fourth phase the buyer organizes meetings with most promising suppliers and conducts supplier certifications to ensure compliance. Lastly, the most suitable supplier is selected.



**Figure 5.** Supplier collaboration formulation

## 2.6. Buyer-supplier relationship dimensions

This section of the paper will discuss and review the fundamental relationship dimensions, which have direct impact on supplier, relationship and customer performance. These dimensions are the following: relationship structure, relational capital or trust and relationship learning. Hence, also provides theoretical support to the following research question (RQ2): *What are the roles of relationship structure, trust and relationship learning in buyer-supplier R&D collaboration?*

### 2.6.1. Relationship structure

The concept of relationship structure has emerged overtime from the studies conducted in several different fields, namely bureaucracy in organization theory and organization sociology. Huikkola et al. (2013) describe the concept as systematic working practices, processes and routines between the supplier and the customer firm. It has been argued that this definition is confronted with other definitions, which concentrates on relationship contracts and monitoring mechanisms (Kohtamäki et al. 2012: 1300). Kohtamäki (2010) added that of the above mentioned definitions are followed by the classical bureaucracy theory, which emphasize on the coercive role of structures. In this role rules and managerial hierarchy coordinate, while simultaneously standardizes ways of working together, monitor compliance, diminish ambiguity and facilitates interaction. Despite varying definition, this study defines the role of relationship structures as an interaction platform. In other words, the role of the platform is to facilitate interaction and knowledge sharing through relational forums between the buyer and supplier organization.

According to Kohtamäki et al. (2012) relational structure consist of four different dimensions through which partners interact and exchange knowledge. First dimension includes relationship steering groups. This means that partners select suitable contact personnel who communicate regularly via different channels. Bäck & Kohtamäki (2016) found that joint meetings facilitate information exchange. Huikkola et al. (2013) added that such meetings are easier to organize if partners are located close to each other. Close proximity facilitates face-to-face interaction and enable the exchange of tacit knowledge. Typically the group consists of two or three key contact persons on both sides of the relationships. For instance, Project Managers, Sourcing Managers or Key Account Manager are often paired up with suppliers Sales Manager or CEO when dealing with

commercial issues. In addition, technical issues are handled by team of R&D specialists. Second dimension is joint development teams who usually work under the relationship steering group. For example, Purchasing Specialists and Sales Assistants are paired up, thus are responsible for implementation of agreed development plans. Ylimäki (2015: 57) stressed that development teams have an important role in terms of being platforms for dialogical interaction, which builds the base for shared understanding. In tandem with this finding, relationship steering and development groups increase participation, commitment and loyalty.

Third dimensions consist of relational IT systems through which companies exchange data. Typical examples are Enterprise Resource Planning (ERP) systems, CAD, Outlook tools, and other design and order-delivery systems, which enable virtual interaction between the buyer and supplier. (Ylimäki 2015: 57.) The fourth dimension includes shared process descriptions, in other words meaning the explicit analysis of relational exchange routines which are constantly updated and further established to guide the interactions within the relationship (Kohtamäki et al. 2012).

#### 2.6.2. Relational capital & trust

Relational capital can be viewed as a modification of social capital. According to Kohtamäki, Möller & Partanen (2013) a general understanding used to be that social capital only exists in social and interpersonal networks which connects individual actors within the society. However, recent studies have built on this concept by claiming that social capital also exists in single business relationships, but instead is referred as relational capital. Hence, relational capital refers to the level of social integration occurring in a single buyer-supplier relationship. (Kohtamäki et al. 2013.)

It has also been argued that trust is one of the most important elements of relational capital (Huikkola et al. 2013). In particular, Adler (2001: 218–219) identified two types of trust dimensions such as competence based trust and relational trust which exists in inter-organizational relationships. Sako (1992) defined competence trust as confidence on partners' technical capability, skills and know-how, and also expectation that the partner will perform according to the agreed contract. Relational trust, however, can be defined based on partner's openness, flexibility, and integrity (Adler 2001: 218–219). Relational trust also lies on the expectation that the partner is willing to do more than is mention in the formal contract (Sako 1992). With that said, this study examines the role of relational

capital and trust in the context of R&D collaboration and aims to identify which type of mechanisms are exploited to develop relational trust with the supplier.

It has been argued that relational form of social capital can increase the effectiveness of cooperation and profitability. In support of this finding, Adler & Kwon (2002: 19) stressed that relational capital is inevitable to the resource exchange, combination and new idea generation in inter-organizational relationships. In similar vein, Tsai & Ghosal (1998: 466) highlighted that relational capital also increase productivity and creativity for interaction. Along with the above mentioned benefits, Huikkola et al. (2013) stressed that relational capital also facilitates joint-learning, intellectual capital and relational innovation.

However, in order to succeed in complex service exchanges, the exchange processes need to be supported by interactive mechanisms such as relational structure to diminish information asymmetries (Kohtamäki et al. 2013). Typically information asymmetries occur if supplier does not have precise understanding of buyers wants or if buyer is not able to assess suppliers R&D capability. Consequently, this may increase transaction costs in the relationship, which can be defined as costs that accrue throughout the interaction between the buyer and supplier. In support of interactive mechanisms, companies should also focus on relationship safety mechanism, which protect from opportunistic behaviour. Henttonen et al. (2016: 146) suggested that formal contracts and other knowledge protection agreements are effective mechanisms, which increase commitment and trust and therefore their value should not be underestimated. The next section discuss about role of relationship learning as practice and its relation to the other relationship dimensions introduced in this chapter.

### 2.6.3. Relationship learning

Highly recognized scholars have defined "organizational learning" as its own type of dynamic capability (Kale & Singh 2009; Teece et al. 1997). Dynamic capability refers to organizations ability to manage and integrate internal and external competencies under various conditions (Teece et al. 1997). However, instead of focusing on organizational learning this thesis examines learning in contexts of single buyer-supplier R&D collaboration. Hence, define "relationship learning" as a dynamic capability, which can be developed via different types of SD mechanisms applied simultaneously. Huikkola et al. (2013) also found that relationship learning has critical role in joint-value creation

between the buyer and supplier. In similar vein, Kohtamäki et al. (2013) added that learning and value creation require active and close collaboration from the partners especially in the exchange of knowledge intensive business services, which include integration of knowledge-based resources and vast amount of information asymmetries.

Huikkola et al. 2013 studied joint-learning in R&D collaboration and discovered that the level of learning in single relationship can be measured as the shared variance among knowledge sharing, joint sense-making and integration of knowledge into a relationship specific knowledge stock. *Knowledge sharing* refers to the action when partners interact and exchange both formal and informal information between each other. Different channels of knowledge exchanges also take place such as IT systems, phones, and meetings. Bäck & Kohtamäki (2016) highlighted the importance of open atmosphere, especially when organizations exchange tacit knowledge.

In similar vein, Fang et al. (2011: 745) highlighted that information sharing enables the partners to obtain environmental knowledge of the market, technological knowledge and also functional knowledge on the product development owned by the individual firm. They also add, that continuous knowledge exchange increases partner's familiarity and strengthens the skills of communication and coordination. Second step of the process is *joint sense-making*, which serves as a platform for explaining and communicating the link between knowledge and its meaning, thus facilitates in finding mutual understanding through the social process. Companies tempt to use variety of different mechanisms for sense making. Namely, board meetings, task-force teams, management meetings, cross functional teams. Selnes & Sallis (2003) also found that partners have also implemented shared process descriptions and virtual mechanisms to support in joint sense-making.

This leads us to the third and final step of the relationship learning process, which consists of knowledge integration into a *relationship specific memory* or knowledge stock via virtual mechanisms (Huikkola et al. 2013). According to Fang et al. (2011) relationship memory may include collective insights, beliefs, procedures, routines, and policies, which have emerged from interactions and are shared between organizations.

In conclusion, relationship learning process consists of the above mentioned steps through which partners potentially gain or sustain existing competitive advantages. In order to learn and develop R&D capability, partners must share tacit R&D knowledge in open atmosphere. In addition, partners need to ensure the flow of information is balanced and not only mandated by one party. Lastly, the exchanged knowledge must be

understood by both parties, after which it can be saved to the relationship specific memory. (Bäck & Kohtamäki 2016.)

## 2.7. Supplier development practices

The final section of this literature review discusses about SD. Moreover, this section builds on the previous chapter by identifying the most dominant SD practices exploited by the buyer organizations to enhance relational structure, relational capital or trust and relationship learning with the supplier. Hence, also provide theoretical support to the following research question (RQ3): *How are these critical dimensions leveraged and embedded in the case company`s operational supplier development strategies?*

Rapidly changing business environment has forced companies to explore every possible opportunity for improving the performance of their product, while simultaneously strengthening their business relationships. As an answer to the call, buyer firms have increased emphasis on their SD strategies. (Krause, Scannell & Calantone 2000.) Supplier development can be defined as buying firms effort to improve their supplier`s performance (Krause & Scannell 2002). Similarly, Watts & Hahn (1993: 12) defined SD as buyer organizations attempt to establish and maintain a competent supplier network.

Chen et al. (2015: 250) & Krause et al. (2000) found evidence that many companies have gained relational benefits from implementation of SD strategies, thus improved quality, cost performance, shortened lead-times, and also enhanced market, operational and financial performance. Watts, & Hahn (1993: 11) argued that the reason why SD is so important is, because the quality of the end-product is completely determined by the capabilities of its vendor. SCM literature discuss about the following SD strategies utilized in buyer-supplier relationship management; supplier assessment, competitive pressure, supplier incentives and direct involvement (Krause & Scannell 2002; Krause et al. 2000).

*Supplier evaluation & Feedback* is a practice, which enables the buyer firm to do in-depth evaluations of supplier performance in the areas of quality, technical, delivery, cost and managerial capability. After assessment buyer organization provides feedback to the supplier. It may be argued, that feedback is the most important factor in terms of relationship development, since it directs the supplier to the right direction and also

clarifies buyer organizations expectations. (Krause et al. 2000: 36.) For example, a common practice is to perform annual Supplier Performance Evaluations (SPE) and also to fulfil supplier scorecard once every quarter. *Competitive pressure* is a practice, which can be applied in case when there are more than one supplier producing the purchased item. Thus, buyer firm can test the market by requesting competitive bids from multiple suppliers. For example, dual or multi-sourcing strategies are often exploited to create competition among suppliers (Krause, Scannell & Calantone 2000).

*Supplier incentives* can be used as a practice, which may be exploited if supplier has performed well. Incentives are given based on certain criteria and can be in form of award, ceremonials, preferred supplier status or promise of current business. It has also been found, that this SD strategy may provoke competition between suppliers and also motivate suppliers for better performance. *Direct involvement* is a practice, which for example, includes site visits to supplier's premises, supplier visits to buyer site and also supplier training. (Krause et al. 2000.) Monczka, Trent & Callahan (1993) stressed that buying firm may invest in to supplier in financial or physical form. However, it must be stated that direct involvement strategy can also be risky, because they involve transaction specific investments into the supplier. Consequently, buyer internalizes all the costs related to supplier's performance development. On the other hand, this type of SD strategy can also reduce buyer organizations transaction costs in the long- run and simultaneously diminish uncertainty regarding to crucial manufacturing inputs. Krause et al. (2002) added cost, quality, rework, production downtime and problem resolution as potential benefits.

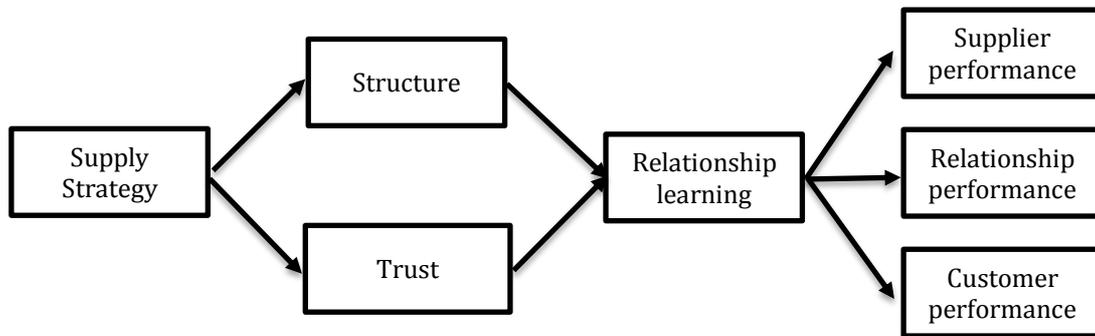
**Table 2** is a modification of the table created by (Chen et al. 2015: 260), which illustrates the most common SD practices identified in the supplier relationship management literature. However, this table differs in a specific way from the original table as it categorizes the SD practices based on the relationships dimension they aim to improve. In simple terms, this thesis examines which type of SD practices are used by the buyer organization to enhance relationship structure, relational capital & trust and relationship learning between the partners in the R&D collaboration.

