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How to stimulate supplier innovation? Insights from a multiple case study

1. Abstract

Drawing on the literature on supplier innovation, supplier development, and the relational view, we bring forward the concept of *stimulation of supplier innovation*, which refers to the buyer company's actions which aim to enhance its suppliers' innovativeness, guide its suppliers' innovation processes, and/or encourage its suppliers to share their innovations. Through four case studies about purchasing categories in three companies, we study how the stimulation focus is determined and what methods can be used for stimulating supplier innovation. We propose that stimulation comprises indirect and direct forms of knowledge-sharing and governance with an emphasis on indirect methods and suggest that the concept sheds light on the research gap on the push model of supplier innovation. We also elaborate the literature on supplier development and relational view in the context of supplier innovation.

Keywords: *supplier innovation, case study, relational view, supplier development, customer attractiveness*

1. Introduction

Instead of pure efficiency improvement, suppliers are increasingly treated as sources of innovations and partners in joint development projects (Azadegan, 2011; Dyer and Singh, 1998; Tanskanen et al., 2017). This has generated a stream of research on how to leverage the suppliers' innovative capabilities for the buyer's benefit (Wagner, 2012; Wagner and Bode, 2014). In particular, the literature under the rubric of *early supplier involvement (ESI)* has focused in involving suppliers in the buyer's product development projects in the early phases (Johnsen, 2009; Petersen et al., 2005). The literature on customer attractiveness (Hüttinger et al., 2012; Schiele et al., 2012; Tanskanen and Aminoff, 2015) complements the discourse of supplier innovation by addressing the question of how to get suppliers to share their innovations by increasing customer attractiveness. The current literature tells us much of how buyers may identify the most innovative suppliers (e.g. Koufteros et al., 2012; Melander and Tell, 2014; Pulles et al., 2014; Schiele, 2006; Wagner, 2010) and how buyers may engage in supplier development to improve their capabilities (e.g. Giannakis, 2008; Lawson et al., 2015). Still, we know relatively little of situations where there are no relevant ongoing development projects, or where the suppliers need to be motivated to innovate (Wagner & Bode, 2014), which limits our understanding of how to fully leverage the suppliers' innovation potential (Schoenherr et al., 2012).

In this study, we put forward the concept of *stimulation of supplier innovation* for the purposes of encompassing the diverse approaches buyers may adopt to advance and leverage their suppliers' innovation capabilities. We adopt a broad definition of innovation which includes all stages from ideas to fully developed and implemented technologies, products, services, and processes (Adams et al., 2006; Roberts, 1988). Drawing from the relational view (Dyer and Singh, 1998; Mesquita et al.,

2008) and the literature on supplier innovation (Koufteros et al., 2012; Melander and Tell, 2014; Pulles et al., 2014; Schiele, 2006) and supplier development (Krause et al., 2000; Wagner, 2006) we conceptualize three conditions which must be met for the suppliers' innovativeness to benefit their customers: i) the suppliers must be innovative, ii) the suppliers must develop innovations that have relevance to the buyer, and iii) the suppliers must share their innovations with the buyer. We define *stimulation of supplier innovation* to comprise managerial principles and methods for advancing these three conditions. Through four case studies in three companies we aim to address the research question: How can buyers stimulate supplier innovation? The purpose is to increase understanding about how buyers may gain innovations from their suppliers i) by conceptualizing the stimulation of supplier innovation, and ii) elaborating the literature on supplier development and the relational view in the context of supplier innovation. We contribute to the literature on supplier innovation by proposing three areas that stimulation may focus on: enhancing suppliers' innovativeness, guiding their innovation processes, and encouraging suppliers to share their innovations, of which we argue that the guiding aspect has been poorly addressed by previous research. We propose that the stimulation focus is determined by the key suppliers' rate of innovation in a purchasing category, the fit of their innovation goals with the buyer's needs and buyer's attractiveness. We also identify knowledge-sharing and effective governance methods that companies may use to stimulate supplier innovation and find that stimulation is dominated by indirect methods that aim to influence suppliers' goals and provide them feedback of their performance, giving them freedom to determine the best course of action (Wagner, 2011). Our results have implications for the discussion of the push model of supplier innovation (Wagner & Bode, 2014), supplier development (Krause et al., 2000), and the relational view of competitive advantage (Dyer & Singh, 1998).