**Table 2.** Summary of SD practices developed based on Chen et al. (2015)

<b>SD Practice</b>	<b>Description</b>	<b>Relationship Dimension</b>
<b>SD1.</b> Supplier assessment	Supplier performance evaluation & feedback	Relationship structure, learning
<b>SD2.</b> Set values & goals	Mutual understanding on values & goals	Relationship structure, trust,
<b>SD3.</b> Information sharing	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)	Relationship structure, trust, learning
<b>SD4.</b> Financial support	Provide capital for new investments or direct investment	Relationship structure
<b>SD5.</b> Physical support	Provide machinery & tools	Relationship structure
<b>SD6.</b> Technical assistance	Provide technical support, and solve technical problems	Relationship structure, learning
<b>SD7.</b> Managerial assistance	Provide support, assistance in QM & inventory management	Relationship structure, learning
<b>SD8.</b> Supplier involvement	Involve supplier in activities such as NPD	Relationship structure, trust, learning
<b>SD9.</b> Plant visits	Visit suppliers premises	Relationship learning
<b>SD10.</b> Invite to visits	Invite suppliers personnel to buyers site	Relationship learning
<b>SD11.</b> Clear specifications	Provide product/ technical specifications	Relationship structure
<b>SD12.</b> Communication	Interact regularly: face-to-face, phone, email, meetings etc.	Relationship structure, trust, learning
<b>SD13.</b> Joint action	Enforce collaboration (R&D)	Relationship structure, trust, learning
<b>SD14.</b> Community of suppliers	Facilitate learning information sharing networks among suppliers	Relationship structure, trust, learning
<b>SD15.</b> Buyers involvement	Process improvements (IT systems, planning, goal setting)	Relationship structure
<b>SD16.</b> Quality emphasis on supplier selection	Choose suppliers according to quality first	Trust
<b>SD17.</b> Quality assurance	Supplier audits & certifications	Trust
<b>SD18.</b> Contractual agreements	Create a formal contract with the supplier	Trust
<b>SD19.</b> Incentives	Promise of current / future business	Trust, relationship structure

## 2.8. Theoretical framework

The purpose of the theoretical framework illustrated below is to demonstrate how buyer-supplier relationships dyads are formed and further explain what types of relationship specific dimensions influence on supplier, relationship and customer performance. Furthermore, this framework is tested in the empirical part, followed by more specific modifications and presentations of the findings. **Figure 6** begins with the idea that the base of supplier relationship formation is strategic. Therefore, buying firms should see their suppliers as an asset through which they can potentially obtain complementary resources. In other words, supply strategy defines how dependent the dyads are from one another.



**Figure 6.** Theoretical framework for Supplier Relationship Management

As this thesis focuses on R&D collaborations the model also depicts relationship specific dimensions, which are embedded in the relationship. Hence, *relationship structure*, *relational capital* and *relationship learning* have been identified as critical relationship dimensions. Moreover, this framework argues that relationship structure and relational capital need to be managed simultaneously in order to enable relational learning. In other words, relationship-level learning varies and thus depends on the relationship structure and relational capital enhancing SD practices used by the buyer organization. With that said, relationship learning is argued to be the most important dimension directing the overall supplier performance, relationship performance and customer performance in R&D collaboration.

### **3. RESEARCH METHODOLOGY**

This chapter of the paper will cover the research methods used in this particular study. At first, the research approach will be described followed by presentation of the data collection and analysis methods. Lastly, the validity and reliability will be covered at the end of the chapter.

#### **3.1. Research approach & design**

Exploratory research approach was chosen for this study. This study also has elements from both deductive and inductive approaches. Therefore, it may be stressed that abductive approach has been applied. Abductive allows a researcher to explore the solutions for a particular study creatively and interpretively and due to that, previously shown theoretical framework can be modified (Dubois & Gadde 2002: 554). To conclude, abductive approach fits to this type of study, because it enables the researcher to go back and forth with theory and empirical data.

This study exploits ethnographic type of multiple case study design as a research type. In this type of study, the researcher is actively involved in the case company's daily operations, thus collects data objectively. Therefore, participant observation serve as part of the primary data collection (Atkinson & Hammersley 1994). During one year time period, I have spent varying amount of days working within the case company's purchasing organization, participating in different activities related to SCM, supplier relationship management, R&D management, supplier evaluation, and supplier development. With that said, I have developed insight on how case company's managers handle SCM tasks in both internal and external environment. In addition, the triangulated research design also included semi-structured interviews, table discussion, several meetings and internal data analysis. This approach can be seen as the most suitable for thesis, because the empirical findings are supported by personal insight, and therefore make the data more reliable.

According to Beverland & Lindgreen (2010) case studies have been widely utilized, for instance in business marketing theory, because of the flexibility and value adding

purposes. Due to this, it is convenient to study complex, evolving relationships and interactions in industrial markets (Dubois & Auraujo 2004). Beverland & Lindgreen (2010) named the following three journals as examples in which case studies are common: specialist B2B marketing journals, (IMM), Journal of Business and Industrial Marketing & Journal of Business to Business Marketing. The goal of the research is to create understanding for the collected data, thus clarify why organizations behave in certain way.

### 3.2. Data collection

According to Yin (2014) by conducting interviews, the author can develop deeper understanding of the studied subject, thus interviews can be seen as one of the most appropriate sources of information. The empirical data for the thesis was collected by conducting semi-structured interviews and open discussion sessions with ABB representatives. The interviewees hold the following positions: Sourcing Managers, Project Manager and R&D specialists and were selected based on the fit with the specific supplier relationship. The supplier relationships were selected together with the managing directors of both ABB business units prior to the interviews.

The details of the interviews conducted can be seen in **Table 3**. In addition, the empirical data collection was enriched with author's personal observations and experience obtained from daily operations. For instance, certain data was collected during weekly follow-up meetings with suppliers, by exploring company's supplier management guides, process descriptions and also from supplier negotiations event. All of the interviews were recorder and transcribed. After that, the most important findings from each collaboration were compared with data in **Table 2** and monitored into a structured template (see Appendix 2). Furthermore the process charts were compared in the cross case analysis section.

**Table 3.** Summary of interviews

<b>Business unit</b>	<b>Position</b>	<b>Date</b>	<b>Length of The Interview</b>
Buyer A	Global category Manager	16/03/2016	35 minutes

Buyer A	R&D Specialist Design Architect	22/03/2016	33:43minutes
Buyer A	R&D Specialist Design Architect	31/05/2016	39:15minutes
Buyer B	Sourcing Manager A	04/05/2016	52:51minutes
Buyer B	Project Manager	11/04/2016	35:29minutes
Buyer B	R&D Engineer	05/04/2016	24:31minutes
Buyer B	Sourcing Manager B	25/04/2016	31:21minutes

Yin (2013) instructs to create a structured interview guide prior to conducting the interviews. The themes discussed in the interviews were the following:

1. Supply strategy
2. R&D collaboration formulation
3. Relationship performance evaluation
4. Data gathering
5. Relationship development

There are three types of interviews used when conducting empirical study: open interview, semi-structured interview and structured interviews. In open interview the interviewee's knowledge and insights are utilized in a more general way in order to achieve a holistic understanding of the subject. It may be argued, that this type of interview is opposite for structured interview in which the researcher express questions that are directly linked to the research hypothesis, therefore places the interviewee in a situation where the answer options are predetermined. Semi-structured interviews can be seen as a mix of open and structured interviews, because it uses both type of questions. For instance, it allows the researcher to ask more detailed additional questions in order to obtain a thorough understanding of the subject, whereas the structured questions serve as a frame for the interview to keep it aligned with the theme. (Hirsijärvi & Hurme 2008.) Considering all of the options, this study exploits the last alternative, which is semi-structured interview in order to attain holistic understanding of the sourcing process.

### 3.3. Data analysis

Yin (2013) stressed that general explanations, which fit the cases should be built when analysing multiple cases. The explanations facilitate the comparison between the cases in order to identify difference and similarities. This study chose cross-case analysis to compare the SD practices of two ABB's business units.

The data analysis is completed based on the theoretical framework represented earlier in this study. This framework is tested in the data analysis section in order to find out, whether the respondents agree or disagree, or if the content of the framework need to be modified. The analysis is divided in to themes used in the interviews in order to make the structure more consistent.

Each theme was analysed from the buyer organizations point of view. The analysis also included comments from the interviewees to provide a peak into the study. The purpose of this analysis is to develop a fresh insight into the current status of R&D supplier relationship management within both of the ABB's business units. A secondary objective of this analysis is to contribute to ABB's internal knowledge by enabling learning between the business units.

### 3.4. Validity & reliability

In order to ensure the literature review is valid and reliable, the theory and concepts selected are obtained from scholarly journals and books written by popular authors. To enhance validity of the thesis, various perspectives from different scholars have been considered. In terms of case study validity, multiple case study approaches are favoured. Yin (2013) states that by exploiting the multiple case study approach the author is more likely to achieve valid findings, since the data is gathered from variety of different sources.

From the reliability point of view it may be argued, that the qualitative research also include weaknesses. Marshall & Rossmann (1999) stressed that situational changes in the business environment prevents repetition of the study in the circumstances. In order to increase reliability and avoid research bias, this study applies a triangulation technique

also exploited by Huikkola et al. (2013) that includes material collection from companies' internal documents and websites, participant observations at the work place and also conducting face-to-face interviews. In addition, in order to increase objectivity both R&D and purchasing specialists were interviewed.

Beverland & Lindgreen (2010) named three ways of operationalizing reliability. First one being standardized interview protocol. Secondly, the structure should be explained precisely and grounded in the vast literature. Thirdly, a provision of audit-trail by providing access to the data. In terms of this study, the third one can be seen as difficult to accomplish, due to confidentiality of the case company.

All in all, the field of SNM management is extremely complex and diverse. The theory around it has multiple viewpoints and companies are using variety of approaches in order to maximize their supplier performance. Consequently, this gives a challenge for the validity and reliability of the research, because each relationship behaves differently.

**Table 4.** Summary of adopted research methods

<b>Key methodology aspects</b>	<b>Adopted method</b>
Research approach	Exploratory and abductive approach
Research design	Ethnographic type of multiple case study
Data collection	Semi-structured interviews, sample size 7 participants
Reliability	Transparent reporting, personal observation and data collection, audio-recording and transcriptions.
Validity	Valid academic material, experienced participants, companies internal material, participant observation
Case description	ABB Oy, power distribution and automation company. Two subcases formulated based on the business units
Analysis methods	Within case analysis, cross case analysis & discussion based on the theoretical framework

## 4. RESULTS

This chapter of the study begins with case company introduction, which is followed by in-depth analysis and discussion of the main observations. In order to remain confidential the case company name (ABB Oy) is only revealed. Business units are discussed as buyer A & B. In addition, supplier names will not be mentioned, but discussed as supplier A, B, C & D.

### 4.1. Case description

The case company, ABB Group operates in the high-technology industry, more specifically in the area of electrical and electronic devices and systems. ABB Group is divided into four divisions based on the customers and industries it serves. Moreover, the company currently employs approximately 140 thousand individuals globally, from which about five thousand work in Finland. ABB Group invests significant amount of resources into R&D, which makes it one of the most innovative companies in the world. As a country Finland can be seen as one of the key R&D centres for ABB, because of its high education level and ability to contribute significant amount of engineering talent. (ABB 2017.)

This case study examines two internal ABB units, which both operate in Finland. These companies manufacture different products, thus aim to fulfil the needs of different customers segments. For example, buyer A provides electrification products, compared to buyer B who manufactures robotics and motion related products. In 2015, buyer A employed 300 people vs. buyer B, which employed approximately 1600 people. In terms of revenue generation to the whole ABB Group, buyer B contributes greater revenues. As mentioned, both business units operate in the high-technology B2B markets in which innovative solutions are constantly demanded, therefore in order to create competitive advantages close R&D supplier relationships are necessary.

**Table 5** summarises the central facts about the buyer-supplier R&D collaborations examined in this particular study. In particular, it depicts that buyer A collaborated with supplier A & B and buyer B with supplier C & D. Categorizing is also done to facilitate data analysis between the buyer organizations. In the next section each of the supplier relationships will be discussed and analysed in more detail.

**Table 5.** Buyer A's and B's relation to their mechanical component suppliers

	<b>Buyer A</b>	<b>Supplier A</b>	<b>Supplier B</b>	<b>Buyer B</b>	<b>Supplier C</b>	<b>Supplier D</b>
<b>Total revenue (Eur/USD)</b>	Not available	5 billion. €	10milj. €	Not available	100milj. USD	104milj. €
<b>Strategic importance</b>	Supplier A: High Supplier B: High	ABB Group: High Buyer A: Medium-low	ABB Group: low Buyer A: Medium-low	Supplier C: Medium Supplier D: High	ABB Group: Medium Buyer B: High in plastic components	ABB Group: High Buyer B: High in R&D services
<b>Employees</b>	300 (unit)	3500 (global)	260 in China	1300 in Helsinki	4500 (global)	1800 (global)
<b>Main products &amp; services</b>	Electrification products	Mechanical components	Mechanical components	Robotics and Motion products	Mechanical components	Mechanical components
<b>Service provision</b>	Specifications	Product tailoring, prototype services	Prototype services, R&D collaboration	Specifications	Product design and prototype service	Product design and prototype service
<b>Partners switching time</b>	-	24 months	12 months	-	12 months	6–8 months
<b>Share of supplier revenue %</b>	-	8%	5%	-	3%	15%

### *Supplier descriptions*

*Supplier A* is a first-tier supplier for buyer A. Supplier A is responsible for case assembly, which are tailored and designed to buyer's product portfolio. In addition, supplier A is responsible for prototype development and technical support. This partnership can be viewed as strategic relationship for buyer A according to Kraljic's matrix. In this type of relationship there is limited access to the items traded in the relationship through market mechanisms and the relationship has high impact on profit through cost of revenue generation (Kraljic 1983). Supplier A's production sites are spread globally, but the final assembly for this specific part is done in Finland. The partners have over ten year's history

of collaboration. Over the years buyer A has made significant investments into machinery and tools placed at supplier premises. As a consequence most of the material supplied are controlled by ABB. In addition, the total spend and annual order volume of these parts is high, therefore also has high impact on buyer's revenue. From suppliers A's perspective buyer A is viewed as important buyer but medium in terms of total revenue generation.