The remainder of the article is structured as follows. First, we introduce relevant theoretical literature on the relational view, supplier development and supplier innovation, which we use to define and position the concept of stimulation of supplier innovation. Then we describe the methods and data of our empirical study, and present the results of the study. Next, we discuss the relevance of the findings for researchers and practitioners. Finally, describe the study's limitations and make recommendations for further research.

2. Theoretical background

The relational view (Dyer and Singh, 1998) proposes that the resources and capabilities that firms use to achieve competitive advantages are not all owned and controlled by themselves. Companies may earn so-called relational rents by combining their own resources with the contributions of their partners. Therefore, by establishing value-adding relationships with external parties, a company may outstrip its competitors. Consequently, firms have in their interest to foster linkages to suppliers, which can provide them access to valuable resources and capabilities (Klein and Rai, 2009; Sanders et al., 2011). According to the relational view (Dyer and Singh, 1998), four determinants explain how inter-firm linkages may generate competitive advantages: i) complementary resources and capabilities, ii) relation-specific assets, iii) knowledge-sharing routines, and iv) effective governance.

Suppliers have been identified to be important sources of innovations (von Hippel, 1988) and, in some industries, the patterns of innovation are even considered supplier-dominated (Pavitt, 1984). The basic motive for working with suppliers is that they have resources or capabilities that are valuable for the buyer but which the buyer does not possess itself (Jap, 2001; Kaufman et al., 2000; Rothaermel, 2001). By combining complementary assets, the partners may be able to jointly create unique new products, services, and technologies (Dyer and Singh, 1998; Pihlajamaa et al., 2017).

Furthermore, relation-specific assets, such as customized machinery or personnel who are acquainted with the other organization, are needed as they increase awareness of the other party's capabilities and knowledge bases and facilitate their utilization (Azadegan, 2011; Dyer and Singh, 1998). These two can be understood as the basis of how supplier's innovativeness benefits the buyer (Azadegan, 2011). In addition, knowledge-sharing routines may enhance organizational learning and effective governance may influence suppliers' willingness to engage in value-creation initiatives (Dyer and Singh, 1998). Hence, by investing in them, the buyer may improve its ability to acquire benefits from its suppliers' innovativeness (Azadegan, 2011).

Getting access to supplier innovations may prove challenging as innovations valued by a buying company are likely to be valued by its competitors and other firms (Pulles et al., 2016). Highly capable suppliers that would be able to provide innovations for one firm are often exactly the same suppliers that would make interesting partners for the competitors as well (Schiele, 2012). In order to motivate suppliers to invest in the buying firm, it should make itself attractive to its suppliers (Ellegaard, 2012; Hald et al., 2009; Tanskanen and Aminoff, 2015). Through developing attractiveness, the buyer aims to increase suppliers' dedication to the buyer, in relation to supplier's other customers (Hald et al., 2009; Pulles et al., 2016; Schiele et al., 2012; Tóth et al., 2015). A customer is perceived attractive if the supplier in question has a positive expectation of the value from the relationship (with this customer) (Tanskanen and Aminoff, 2015; Thibaut and Kelley, 1959). Suppliers also compare customers with alternatives, so if there are other potentially interesting customers, it is more difficult to be seen as highly attractive (Schiele et al., 2012). Importantly, attraction is about perceptions (Ellegaard et al., 2003; Hald et al., 2009); the customer company's success in influencing its suppliers depends on supplier's perceptions of the customer company (Aminoff and Tanskanen, 2013; Hald et al., 2009). Some customers will get preferential access to best resources of suppliers; these are the "preferred customers" of a supplier. Having a preferred customer status can have significant competitive benefits for firms (Schiele, 2012).