*Supplier B* is mainly a second-tier supplier for buyer A and is located in China. The collaboration began ten years ago in attempt to diminish material expenses. Over the years, buyer A has made investments into supplier's machinery and tools. These parts are tailored and designed by buyer's R&D unit and shipped to another supplier for assembly. There are also few other components, which are sent directly to buyers premises. In terms of R&D this supplier is only responsible for prototypes and collaboration. This relationship can be viewed as noncritical according to Kraljic's matrix. The reason being that there are other suppliers available through market mechanisms and the impact on profit through cost or revenue generation is low.

*Supplier C* is a first-tier supplier for buyer B. Supplier C manufactures plastic frames, which are tailored to buyers product portfolio by the buyers R&D team. In terms of R&D, supplier C is responsible for manufacturing a preliminary model and providing technical support. This partnership can be viewed as bottleneck relationship according to Kraljic's matrix. Supplier C's production site is located in China and the partners have over ten years history of collaboration. Over the years buyer B has made significant investments into supplier's moulding tools. In terms of total spend and order volume buyer B is a medium size customer for the supplier. In contrast, supplier C can be seen as important partner in mechanical parts. Despite, the large size of the supplier, buyer B aims to remain as interesting customer, but still less than 50% share of supplier C's total revenue generation to reduce risk of increased fixed cost.

*Supplier D* is first-tier supplier for buyer B. Partneuyerrs collaboration began in the means of a specific R&D project. In addition, some previous contact has also taken place. Supplier D manufactures die castings to one of buyers products. These mechanical parts are tailored and designed in cooperation with supplier D. In term of R&D this supplier is responsible for technical support, prototypes and second-tier network management. Considering the total revenue of ABB Group this supplier has low impact, but on business unit level the importance of this supplier increases. On contrary, buyer B contributes approximately 15% of supplier's revenue. With that said, buyer B can be seen as a large customer for supplier D. From purchasing management perspective, this relationship can

be seen as noncritical relationship according to Kraljic's matrix. However, from R&D perspective this partnership can be viewed as relatively important, because of suppliers technical and innovation competence.

#### 4.2. Within case analysis

In this part of the study the author is going to introduce four different procurement process models, which have been used as templates for data collection when conducting the interviews with case company representatives. For better understanding each model represents a different buyer-supplier R&D collaboration. In particular, the author attempts to identify which type of SD practices are exploited by the buyer organizations (buyer A & B) to enhance relational structure, relational capital or trust and relationship learning with specific R&D suppliers.

In order to build synthesis with the theory the content of each process model is built based on **Table 2**. For example, if buyer firm exploits supplier assessment as a management practice at some point of the procurement process then that practice is marked as **SD1** in the correct phase of the process model. In addition, short summary tables are also provided systematically as reminders of what each coding means. With that said, this section also serves as groundwork for the cross-case analysis section of the study in which similarities and differences are discussed more thoroughly.

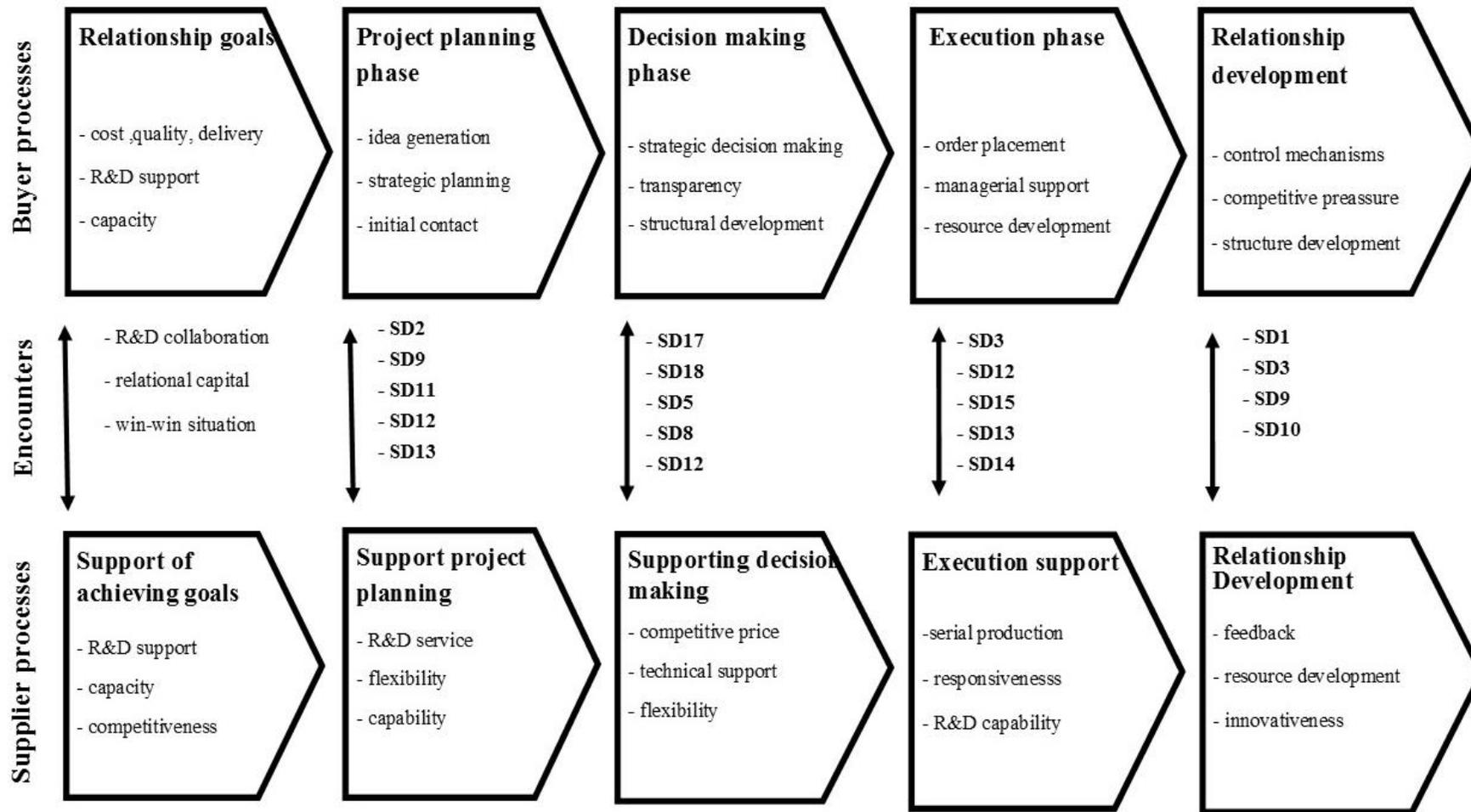


Figure 7. Buyer A's relationship with supplier A

### *Relational structure*

Buyer A exploits different types of SD practices in order to enhance relational structure with supplier A. The results show that frequent interaction, knowledge sharing and mutual understanding of each other values and goals were identified as important elements. In particular, partners have assigned key account managers to facilitate communication between partners. Other responsible contacts (purchaser, supplier sales personnel and R&D specialist) have also been assigned to take care of the operational and technical processes. Another important observation was that buyer A invests heavily into machinery and tools placed at supplier's site. This means that buyer A has total control and ownership of the product, thus reduce dependence and increase competitiveness.

Considering the operational phases of the procurement process, it can be observed that buyer A has implemented IT mechanisms to monitor and evaluate supplier performance. For instance, buyer's ERP measures supplier's delivery accuracy based on agreed lead-time. In case of repetitive delays, supplier may receive a penalty. In addition, random incoming material quality checks is also utilized. Ultimately, the findings also reveal that buyer A has integrated IT systems with supplier A such as EDI (Electronic Data Interchange), ASCC, Kanban board, and RFID. In addition, supplier A has access to buyers SharePoint that enables reciprocal data sharing and documentation.

**Table 6.** Summary of relational structure practices

<b>SD1</b>	Evaluate suppliers performance in formal or informal process
<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD5</b>	Provide machinery & tools
<b>SD11</b>	Provide product/ technical specifications
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD14</b>	Facilitate learning / information sharing networks among suppliers
<b>SD15</b>	Process improvements (IT systems, planning, and goal setting)

**Table 6** summarises the main SD practices applied by buyer A to improve relational structure. Reflecting on **Figure 7** it can be interpreted that supplier A is strategically important partner to buyer A, because they invest significant amount of effort into improving collaboration and interaction. Overall, my findings were consistent with the theory, because previous studies conducted by Huikkola et al. (2013) and Kohtamäki et al. (2012) also discussed about the importance of reciprocal communication and also pointed out that IT systems have central role in facilitating knowledge sharing. It was also found that competitive pressure formerly identified by Krause & Scannell (2002) and Krause (1997) was used to some extent when evaluating supplier operational performance. Most of the practices discussed above can also be related to trust building practices which are discussed next.

### *Trust*

Buyer A considers trust as one of the core values and therefore its management plays central role in the relationship with supplier A. As an example, prior to supplier selection, buyer A performs audits at supplier premises in order to verify supplier compliance. After verification partners sign a formal contract together with Non-Disclosure Agreement (NDA) to safeguard the relationship. Another observation was that the threat of opportunistic behaviour is at medium level, because supplier A is also subcontractor for other competing firms. It was also found that buyer A does not need to guide the supplier in the assembly process, thus trust suppliers knowhow. Furthermore, supplier A has also been trustworthy in terms of quality, lead time and responsiveness which can be seen as crucial elements in a collaborative R&D relationship.

**Table 7.** Summary of trust enhancing practices

<b>SD17</b>	Supplier audits & certifications
<b>SD2</b>	Mutual values & goals
<b>SD18</b>	Create a formal contract with the supplier
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)

**Table 7** summarises the main SD practices exploited to strengthen trust between the partners. Reflecting on **Figure 7** it can be observed that trust enhancing practices such as supplier certification, contracting and concealments are spread out into decision making and execution phases of the procurement process. Previous studies also support my findings by stressing that supplier certification, contracting and concealments are important processes, which have significant influence on relational capital development, quality of collaboration and also accumulation of unnecessary transaction costs (see Henttonen et al. 2016; Larson & Kulchitsky 1998). As a result, it may be stated that buyer A had a clear strategy and systematic processes in place when managing trust in this specific relationship. Factors facilitating relationship learning are discussed next.

### *Relationship learning*

Buyer A and supplier A have worked together over a decade, which mean that both have gathered vast amount of information about each other's business operations. Considering the relationship learning aspect, it may be argued that partners engage learning through sequence of trial-error encounters in various projects. It can be added, that reciprocal communication and knowledge exchange have also enabled joint-learning. The findings also reveal that buyer A prefers to visit supplier site and also invite supplier for visit. As a result, both organization have the ability to see each other's facilities and make observations. Lastly and perhaps most importantly, it was found that buyer A completes annual supplier performance evaluation in order to give continuous feedback to supplier on quality, delivery, cost and responsiveness. From SCM point of view it can be stated that supplier assessment is essential part of the learning process, because it reveals what needs to be done more efficiently.

**Table 8.** Summary of relationship learning enhancing practices

<b>SD1</b>	Evaluate suppliers performance in formal or informal process
<b>SD9</b>	Visit suppliers premises
<b>SD10</b>	Invite suppliers personnel to buyers site
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD14</b>	Facilitate learning / information sharing networks among suppliers

**Table 8** illustrates the main SD practices exploited to enhance relationship learning. Reflecting on **Figure 7** it can be interpreted that relationship learning practices are mostly exploited in the decision making and execution phase. Previous studies (see Huikkola et al. 2013; Kohtamäki et al. 2013; Kohtamäki & Bourlakis 2012 & Kohtamäki et al. 2012) discuss about the role of relational structure, relational capital, and relational investments as critical dimensions, which combined determine the level of relationship learning in R&D collaboration. In more detail, they examined the practices which facilitate knowledge sharing, joint-sense making and knowledge documentation in R&D collaborations. My results were partly consistent with the theory, since buyer A had formed a systematic practices to support relational structure and relational capital which enabled open knowledge sharing, and joint-sense making with supplier A. For example, frequent meetings, supplier assessment and feedback, and supplier visits were exploited as practices. However, some of the findings were also inconsistent by showing deficiencies in knowledge documentation practices. It was obvious that too often the exchanged information stayed in hands of one person and was not communicated properly to the whole team.