2.1 Conditions under which suppliers' innovativeness may benefit their customers

The fundamental logic of supplier innovation is that buyers wish to leverage suppliers' innovation capabilities (Dowlatshahi, 1998). Such capabilities allow them to develop novel ideas, products, services, processes, and technologies (Fagerberg, 2005). The relational view predicts that the value of a buyer-supplier relationship is lower if the supplier does not have such capabilities (Dyer and Singh, 1998). Hence, it is often in the buyers' interests that their suppliers would invest in the development of new technologies and improved operations (Azadegan, 2011). The suppliers may, however, be reluctant to do so (Zhang et al., 2015). The literature on public procurement has focused on how to increase the innovativeness of whole sectors by removing suppliers' barriers to innovation (Uyarra et al., 2014). Similarly, managers in the private sector may help their suppliers increase their ability to innovate (Bocquet, 2011; Jean et al., 2012). Originating in the practices of Japanese manufacturers, supplier development has become a key management area for buying companies (MacDuffie and Helper, 1997; Sako, 2004). Defined as sets of activities by a buying organization to improve the performance of its suppliers (Krause et al., 1998), supplier development can be seen as a source of relational rents (Sánchez-Rodríguez, 2009). As a result of these activities suppliers may generate new assets, knowledge, and capabilities that can be combined with the buyer's own to create competitive advantages. While supplier development is usually targeted at suppliers' cost reduction and technical, quality and delivery performance (Watts and Hahn, 1993), there is evidence that it can be also used to improve suppliers' innovativeness (Inemek and Matthyssens, 2013; Lawson et al., 2015).

Assumption 1: Suppliers' innovation capabilities are necessary for the buyer to benefit from supplier innovation. The buyer may act to enhance its suppliers' innovativeness.

Dyer & Singh (1998) argue that specialization of assets is necessary for competitive advantages to emerge from a partner relationship. Some firm resources and capabilities may be relation-specific meaning that they bring value to a certain relationship but cannot be applied to other settings (Dyer and Hatch, 2006). Furthermore, it is suggested that these relation-specific assets are superior to redeployable assets that can benefit also other customers and that supplier development may help gain access to them (Mesquita et al., 2008). Even if a supplier is able to innovate, its innovation processes may be misaligned with the buyer's interests, which decreases the potential for benefiting from the relationship. Motivating suppliers to start developing particular products has, in fact, been argued to be a key task of the purchasing department (Schiele, 2010; Wynstra et al., 2003). Buyers may, for example, organize supplier days where they reveal their development targets (Perrons, 2009) or share their technology roadmaps with key suppliers (Mackenzie and DeCusatis, 2013). Creating shared future visions (Wagner and Bode, 2014) and building trust in supplier relationships (Yeniyurt et al., 2013) have also been proposed to guide suppliers towards innovations which are useful for the buyer company.

Assumption 2: Suppliers' innovation capabilities must be directed towards domains that are beneficial for the buyer for the buyer to benefit from supplier innovation. The buyer may act to guide its suppliers' innovation processes.