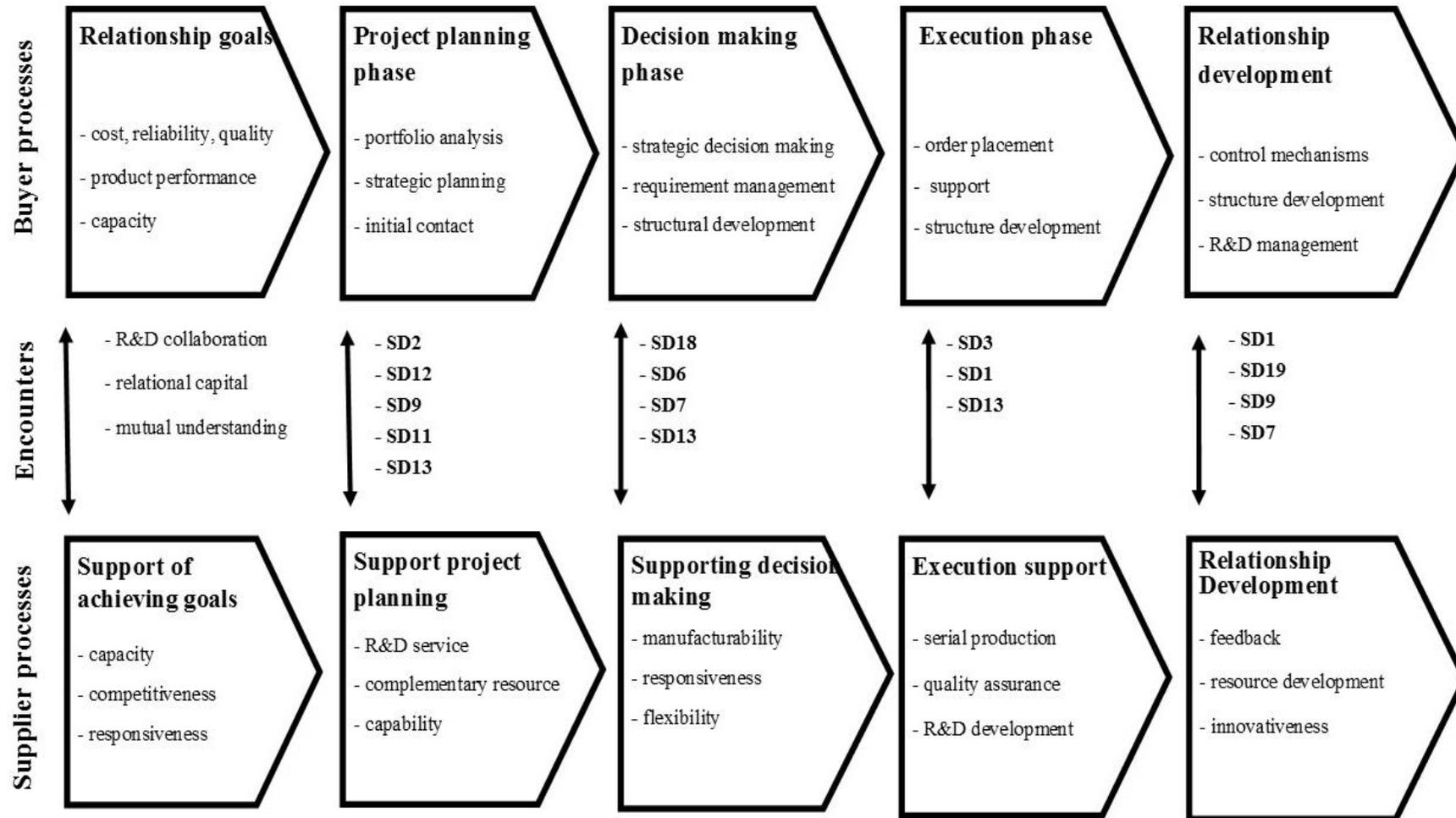


Figure 8. Buyer A's relationship with supplier B

### *Relationship structure*

Buyer A and supplier B have minimal direct collaboration, because supplier B is second-tier supplier. It may be argued that buyer A has created a network in which one serves as a hub-firm and therefore coordinates the network from arms-length distance (Jarillo 1988). Another interesting finding was that buyer A uses significant amount of effort in both communication and requirement management, because partners do not share a common language. For example, all of the R&D information such as product specifications are exchanged and translated via third party contact. Furthermore, other managerial assistance was provided to control the network performance. As an example, buyer A arranged development meetings one or more times a year. Another finding was that buyer A provided volume increase incentive for the supplier. Despite the challenges, collaborates have had success. One could argue that, the main driver for relationship continuity has been the relatively low bargaining power of supplier and achieved cost benefits.

**Table 9.** Summary of relational structure practices

<b>SD1</b>	Evaluate suppliers performance in formal or informal process
<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD6</b>	Provide technical support, and solve technical problems
<b>SD7</b>	Provide support, assistance in QM & inventory management
<b>SD11</b>	Provide product/ technical specifications
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD19</b>	Promise of current / future business

**Table 9** summarise different types of SD practices exploited by buyer A to strengthen relationship structure. Reflecting on **Figure 8** it can be observed that buyer A has achieved relational success by establishing collaborative atmosphere with the network partners. This has required constant managerial support, interaction, and joint-sense making in the planning, decision and execution phases. Reflecting on the theory, it may be argued that buyer A executes a competitive strategy, which requires less managerial

focus and interaction, but focuses more on cost (Park et al.2010). Therefore, the SD practices utilized to strengthen relational structure (e.g. communication, and knowledge sharing) are exploited mostly at the initiation phase and in alignment with the strategy. In addition, Chen et al. (2015), Krause & Scannell (2002) & Krause (1997) highlighted that provision of incentives is a smart managerial technique to keep the supplier motivated and work well in noncritical supplier relationships. This was also recognized by buyer A.

### *Trust*

Buyer A and supplier B have built trustworthiness through joint collaborative action. Therefore, one may argue that the key drivers of this relationship have been reciprocal interaction and operative performance. The findings show that buyer A pushed towards reciprocal information sharing and joint- sense-making in attempt to develop trust and also to attain strategic objectives such as competitive cost and lead-time. Considering the relationship governance aspect partners have established contractual agreement in order to safeguard the relationship. However, since supplier B is second- tier supplier most of the managerial responsibility is put on the first-tier supplier.

**Table 10.** Summary of trust enhancing practices

<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD18</b>	Create a formal contract with the supplier

**Table 10** represents the SD practices used to enhance trust between the partners. Reflecting on **Figure 8** it can be observed that buyer A exploits these practices mostly in the planning and decision making phases of the procurement process. Huikkola et al. (2013) and Kohtamäki et al. (2012) stressed that reciprocal information exchange and joint sense-making improve relational structure through which relational capital and learning can be obtained. In tandem with this finding, my results show that relational structure and trust enforcing practices are very similar and therefore are exploited

simultaneously in order to gain relational rents. The practices facilitating relationship learning are discussed next.

### *Relationship learning*

Based on the interview results, it is obvious that buyer A is responsible for learning management. For instance, buyer A has patiently created a relationship structure, which enables interaction and open knowledge exchange, thus are pre-requisites for joint-learning (Huikkola et al. 2013). Therefore, it can be argued that the hub firm can be seen as learning enforcer within the network. In order to gather greater insight about supplier B's business, buyer A has also visited supplier's site. Furthermore, buyer A also performs supplier assessment together with the first-tier supplier in order to monitor and control supplier's performance.

**Table 11.** Summary of relationship learning enhancing practices

<b>SD1</b>	Evaluate suppliers performance in formal or informal process
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD9</b>	Visit suppliers premises
<b>SD13</b>	Enforce collaboration (R&D)

**Table 11** summarizes the main SD practices utilized to improve learning between the partners. Reflecting on **Figure 8** it can be observed that as the strategic objective is at achieving low-cost, the resources used towards learning and innovation are also minimal. Instead, competitive pressure and supplier assessment are more applicable practices. Previous studies (see Krause & Scannell 2002; Krause 1997; Watts & Hahn 1993) identified similar phenomenon that in arms-length relationship buyer organization focuses less on learning and innovation management, when executing competitive strategy or multi-sourcing strategy. Moreover, Henttonen et al. (2016) stressed that many R&D collaboration fail due to lack of mutual understanding. To avoid this situation, buyer A offered significant amount of technical and managerial assistance for supplier B.

In conclusion, the above-discussed findings indicate, that the so called relationship dimensions such as relationship structure, trust and relationship learning were identified as essential elements of R&D collaboration. In other words, buyer A utilized a variety of focused SD practices throughout the procurement process in order to control the supplier and further improve the overall relationship performance. However, certain managerial differences were also identified. For example, supplier A did not require managerial nor technical assistance from buyer A compared to supplier B who required significant amount. With that said, each R&D collaboration must be managed differently. In addition, buyer organization has to make strategic decisions on which type SD practices can be applied to reinforce the relationship dimensions.

The following section illustrates and discuss about the central findings collected from interviews with buyer B. Similarly to the previous chapter, this section focuses on analyzing the SD practices exploited buyer B with supplier C & D (see **Table 5**). In addition, the SD practices are categorized based on which type of relationship dimension (e.g relationship structure, trust or relationship learning) it aims to develop.

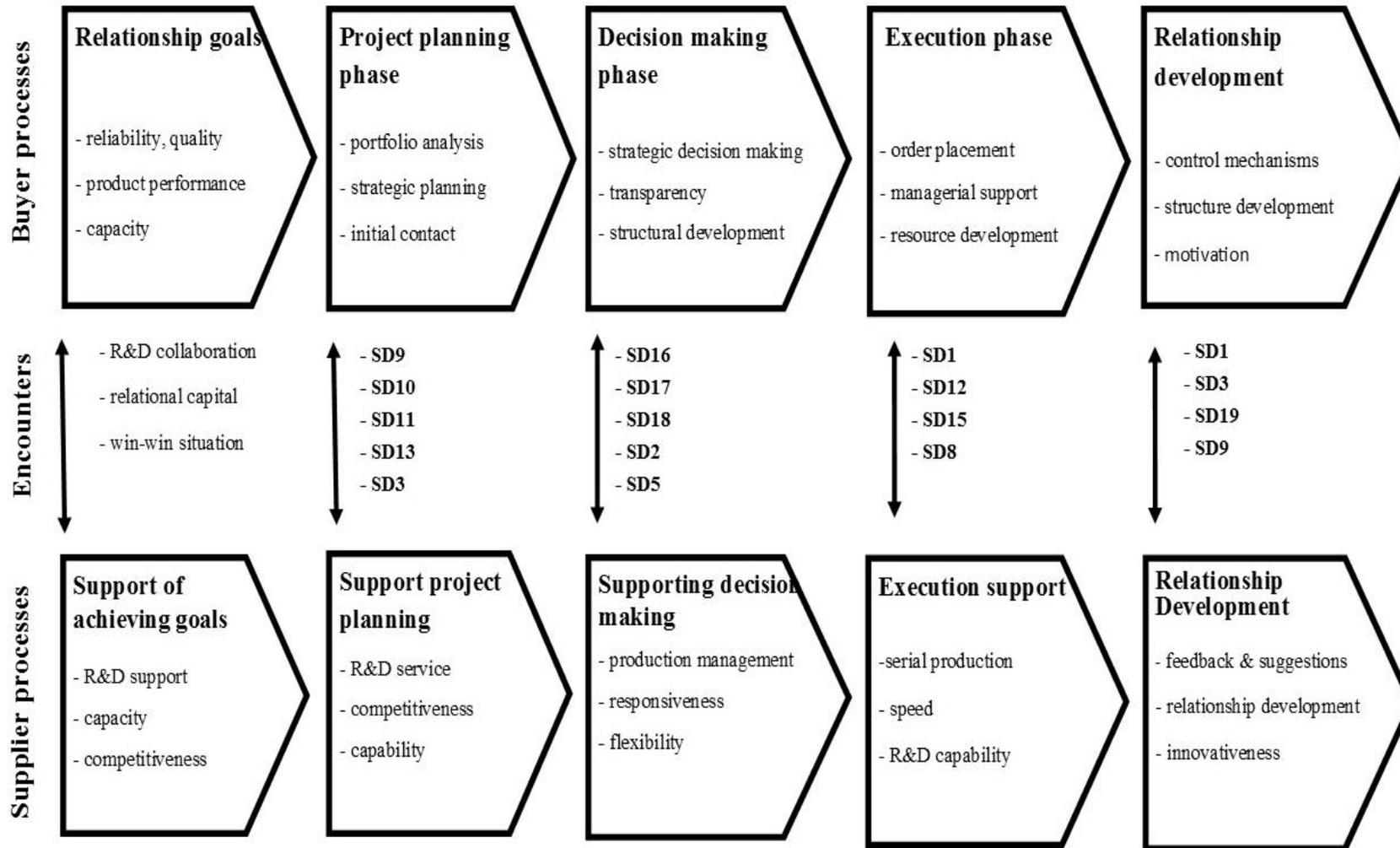


Figure 9. Buyer B's relationship with supplier C

### *Relationship structure*

Buyer B and supplier C have over a decade long history of R&D collaboration. As **Figure 9** display buyer B use variety of SD practices to enhance interaction and transparency. For example, partners have established a relationship steering group, who meets regularly to discuss about current operations. Buyer A also executes frequent supplier visits to collect visual data. Moreover, buyer B and supplier C have integrated IT systems to improve information flow. For instance, SharePoint, Electronic Data Interchange (EDI), ASCC, Kanban and Hermes (buffers) are currently at use. In addition, technical specification and drawings are created by CAD program and further shared with the supplier in Microsoft PowerPoint format. The results also show that buyer B invests significant amount of money into machinery and tools placed at supplier premises in order to maintain control and ownership of the product.