Finally, to benefit from the innovations that the suppliers have produced, the buyer must gain access to them. The relational view suggests that knowledge-sharing routines and effective governance enable the combination of complementary capabilities by facilitating joint value-creation and providing incentives for collaboration (Inemek and Matthyssens, 2013). Even if a supplier develops innovations that are relevant for the buyer, it is not self-evident that they are shared with the buyer or implemented to benefit the buyer-supplier relationship, and not all competent suppliers are willing to share their innovation with all buyers (Schiele, 2012). In fact, Dyer & Singh (1998) argue that scarcity of good partners explains why companies are able to get competitive advantages from supplier relationships. To gain a competitive advantage, firms need ways to obtain better supplier resources than their competitors (Pulles et al., 2015). Wagner & Bode (2014) identify two ways that suppliers may share their innovations. First, in the *pull model*, the buyer is the active party who takes the initiative to influence the supplier. Second, in the *push model*, the suppliers voluntarily share their innovations. The pull model is addressed by an active research stream on supplier involvement in new product development (Ragatz et al., 1997; Van Echtelt et al., 2008). Then again, research on the push model has been rare. Wagner & Bode (2014) note that to encourage suppliers for innovation sharing, buyers may enforce safeguards such as long-term contracts (Geffen and Rothenberg, 2000; Wagner and Bode, 2014). Furthermore, high attractiveness and preferred customer status has been proposed to play a role in encouraging suppliers to share their innovations (Ellis et al., 2012) and hence buyers may use, for example, reputation management to attract more innovations (Knoppen et al., 2015). A more straightforward alternative would be to provide direct monetary compensations to suppliers to generate a reciprocal response in the form of innovation sharing (Zhang et al., 2015). In general, it is proposed that maximizing collaborative activities and minimizing competitive activities may increase suppliers' commitment to a relationship and willingness to share their innovations (Henke and Zhang, 2010).

Assumption 3: Suppliers may choose not to share their innovations with the buyer preventing the buyer from benefiting from supplier innovation. The buyer may act to encourage its suppliers to share their innovations.

In conclusion we propose that a buyer's benefits from supplier innovations are dependent on three conditions. First, the supplier must have innovation capabilities (does the supplier innovate?) Second, those capabilities must be used to provide complementarities with the buyers' resources and capabilities (do the innovations match the buyer's needs?) Third, the resulting ideas and innovations must be shared with the buyer so that they may be combined with the buyer's assets (which customer gets the innovations?) We further find evidence from the literature that the fulfilment of all of the three conditions may be promoted by the buyer's actions. From now on, we describe the ensemble of actions which aim to fulfil these conditions as *stimulation of supplier innovation*. We define stimulation as follows:

Stimulation of supplier innovation refers to the buyer company's actions which aim to enhance its suppliers' innovativeness, and/or guide its suppliers' innovation processes, and/or encourage its suppliers to share their innovations.

Figure 1 illustrates the concept of stimulation by drawing attention to the three distinct focuses that companies may have in tapping their suppliers' innovation potential.