**Table 12.** Summary of relational structure practices

<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Exchange all types of information openly (quality, cost, delivery, technical etc.)
<b>SD5</b>	Provide machinery & tools
<b>SD11</b>	Provide product/ technical specifications
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD15</b>	Process improvements (IT systems, planning, goal setting)
<b>SD19</b>	Promise of current / future business

**Table 12** summarises the main SD practices exploited when building relationship structure. As **figure 9** illustrates buyer B aims to enhance relational structure by implementing SD practices, which facilitate interaction and performance monitoring. For example, buyer B enforced two-way communication and transparency in the supplier selection and prototyping processes. They also assigned responsible project team and designed integrated virtual channels for knowledge exchange. It may be argued, that my results were aligned with the previous discoveries, because similar practices were also identified as effective mechanisms, which enhance relational structure in collaborative R&D relationships (see Chen et al. 2015, Huikkola et al. 2013; Kohtamäki et al. 2012). Moreover, my empirical data supported the fact that partners need to share information

to plan and coordinate their work in order to meet the organizations strategic objectives (Fang et al. 2011).

### *Trust*

Buyer B and supplier C have built trust through collaborative action. Therefore, it can be argued that the key enablers of trust development have been transparency and open knowledge sharing. According to the results, buyer B reinforces trust by placing high emphasis on quality and safety management. Furthermore, the findings also reveal that supplier C requires minimal amount of technical or managerial assistance, which can be seen as sign of trustworthiness. However, along with positive signs of trust, there are also processes, which can be improved. For example, in terms of opening material cost structure the transparency should be developed by the supplier C in order to enhance relational capital.

**Table 13.** Summary of trust enhancing practices

<b>SD3</b>	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD16</b>	Choose suppliers according to quality first
<b>SD17</b>	Supplier audits & certifications
<b>SD18</b>	Create a formal contract with the supplier
<b>SD19</b>	Promise of future business

**Table 13** summarizes the SD practices exploited to enhance trust. Reflecting on **figure 9** it can be observed that most of the trust enhancing practices are utilized early on in the procurement process. For example, prior to serial production buyer performs quality, safety, process audits in order to verify supplier compliance. Moreover, buyer B also has a valid formal contract and NDA agreement with the supplier. Similar practices have also been identified as crucial processes in other buyer-supplier R&D collaboration. For instance, Larson & Kulchitsky (1998) found that by completing supplier certification, buying firms expect to improve relational trust and communication, to enhance supplier

product quality, to diminish communication errors and also to reduce inventory and inspection costs. Wisner & Tan (2000: 40) added that supplier certification is believed to increase cooperation between the partners. Furthermore, Henttonen et al. (2016: 146) stressed the importance of establishment of knowledge protection mechanisms namely, contracts, intellectual property rights, concealments, and patents to prevent from opportunistic behaviour. However, parts of my findings built on the existing theory. For example, buyer B also aims to motivate the supplier through incentives. In terms of relationship development incentives can be seen as general and effective practice used by buyer organizations to enhance supplier trust and performance.

### *Relationship learning*

In this relationship learning has occurred through repetitive action. During the years of collaboration partners have been able to gather viable R&D knowledge especially through NPD projects. It may be argued that the key factors enabling relational learning have been reciprocal communication and transparency. The findings also indicate, that the supplier has also been responsive in terms of managing its own subcontractors. Therefore, it can be argued that partners have created a learning network in which the buyer serves as a network coordinator. Another finding was that collaborates have also been active in terms of visiting each other's premises through which they have become familiar with each other's manufacturing processes and business culture.

**Table 14.** Summary of relationship learning practices

<b>SD1</b>	Supplier performance evaluation & feedback
<b>SD3</b>	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)
<b>SD8</b>	Involve supplier in activities such as NPD
<b>SD9</b>	Visit suppliers premises
<b>SD10</b>	Invite suppliers personnel to buyers site
<b>SD13</b>	Enforce collaboration (R&D)

**Table 14** summarizes the main SD practices utilized to enhance relationship learning. Reflecting on **figure 9** it can be observed that buyer B engages supplier C in the learning

process early on at the relationship development phases by enforcing reciprocal communication and open knowledge sharing environment. Interaction and knowledge sharing has been identified as prerequisites for learning (Selnes & Sallis 2003). As a result, it can be stated that my findings are partly aligned with the theory, since most of the SD practices exploited to enhance relationship learning support open information sharing, joint-sense making and joint knowledge storing, which were also identified as key processes to enable joint-learning in R&D collaboration (see Huikkola et al. 2013; Kohtamäki et al. 2012; Fang et al. 2011). However, my findings also build on the existing theory by highlighting the role of supplier visits in learning contribution.

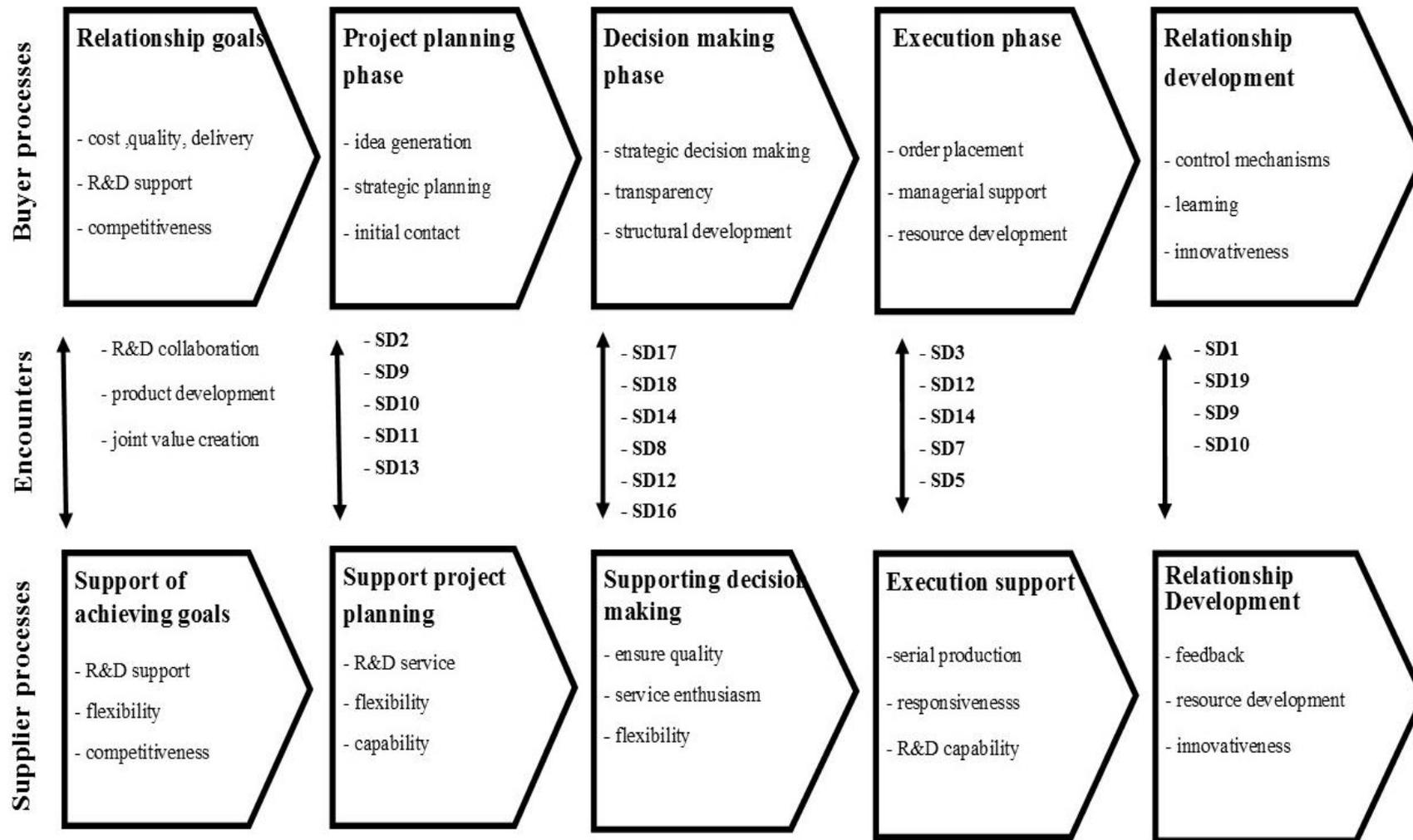


Figure 10. Buyer B's relationship with supplier relationship D

### *Relationship structure*

The key driver for relational success in this R&D collaboration is well managed systematic structure. Buyer B exploits variety of SD practices in order to improve relationship performance. For example, at the initiation phase of the relationship buyer B expects transparent two-way communication and commitment from the supplier when designing and tailoring the product. In addition, buyer B requires prototype service from the supplier to ensure product compliance. Another finding was that in order to maintain control and ownership of the product, buyer B constantly invests into machinery and tooling which are placed at supplier's premises.

Considering the operations management, it was found that collaborates have established a relationship steering group, who meet regularly to discuss relationship performance. In addition, supplier D has also been active in terms of incorporating third party suppliers into the knowledge sharing network. In order to facilitate information exchange within the network, buyer B has integrated joint IT systems such as supplier SharePoint, Electronic Data Interchange (EDI), ASCC. 3-platform and R&D project files were also mentioned. In order to improve supplier performance (quality, cost, delivery, flexibility) buyer B provides consistent feedback through supplier ratings.

**Table 15.** Summary of relationship structure practices

<b>SD1</b>	Supplier performance evaluation & feedback
<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)
<b>SD5</b>	Provide machinery & tools
<b>SD8</b>	Involve supplier in activities such as NPD
<b>SD11</b>	Provide product/ technical specifications
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD14</b>	Facilitate learning information sharing networks among suppliers

**Table 15** summarizes the main SD practices exploited to enhance relationship structure. As **Figure 10** represents most of the SD practices are mainly exploited during planning and execution phases. The interview results also highlight, that buyer B and supplier D work as a team and therefore have jointly implemented systematic processes and practices, which support intensive knowledge exchange and joint sense-making. For that reason, it may be stated that the empirical findings are consistent with the theory, since buyer B strategically utilize SD practices, that enforce interaction, knowledge sharing, and joint-sense making, thus are the building blocks of relationship structure (see Huikkola et al. 2013; Kohtamäki et al. 2012; Fang et al. 2011).

### *Trust*

The key enablers of trust development between the partners have been shared value and goals, transparency and commitment. According to the empirical findings, buyer B has high competence and relational trust on supplier D (Adler 2001). Buyer B's Sourcing Manager described competence trust development in NPD projects as the following: our steering group meets regularly with the supplier to discuss about project related issues such as product functionality, product testing, product specifications, machinery and tooling in order to improve product performance. Another finding was that buyer B develops trust by emphasizing on quality and safety management. For example, prior to supplier selection buyer performs quality, safety, process audits in order to verify supplier compliance. In addition, as a governance mechanism partners have a valid contract stating the responsibilities.

**Table 16.** Summary of trust enhancing practices

<b>SD2</b>	Mutual understanding on values & goals
<b>SD3</b>	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)
<b>SD8</b>	Involve supplier in activities such as NPD
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD14</b>	Facilitate learning information sharing networks among suppliers
<b>SD16</b>	Choose suppliers according to quality first
<b>SD17</b>	Supplier audits & certifications
<b>SD18</b>	Create a formal contract with the supplier
<b>SD19</b>	Promise of current / future business

**Table 16** summarizes the main SD practices exploited to develop competence and relational trust. Reflecting on **Figure 10** it can be observed that buyer B has systematically implemented supportive mechanisms, which enhance both competence and relational trust. For example, buyer B focuses on communicating its strategic objectives to build shared understanding of the project goals and also to minimize potential risks. According to Henttonen et al. (2016) many R&D collaboration fail due to lack of mutual understanding and competence trust. Therefore, it is important to clarify and discuss about the strategic objectives and requirements of the project early on. In addition, supplier auditing process was seen as central in terms of trust development, because through it buyer was able to verify that supplier meets the required standards for manufacturing.

Other studies (see Chen & Paulraj 2004B; Larson & Kulchitsky 1998) found the link between supplier certification and relational capital development mechanisms. Many scholars (Henttonen et al. 2016) have also argued about the importance of contractual agreements in supplier management, however my findings differed in a way that formal contract was established, but was not referred to while doing business, instead partners showed flexibility in problem solving. As a result, it may be argued that my empirical findings are consistent with the theory, since similar practices and process have been applied by buyer firms to enhance relational capital (see Huikkola et al. 2013; Larson & Kulchitsky 1998), but emphasize that trust cannot be managed solely, thus builds alongside with relational structure. Factors facilitating relationship learning are discussed next.

### *Relationship learning*

As previously discovered relational learning is the contribution of numerous trial and error encounters in previous projects, properly managed relationship structure and mutual trust developed with the collaborate. Considering this R&D collaboration, it can be pointed out that joint-learning is at the core of both partners' strategies. For example, buyer B seeks R&D support from supplier D in order to build more innovative end products and respectively supplier D seeks buyer B's project management competence and business environmental knowledge. Another important observation was that buyer B includes R&D personnel and sometimes third party suppliers in the monthly face-to-face meetings for the purpose of collective learning. As a part of relationship learning process relationship steering groups also tend to visits each other's facilities in the means of

strengthening the bonds and also to collect visual observations of both production line performance and general working habits. In addition, buyer B executed monthly supplier performance evaluations and annual supplier ratings.

**Table 17.** Summary of relationship learning enhancing practices

<b>SD1</b>	Supplier performance evaluation & feedback
<b>SD3</b>	Reciprocal knowledge exchange (quality, cost, delivery, technical etc.)
<b>SD7</b>	Provide support, assistance in QM & inventory management
<b>SD8</b>	Involve supplier in activities such as NPD
<b>SD9</b>	Visit suppliers premises
<b>SD10</b>	Invite suppliers personnel to buyers site
<b>SD12</b>	Interact regularly: face-to-face, phone, email, meetings etc.
<b>SD13</b>	Enforce collaboration (R&D)
<b>SD14</b>	Facilitate learning information sharing networks among suppliers

**Table 17** summarizes the main SD practices exploited to enhance learning between collaborates. Reflecting on **figure 10** a general observation is that learning requires supplier involvement, continuous interaction, joint understanding, collective data collection and mutual trust. In tandem with this finding, Huikkola et al. (2013) highlighted that knowledge sharing, joint-sense making and knowledge storing to relational memory are essential actions, which enable relational learning. My findings also build on the existing literature by revealing that buyer organizations should involve second-tier suppliers into the product development teams in order to increase transparency and new idea generation. Furthermore, it was also found that supplier visits are important in terms of relational learning. Many previous studies (see Chen et al. 2015: 260, Krause & Scannell 2002; Krause et al. 2000; Krause 1997) had similar findings and therefore supported the fact that visits and supplier assessment are effective practices, which enhance relationship learning.

In conclusion, the study findings indicate, that the so called relationship dimensions such as relationship structure, trust and relationship learning had central role when managing the R&D collaborations with supplier C&D. With that said, it may be stated that they can be identified as the main building blocks of R&D collaboration. The empirical findings revealed that buyer B had dominant managerial role in both of the relationships, and

therefore utilized variety of SD practices simultaneously throughout different phases of the procurement process. However, certain differences were also identified. For example, supplier D was very active in terms of integrating third party suppliers into the learning network compared to supplier C who kept arm's length distance to its first-tire suppliers. As a result, it can be observed that each R&D collaboration must be managed differently, thus buyer organization have to make strategic decisions on which type SD practices can be applied to reinforce the relationship dimensions.

#### 4.3. Cross case analysis

In this section of the study the author compares and analyzes the main findings collected in the empirical part. In more detail, the author aims to highlight similarities as well as differences in the ways of how buyer A and buyer B manage their existing R&D collaborations and what type of managerial mechanisms are in use to enhance relational structure, relational capital and relationship learning. Furthermore, the cross case analysis is enriched by captures taken from the interviews with the case company representatives.

##### 4.3.1. Practices of relational collaboration

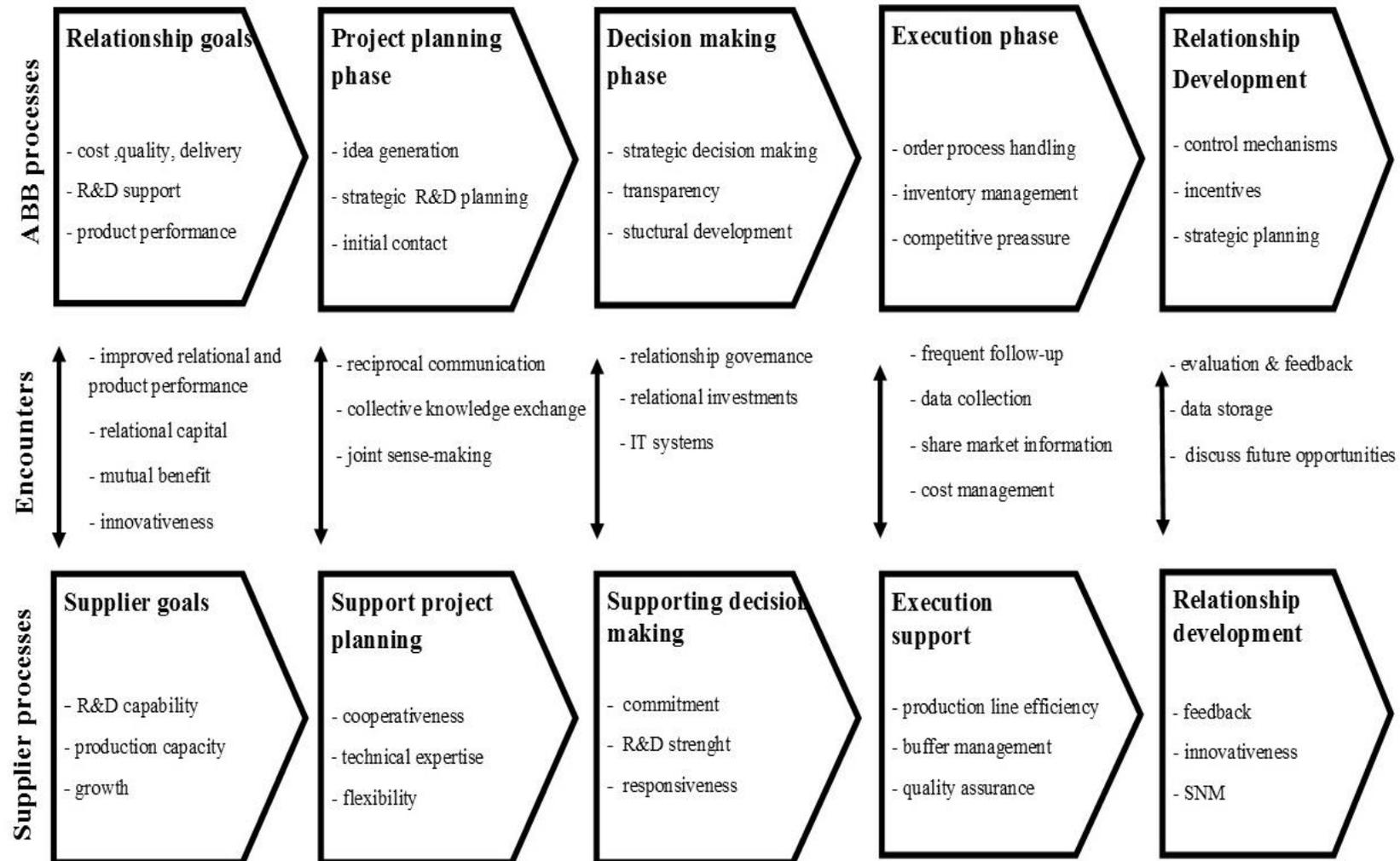


Figure 11. Buyer- supplier R&D collaboration procurement model

**Figure 11** visualizes the different processes and practices, which were common in the relationships investigated. All of these processes and practices have not been identified in every relationship, but it is a combination of practices perceived. The process model is divided in four phases which are planning, decision making, execution and relationship development phase. As **Figure 11** illustrates most of the practices utilized in the planning and decision making phases focus on developing relational structure and trust between the partners, thus highlight the importance of reciprocal interaction, open knowledge sharing and joint-sense making. Moreover, it can also be observed that reciprocal interaction and knowledge sharing play important role in enabling relational learning. Reflecting on **Figure 11** it can be noticed that in the execution and relationship development phases buyer organizations collect different types of data from the ongoing operations based on which its supplier performance is evaluated, thereby highlighting the importance of continuous relational development. The results also highlight the importance of shared meetings and development discussions as mechanisms that improve relational learning.

#### 4.3.2. Role of relational structure as practice

Relational structure plays an important role in clarifying the roles and function of each partner in the R&D collaboration. Thereby, it facilitates the creation of mutual understanding of the relationship goals. (Huikkola et al. 2013; Kohtamaki et al. 2012.) Interviewees from both organizations highlighted that the buyer organization has a more dominant role in terms of communicating its wants and needs to the supplier and further ensuring that the supplier understands its tasks and acts according to the given instructions.

*“In this kind of relationship our first responsibility is to evaluate product manufacturability, which requires intense examination of supplier’s competences. After that, we provide product specifications and technical drawings to the selected supplier. In turn, supplier is responsible for prototype development, which will later be accepted or denied.”* (Global Category Manager / Buyer A).

*“We expect our supplier to be active in terms of commenting on designs. This way we can ensure that supplier clearly understands what we type of product*

*we are looking to develop and helps to identify potential problems at early stage.” (R&D Specialist Design Architect / Buyer A).*

*“Sometimes finding consensus may be difficult, however, we can facilitate the process by being willing to negotiate and providing simpler designs, which can be manufactured in reasonable time. Often our products have 20+ years life cycle, therefore finding consensus is crucial.” (R&D Specialist Design Architect / Buyer A).*

I also found that certain type of relationships (buyer A & supplier B) require more guiding and active coordination. In simple terms, buyer organization needs to assist the supplier throughout the entire procurement process in order to build systematic processes and routines, mutual understanding of the processes, and ultimately achieve sufficient product quality.

*“We have invested significant amount of time and effort in getting this relationship to work. The issue is that we do not share a common language and supplier lacks technical know-how. However, we have managed these issues by teaching the supplier.” (R&D Specialist Design Architect / Buyer A).*

Also the interviewees from buyer B had similar views on the roles and function of each party in the R&D collaboration. Thus, highlighted that buyer organization is responsible for communicating its wants and needs to the supplier and further ensuring that supplier understands its tasks and acts according to the given instructions. However, the findings differed in a way that buyer B gave more responsibility to supplier D when planning and tailoring the product.

*“Well, the roles are quite clear. A general procedure is that our product engineer is responsible for product design and specifications and Sourcing Manager deals with commercial issues with the supplier. Supplier is*

*responsible for prototype service, quality management and meeting the operative targets” (Project Manager / Buyer B).*

*“We emphasize on collaboration so that we can achieve satisfying end results for both parties. We also listed our supplier’s ideas carefully, because we trust in their competence. Product testing is scheduled together with the supplier, but could be done more systematically” (Sourcing Manager A / Buyer B).*

Previous research also indicates that relational structure has important role in facilitating information exchange in R&D collaborations. In this study I found examples of various types of relational structure dimensions such as relationship steering groups, relational IT systems (Huikkola et al. 2013, Kohtamäki et al. 2012) and supplier visits (Krause & Scannel 2002) all of which enhance information exchange. Interviewees emphasized on the role of relationship steering groups in improving customer, supplier and relationship performance. Relationship steering groups were seen as functions, which strengthen the bonds between the partners and also serve as continuous forums for discussion and knowledge sharing. In the relationships investigated the relationship steering groups included personnel holding following titles: Supply chain and Sourcing managers, Global category manager, Project manager, Purchasing specialist and R&D personnel from buyers side and sales, R&D and top-level managers from supplier’s side.

*“We have assigned a Key Account manager who is the first hand contact for the supplier. At supplier end an equivalent contact is their Sales Manager or other managing director. Purchasers communicate with sales personnel. In case of technical issues, we have assigned specific contact personnel on both sides, thus our engineers get support from suppliers technical specialists.” (Global Category Manager / Buyer A).*

*“Our product teams have face-to-face meetings once every month in which we discuss about current operations and provide feedback to each other. Our close proximity enables this to happen so often. In addition, we make phone calls if needed and send emails on daily basis.” (Project Manager / Buyer B).*

*“In the meetings with the supplier we write down actions and further execute detailed schedules for acting upon the issue. These schedules are shared via email and phone. We also use gate model in NPD projects”* (Sourcing Manager B/ Buyer B).

Interviewee from buyer A highlighted that in complex arm’s length relationships the amount of interaction can be kept as minimum to avoid unnecessary transaction costs. It was found that when buyers strategic objective was to achieve lowest possible cost, they tend to invest less time into the relationship development activities.

*“As far as quality and cost remains satisfying and supplier can deliver the products on time we don’t have to intervene suppliers operations. However, we still perform operational reviews on monthly basis via third party contact.”* (R&D Specialist Design Architect / Buyer A).

Interviewee from buyer B highlighted that in international collaboration it is important to visit the supplier premises to get accustomed to their facilities, business habits and further create social connection with them.

*“Our Sourcing Manager together with Chinese colleagues visits supplier’s facilities once every quarter and in case of problems more frequent visits are executed. During these visits, we do factory tours and have several discussions on operational, commercial and technical issues.”* (Sourcing Manager B/ Buyer B).

IT systems were seen as one type of relational structure, which support knowledge sharing and also promote buyer-supplier relationship. My results also indicate that both buyer organizations were aware of the criticality of IT systems in relational structure development. Hence, showed that variety of joint- IT systems were implemented to facilitate virtual knowledge exchange, increase communication, support product design and tailoring process, improve monitoring supplier performance as well as in relationship

data collection. All but one of the investigated relationship utilized some sort of relational IT systems as supportive mechanisms.

*“In R&D we use CAD systems (Computer Aided Design) when creating designs for the mechanical parts. We approach the supplier with PowerPoint presentation which include both 3D and 2D models responsive to suppliers CAD.”* (R&D Specialist Design Architect / Buyer A).

*“Typically, we sent 3D model to the supplier in PowerPoint format as a request for quotation. In turn, supplier offers a price for the part and completes DFMA-analysis for the model with comments. After that, I accept or deny the suggested changes. Often this process is completed within one round, but sometimes it may take several rounds after we find an agreement.”* (R&D Engineer/ Buyer B).

Interviewees from both case companies highlight that SAP is extremely important tool supporting operations management. Thus, it is applicable to several different functions. For example, order-delivery process management, master data management, quality management, and inventory management.

*“SAP is a very efficient ERP system which enables us to proceed orders electronically. In addition, most of our suppliers use a corresponding systems through which they are able to send order confirmations directly to our system. This saves us plenty of time and decrease transaction costs”* (Global Category Manager/ Buyer A).

*“Every transaction regarding order-delivery process goes through SAP. We also have integrated ASCC through which supplier can download recent orders and further send order confirmation”* (Sourcing Manager B/ Buyer B).

In different from other relationships, it was found that buyer B also uses another IT system to manage their external warehouse placed at supplier's site. This database is used in cooperation with the supplier to add more flexibility and ensure material availability.

*“Each month we plan our external buffers with Hermes, so that our suppliers can prepare material according to the demand”. This way we also ensure that material is always available when needed (Sourcing Manager A/ Buyer B).*

Interviewees from both organization also pointed out that IT systems are crucial in the supplier assessment process. For example, suppliers were measured based on their delivery promptness, responsiveness, quality and lead-time. In addition, interviewees also stressed that supplier assessment was effective practice to keep supplier committed to the targets.

*“Suppliers operational performance is evaluated once every quarter by fulfilling a scorecard. However, as one of our strategic objectives is to achieve 100% OTD-rate to our customer, we draw monthly OTD reports from SAP to monitor supplier delivery accuracy. In case of multiple late deliveries without notification, our supplier may receive a penalty fee.” (Global Category Manager/ Buyer A).*

*“As a new practice, we have started to measure supplier lead-time. In addition, we have started to pay attention to the amount of reclamations per supplier, because they often generate significant expenses, however this process is still under development. Without the help of SAP this kind of analysis would be difficult.” (Sourcing Manager A/ Buyer B).*

*“In this global competition we have to be strict on our suppliers in terms of meeting the agreed targets. These are issues which are constantly discussed in the meetings.” (Global Category Manager/ Buyer A).*

Case Interviewees also indicated that relational structures such as relational IT systems offer a tool for relational data documentation. For example, with such tools partners can save meeting notes, price lists, quotations, and other relevant information. In addition, it was highlighted that relational memory increase transparency between the partners.

*“We use supplier Sharepoint as a data sharing platform in which our supplier has access. Meeting MoM’s, quarterly forecasts, RFQ’s, material and price lists can all be found from this cloud service.”* (Global Category Manager/ Buyer A.)

*“Sharepoint is an excellent mechanisms for collective data storing. It is important that certain documents are kept in a safe place in which both parties have 24/7 access. However, we are constantly aiming at developing transparency in all of our processes with the supplier.”* (Sourcing Manager A/Buyer B).

My research did not show evidence on the usability of shared process descriptions for the purpose of developing supplier performance nor improving R&D collaboration. However, as a personal observation it was found that buyer A’s strategic purchasers’ documents process models with detailed descriptions from most of its operations and saves them for internal use.

#### 4.3.3. Practices enabling trust

In support of relational structure, relationship capital primarily discussed as trust play important role in facilitating knowledge exchange and interaction. Trust enables the partners to share strategically crucial data related to R&D collaboration without inhibitory transaction costs (Huikkola et al. 2013). My results indicate that both buyer organizations have implemented practices such as shared project meetings in order to develop competence and relational trust with their suppliers. Moreover, it was found that close proximity (psychological and physical) facilitate joint-problem solving, increase transparency in terms of communication, and also enhance familiarity between people. Some noted that networking capability also facilitated interaction.

*“We have had few incidences where the shared information does not get communicated properly from the sales person to the manufacturing facility. Therefore, it is important to establish a transparent communication strategy with supplier, so that information flows efficiently and stays in right hands.”* (R&D Specialist Design Architect / Buyer A).

*“I think that trust builds up gradually while the project moves forward, however in this kind of project we need to work closely with the partner. We also need to make sure our supplier is confident and committed to the project, thus is willing to exchange the required information openly.”* (Sourcing Manager B/ Buyer B).

*“The cooperation has lasted for a long time so we have mutual trust for one another’s skills and also respect for one another. It has also been great that their site is close to us, so we can frequently meet face-to-face and also be able to share ideas more openly”* (Global Category Manager /Buyer A).

In only one of the relationships (buyer A- supplier B) the development of competence trust was not as straightforward, because the supplier was not able to communicate in English and also lacked technical understanding. The interviewee highlighted the importance of patience when managing this kind of partnerships. He also added that if supplier shows commitment and willingness to learn every problem can be solved.

*“At the start it was quite obvious that we had to take a lead in this relationship in order to get what we wanted. We knew our supplier possessed the manufacturing capability and competitive price, but first had to ensure they understand and are able meet our technical requirements. Thanks to our Chinese colleague, who helped us share the necessary information and further assisted the supplier in the operations to fulfil our quality requirements.”* (R&D Specialist Design Architect / Buyer A).

The results also indicated that two of the suppliers were not willing to open up their material cost structure, thus buyer firms had to use competitive pressure to achieve price reductions. The interviewees from both business units highlighted that more transparency

is needed when negotiating about material costs structure, so that the cooperation can continue:

*“I would say that we are satisfied with the overall supplier performance, however they could be more open in revealing the material cost structure.”*  
(Project Manager/Buyer B.)

*“Challenging market conditions forces us to find the best possible price for each part and component, thus we can only cooperate with suppliers who can provide a competitive price and be flexible with it. Considering this relationship we know that our supplier has not showed us all and therefore we need to concentrate on developing alternative mechanisms to achieve the best quotation.”* (Global Category Manager /Buyer A).

Only one of the investigated relationships (buyer B- supplier D) highlighted the importance of knowing their second-tier suppliers. Buyer B wanted to get to know supplier D’s subcontractors and further include them into the project meetings in order to strengthen the network structure, and develop mutual trust:

*“We invite second-tier suppliers to product development meetings, so that all of the parties involved in the project become familiar with the requirements and can act towards a shared goal. In addition, with this practice we have also been able to generate more ideas together”* (Sourcing Manager B/ Buyer B).

*“Close and frequent interaction has been the key for success. In case of problems we can always rely on our supplier network and can find solution together.”* (Project Manager/ Buyer B).

The results also indicated that relationship safeguarding mechanism play important role in R&D collaborations, because most of the time the shared knowledge is highly confidential and cannot be leaked to competitors. Interviewees from both business units

highlighted the importance of formal contracts and concealments as mechanisms, which protect from knowledge spill overs and also represents commitment and trust.

*“In case of operational problems we do not have to refer to the contract details, instead we discuss through the problem and aim to find solution together, which is a sign of flexibility and trust.”* (Global Category Manager / Buyer A).

*“We have signed NDA (Non-Disclosure Agreement) with the supplier, which purpose is to protect knowledge, thus our supplier is aware that the information is highly confidential.”* (R&D Specialist Design Architect / Buyer A).

*“The main purpose of the contract is to clarify the tasks, which the supplier is responsible of performing. It should also include other fixed details such as delivery and payment terms, penalties and warranty periods.”* (Sourcing Manager B./ Buyer B).

*“Both of us are aware that things may change quickly, so we need to be flexible in regards to the contractual details. However, the existence of a formal contract is important, because it protects the operations.”* (Sourcing Manager A/ Buyer B).

*“In R&D projects a formal contract is not necessary, because the projects often include so many changing variables. However, NDA agreement is required in this kind of partnerships, because there is always risks that the information leaks out.”* (R&D Engineer/ Buyer B).

Along with contracts and concealments both buyer organizations executed supplier certification process in order to verify whether or not supplier fulfils the required compliance standards. My results indicate that both business units performed supplier audits as standard protocol in all but one of the relationships investigated to ensure supplier compliance and build trust:

*“Multiple parties such as Product Managers, SCM personnel and R&D managers are involved in supplier selection process to verify supplier compliance and build transparency. ABB Group protocol is to audit each supplier in the areas of quality, manufacturing processes and safety.”* (Sourcing Manager A / Buyer B).

*“Our suppliers has to pass our certification program before moving into the serial production phase. Considering this relationship our supplier manufacturing process, quality and safety are on good level, so there is no need to intervene.”* (Global Category Manager / Buyer A).

Lastly, the case study results also highlighted the importance of supplier recognition. It was evident that all kinds of feedback is essential for relationship development, however that may not be enough, therefore in order to keep the supplier motivated they should have incentives. Supplier recognition was also seen as effective practice to enhance relational trust. All but one of the relationships showed evidence that supplier incentives was used as a mechanisms to motivate the supplier and also to enhance mutual trust and commitment.

*“If supplier is able to perform on satisfying level in terms of cost, quality, on-time delivery and R&D, we like to thank them by providing more volume. We also give out best supplier rewards annually.”* (Global Category Manager / Buyer A).

*“Our goal is to reduce the supplier base, which increase the competition among the suppliers. Consequently, best supplier are recognized and rewarded with new projects.”* (Sourcing Manager A / Buyer B).

#### 4.3.4. Practices enabling learning

Relationship learning is crucial dimension, which determine the pace of relational development. In particular, it can be defined as a continuous process that requires the implementation of systematic managerial practices and routines which enable interaction, knowledge sharing in open atmosphere and knowledge integration into relationship

specific memory between the collaborates (Huikkola et al. 2013). My results revealed that interactive mechanisms used by buyer organizations to enhance relational structure and trust also facilitated relationship learning, thus functioned systematically. For instance, all of case interviewees highlighted the importance of interactive mechanisms such as joint-meetings, factory visits, and supplier assessment as enablers of relational learning. Some noted that project and cross functional teams play central role in enabling joint-learning and generating new development ideas.

*“We organize development meetings with the supplier once a year in which we discuss about current business and possible relationship development opportunities, so far this practice has worked out well and we have been able to improve our business. However, we could improve the documentation of these meetings in case people change.”* (R&D Specialist Design Architect / Buyer A).

*“Supplier visits are great chances to make observations and have helped us to become familiar with suppliers personnel and overall manufacturing processes.”* (Global Category Manager / Buyer A).

Interviewee from buyer B highlighted the importance of close collaboration and transparency when working with supplier C. In case of problems, partners need to support one another in order to find solution and further enable relational learning. It is also crucial to understand the complexity of the projects in order to prevent frustration.

*“Learning occurs through sequence of trial and error encounters. Sometimes things get so complex that we need to try multiple things to find a solution. This kind of situations require understanding, patience and close cooperation.”* (Sourcing Manager A/ Buyer B).

Another finding, which differed from the other relationships was that buyer B placed more strategic emphasis on joint-learning and relationship development with supplier D by reinforcing supplier involvement and maximizing the potential of relationship steering group.

*“Our R&D personnel are included in the product development meetings with the supplier and second-tier subcontractors, which has turned out to be very successful practice in terms of new idea generation. We want to develop our suppliers, so that we can together build competitive advantages.”*(Sourcing Manager B / Buyer B).

*“The level of learning can be used as a mechanism to measure the relationship performance.”* (Project Manager / Buyer B).

My results also show that IT programs have important function in facilitating operational and R&D knowledge sharing, developing product tailoring and design process, and further speeding up the processes between the buyer and supplier, thus IT systems open up new ways for relational learning.

*“The exploitation of virtual channels in knowledge exchange has reduced the amount of traditional tangible documents. For example, CAD programs are replacing technical drawings. Today’s processes have become faster with the current technology”* (R&D Specialist Design Architect / Buyer A).

*“Nowadays every transaction made leaves a mark into our ERP system, which enhance traceability. Integrated IT systems also allows us to save plenty of data and draw all types of reports, which can be used for business analysis purposes.”*(Global Category Manager / Buyer A).

In similar vein, interviewee from buyer B highlight the importance of IT systems in interaction and knowledge exchange, but they also note that computing devices facilitate in search of external knowledge.

*“Knowledge sharing has become easy and efficient due to rapid development of information networks. Internet and internal data bases enables us to find crucial information about existing and potential suppliers. In addition, virtual programs help in collecting crucial information about our competitors and overall market conditions.”* (Sourcing Manager A / Buyer B).

The interview results highlighted that buyer A could improve their information documentation process. It was found that in many cases information does not get communicated transparently throughout the team, thus only stays in hands of the responsive person. Often this causes misunderstandings and time lacks in the operations.

*“Personal and team email is used as the main communication channel with the supplier, so the information is saved in email. Recently, we have started to utilize supplier SharePoint in knowledge documentation, but the problem is that not everybody knows how to use properly nor has user rights to the relevant sites.”* (Global Category Manager / Buyer A).

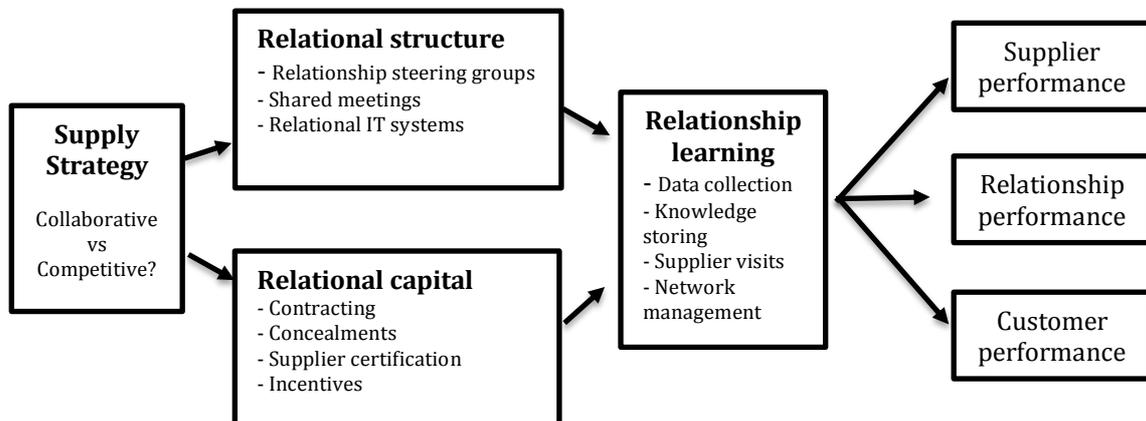
On contrary interviewee from buyer B highlighted the role of action plans and DSM in facilitating information documentation. Thus, my results reveal that both buyer organizations had varying interests towards exploiting knowledge documentation mechanisms and did not follow a standard protocol. Overall, it seemed like buyer B had implemented more systematic routines to support knowledge documentation and relational learning processes compared to buyer A, who was still at the initiation phase.

*“Both of us pay a close attention to the action plans created in joint-meetings. These files are shared via email and also saved to SharePoint in which both of us has access to. This has been a successful mechanisms, which increases transparency in the operations and ensures that projects are moving forward. Recent updates are also visible in DSM database.”* (Sourcing Manager B / Buyer B).

#### 4.4. Summary of the results

To summarize the findings of the study, the different relationship dimensions are illustrated in **Figure 12**. Modifying the theoretical framework in chapter 2, see **Figure 6**, each relationship dimension brought up by Huikkola et al. (2013) e.g. relational structure, relational capital and relationship learning is complemented with supplier relationship

development practices, which were identified in the research. However, it is important to note that not all practices were utilized in every relationship, but the model is a combination of the practices perceived.



**Figure 12.** Supplier relationship development model in practice

**Figure 12** depicts that supplier relationship formulation is strategic. Therefore, buying firms see suppliers as an asset through which they can potentially obtain complementary resources. In other words, supply strategy articulates how dependent buyer and supplier are from one another and also define what type of managerial practices are needed in order to meet the strategic objectives. Furthermore, **Figure 12** highlight that relational structure, relational capital and relationship learning are critical elements of the R&D collaboration, thus need to be managed systematically via different types of mechanisms.

My research shows that case organizations view relational structure as formal or informal communication platform through which partners relationship steering groups interact, share project specific knowledge related to different R&D tasks and ultimately gain mutual understanding of that knowledge. **Figure 12** also highlights that relational steering groups, shared meetings, and relational IT systems were exploited to strengthen the social bond between the buyer and supplier and also facilitating frequent communication, and systematic knowledge sharing.

In support of relational structure, the findings also imply that both case organizations place high importance on developing relational capital or relational trust with their partner via different types of SD practices. Reflecting on **Figure 12**, buyer organizations have signed an agreement with their supplier, which states the main responsibilities of both actors and also contains other contractual details. In addition, both organizations utilize concealments for knowledge protection purposes. As another finding, buyer organizations also build competence trust by auditing their suppliers' quality, manufacturing and safety processes. Lastly, supplier recognition was used as general mechanisms to motivate the supplier and increase trustworthiness among the partners.

My findings also indicated that interactive mechanisms used to manage relational structure and relational capital supported relationship learning. **Figure 12** Illustrates that case organizations exploited integrated IT systems in data collection, knowledge sharing and monitoring the relationship performance. However, it was also found that some R&D collaborations were more efficient in documenting the project information than others, thereby some lacked proper knowledge documentation processes and mechanisms. Moreover, both business units agreed that supplier visits and shared meetings facilitate problem solving and further enhance relational learning.

## 5. DISCUSSION AND CONCLUSIONS

In chapter 1.1, following research questions were established for this study:

1. What are the processes of relational development in different categories of procurement?
2. What are the roles of relational structure, relational capital or trust and relationship learning in buyer- supplier R&D collaboration?
3. How are these critical relationship dimensions leveraged and embedded in the case company`s operational supplier development strategies?

This final chapter of the study summarizes the main findings of the research on the basis of the research questions, theory and the model presented in chapter 2. In addition, this section includes recommendations for managerial implications, limitations of the study and suggestions for further research.

### 5.1. Theoretical contribution

Whereas earlier research on the subject of SD have focused on identifying the best mechanisms to enhance buyer-supplier relationship performance, (Chen et al. 2015; Krause & Scannel 2002, Krause. al 2000; Krause 1997) and has also studied practices which enable relational learning in R&D collaborations (Bäck & Kohtamäki 2016; Huikkola et al. 2013), relatively little research has been conducted on how the existing SD practices are applied in the context of buyer-supplier R&D collaborations. Building on SD literature, my research is one of the first ones to examine what types of development practices (see **Table 2.**) are utilized to enhance relational performance in buyer-supplier R&D collaboration.

My research expands the existing literature on SD by classifying the SD practices into three categories based on their relation to the following dimensions brought up (Huikkola et al. 2013); *relational structure, relational capital and relationship learning* (see Chapter 4). Firstly, I found that SD practices, which enhance relational structure and relational

capital yield better outcomes, when implemented at early stage of the procurement process, because that is when there are more information asymmetries and R&D project has higher probability to fail. Secondly, I also discovered that certain SD practices such as shared meetings, relational steering groups, and networking capability were exploited to strengthen the relational structure or social bond not only between the buyer and supplier, but also with second-tier subcontractors who participate in the product development projects.

Previous studies also highlights the importance of relationship development teams in enabling relational structure (Huikkola et al. 2013; Kohtamäki et al. 2012). However, my results did not support such conclusions, but showed that the personnel assigned to the relationship steering groups are responsible for generating new ideas and also implementing required development activities accordingly, therefore there is no need for separate relationship development team. Moreover, my results support the findings drawn by others by showing that relational IT systems strengthen relational structure, trust between the buyer and supplier, thus serve as important mechanism that facilitate communication and information exchange between the partners (Huikkola et al. 2013). Based on my results, the exploitation of relational IT systems also fasten the information flow, reduce transaction costs and facilitate in supplier performance evaluation process.

The second main contribution of this research is to extend the current knowledge of relational capital in R&D collaboration by revealing the SD practices through which relational and competence trust can be developed. Previous studies point out the role of interactive mechanisms such as shared meetings, open dialogue, joint sense-making and physical proximity as enabling practices to enhance relational capital or trust in buyer-supplier relationships. (Huikkola et al. 2013; Kohtamäki et al. 2013; Kohtamäki et al. 2012). My results partly supports the conclusions drawn by others, by implying that relational trust development require interactive mechanisms such as shared meetings, open dialogue and joint-sense making, but also highlight the importance being familiar with each other's personnel, capabilities and processes in practice. However, it may be argued that the identified SD practices used to enable relational structure also strengthen relational-trust between the actors, but do not have direct impact on competence trust development.

My results contribute to the existing literature on relational capital enabling practices by distinguishing the SD practices, which can be exploited to build relational trust and competence trust. Thereby, suggest that competence trust can be developed via supplier

auditing process. Moreover, my results also recognize the importance of relationship safety mechanisms such as contracts and concealments. I find that contractual agreement is a sign of commitment and trust, thus ensure that partners promise to behave respectively towards one and other. In addition, concealments ensure that the exchanged information stays in right hands and simultaneously brings the partners closer together.

My third main finding concerns those SD practices and mechanisms through which the buyer and supplier enable learning in the R&D collaboration. Recent studies in industrial marketing management literature (see Huikkola et al. 2013; Kohtamäki et al. 2013; Kohtamäki et al. 2012) indicate that relational learning is a emergent process, which needs to be supported by relational structure and relational capital. In particular, they divided learning in three separate processes which were; knowledge sharing, joint-sense making and knowledge integration into relationship specific memory. My results supports these findings by showing that similar processes such as data collection, data integration and supplier visits were applied by the case companies to enhance relational structure and relational capital.

However, my results differ from the previous in a way that they highlighted the importance of second-tier subcontractor involvement in the relationship steering groups. I find that it is important to be close with second-tier subcontractors, because that way the each stakeholder gains more holistic understanding of the project and are better able to support each other in problem solving. Therefore, my research contributes to the current body of knowledge in relationship learning by defining networking capability as practice which facilitates joint-sense making and new idea generation. Moreover, my research indicates that industrial firms are continuously seeking new ways of developing virtual mechanisms for knowledge integration and documentation with suppliers, but yet require more time, development and systematic processes.

The fourth main contribution of this research is to highlight how SD practices and mechanism can be used simultaneously to enhance relational structure, relational capital or trust and relational learning between the buyer and supplier. My results support the conclusion drawn by others that SD practices are effective mechanisms which can be applied to improve supplier and relationship performance (Krause & Scannell 2002; Krause et al. 2000). However, my research extends the existing body of knowledge by finding that the exploitation of SD practices in R&D collaborations also have positive impact on customer performance. In particular, I found that SD practices such as supplier involvement, shared meetings, reciprocal information exchange, supplier visits and

supplier certification facilitate cooperative relationship formulation with the supplier. Consequently, these mechanisms help the buyer organization in supplier base optimization process, in risk sharing, gathering external information and also fastens the time to market.

Lastly, the fifth main contribution of this research is to extend ABB's organizational knowledge by performing a detailed analysis on the existing SD practices used in different R&D collaborations. Moreover, my research provides a general supplier development tool see **figure 12**, which can be exploited later in practice. I find this kind of study as important, because it examines the current state of supplier relationship management and supplier development on broader scale by comparing the habits of two business units within the same organization. This study also provides an opportunity for both units to learn from each other.

## 5.2. Managerial implications

Lack of management support and communication are the major causes of failure in R&D collaborations. The R&D projects should always be transparent in nature and have managerial-level support. In order to build more transparency and strengthen the relationship structure each one of the members involved in the project teams should have chance to visit supplier's premises to get familiar with their personnel and manufacturing processes, because that builds mutual trust between the individuals as well as between the organizations.

Moreover, managers should also ensure that all of the members involved in the relationship steering group are informed in case one of the group members exchanges formal or informal (technical or operational) information with the supplier. With this practice, partners ensure that all of the parties involved are on same page.

As another development suggestion is that managers should pay more attention to the role of IT systems in enabling relational structure and relational learning. Firstly, they should be aware of the databases used internally and also be familiar with the ones that their suppliers use, because that way they can identify certain functions of the IT systems which can be integrated. Along with that, more attention should be paid to knowledge

documentation processes, so that the relationship data is stored to a relationship specific memory in which both parties have access to. My personal suggestion is that both business units who participated in this study should consider Finnish technology company Jakamo as a potential business partner. Jakamo offers a web based platform designed for Supply Chain collaboration. More specifically, this platform facilitates inter-organizational knowledge sharing, documentation and collaboration.

Lastly, in order to learn more about SD practices, top-level managers of each business unit should organize annual workshops during which they discuss about the processes and practices, which they have found successful in managing their supplier relationships and also identify the ones that have been less beneficial. This kind of practice would help in identifying the best practices and also enhance internal collaboration and learning.

### 5.3. Limitations

Despite the fact that this study was carefully executed and achieved its main objectives, it still had some limitations. First, in order to gain more accurate insights, more discussions and interviews should have been conducted. Some interviewees could have been interviewed twice, which would have given better results and increased their understanding of the study objectives, however due to time-restriction only one round of interviews was conducted. In addition, the interview questions could have been prepared more accurately if there was more time to get familiar with the theory around SCM. Lastly, the findings cannot be generalizable to the population, because they are qualitative in nature and also because the data was only collected from two business units within the same organization.

### 5.4. Future research

Considering the output of this research, it can be stated that this study only grasps the surface in the subject of SD, thus leaves room for further research opportunities. In the future a similar study could be conducted in broader scale by including all of the business units within ABB Group. Also more interviews could be conducted with different level

employees within the business units in order to gain more practical insight. It would also be interesting to find out whether or not similar SD mechanisms have been exploited by the competitor organization. Moreover, similar study could also be replicated in different industries, where the projects have shorter life-cycle and products are not as complex. Future research could also collect suppliers' opinions in regards to the effectiveness of the existing SD practices enabling relational structure, relational capital and relational learning.

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## APPENDICES

### APPENDIX 1. Interview questions

#### General Questions:

- How long has this collaboration lasted?
- How important is this supplier to you strategically?
- What are the relationship objectives from purchasing point of view?

#### Planning phase

- How would you describe the steps in the relationship initiation?
- How do you select suppliers for R&D cooperation?
- How do you communicate with the supplier?

#### Decision making phase

- How do you share and communicate the responsibilities with the suppliers?
- What types of factors influence on the relationship quality? How about trust development?
- What are the most important criterion influencing supplier selection?
- How would you describe the price negotiations process with the supplier?
- Do you have a valid contract with the supplier?

#### Implementation phase

- How do you manage the supplier throughout the process? Is there any particular practices that have turned out to be successful?
- How would you describe the information exchange with this particular R&D supplier?
- Do you have systematic structure for knowledge storing?
- How do you protect knowledge sharing processes?

#### Relationship performance phase

- How do you ensure supplier stays committed and motivated?
- How do you measure supplier performance?
- Can you name certain situations during which you have confronted challenges? How have you solved the situation?
- How would describe the innovativeness of this particular supplier?
- What kinds of development ideas have emerged during the R&D project?

APPENDIX 2. Template for data collection