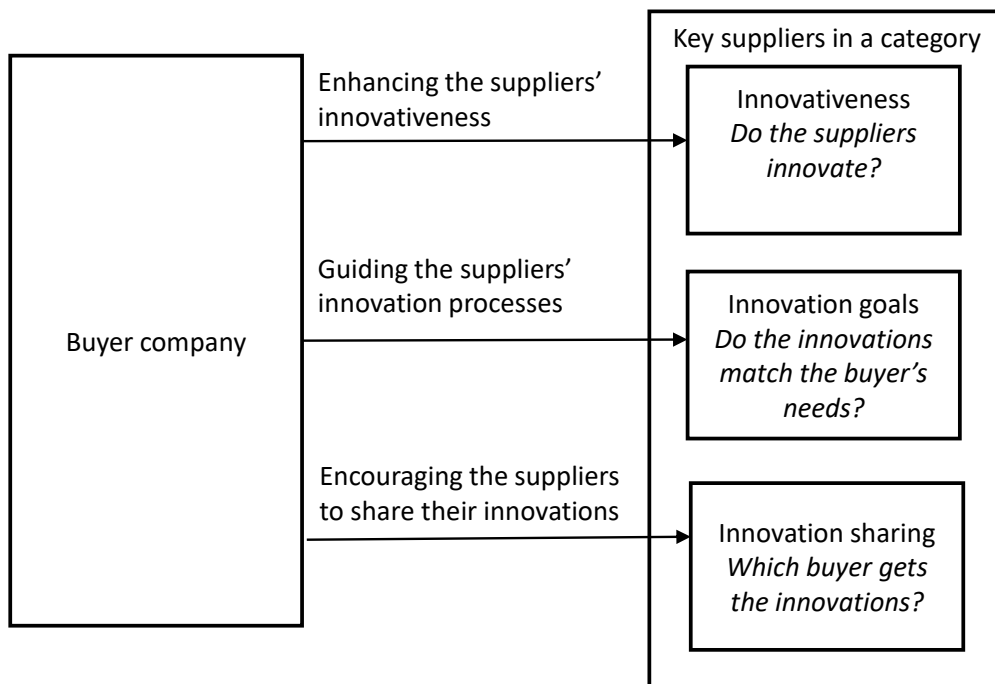


Figure 1. Stimulation of supplier innovation.

3. Methodology and data

We chose a qualitative case study design to match the state of current theory and the exploratory goals of the study. A case study design is applicable for identifying emerging themes and patterns as it allows for acquiring rich and detailed data of the studied phenomenon (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Multiple cases are investigated to provide more accurate and generalizable results (Yin, 2009). To find suitable case companies, we used theoretical sampling (Eisenhardt and Graebner, 2007; Yin, 2009). We chose companies for which suppliers are important sources of innovations and which have adopted advanced supply management methods, since they are likely to

have great benefits from successful stimulation of supplier innovation and have the capabilities to carry out such tasks. Therefore, these kinds of companies are promising sources of insights about how companies influence their suppliers' innovation activities in practice. For the unit of analysis we focused on key suppliers in a purchasing category focusing on categories with a high need for supplier innovations and a high significance for the company. Many organizations segment their spend areas into purchasing categories: distinct groups of groups and services to capture potential synergies (Heikkilä et al., 2018; O'Brien, 2015). Purchasing category is a suitable starting point as many supplier-related managerial goals and practices are defined at this level (Tanskanen et al., 2017). Since many categories have diverse suppliers that are managed in different ways, we chose to focus on the most important suppliers for the category as evaluated by the interviewees.

Guided by our selection criteria, we ended up with four purchasing categories from three Nordic companies (Table 1). To protect the confidentiality and anonymity of the informants, we use pseudonyms in place of the companies' names. The first company, Engineering Inc., provides engineering products and services to its customers in a global scale. The studied purchasing category is Telecommunications which comprises various information and communications technologies that the company embeds in its products. The second company is referred to as Pharma Inc., and it develops and manufactures pharmaceuticals and diagnostics equipment. The studied category, Research & Development (R&D), includes the outsourcing of research and testing tasks to external laboratories. The third company is a public agency responsible of the construction and maintenance of transport infrastructure at a national level. The first category of Construction Inc. is Complex projects which uses a highly collaborative contracting approach to execute large infrastructure construction projects such as highways and tunnels. The second category, Highway maintenance, comprises of the purchasing of the care and upkeep of the national road network. The categories are distinct from each other in many respects which allows the identification of differences between managerial approaches in various contexts.

Table 1. Overview of the studied cases

Company pseudonym	Engineering Inc.	Pharma Inc.	Construction Inc.	Construction Inc.
Field	Engineering and services	Pharmaceuticals	Infrastructure construction	Infrastructure construction
Category	Telecommunications	Research & Development	Complex projects	Highway maintenance
Interviewees' profiles	Category manager (2 interviews), Head of Connectivity, Network specialist	Head of purchasing, Head of medicinal chemistry, Category manager, Contract manager	Project manager, Consultant, Project manager, Director of major investment projects, Project manager	Procurement manager, Unit manager, Senior project manager, Director, Project manager
Number of interviews	4	4	5	5
Length of interviews	39-83 minutes (mean: 60 minutes)	77-91 minutes (mean: 84 minutes)	66-93 minutes (mean: 83 minutes)	55-93 minutes (mean: 87 minutes)

Our main data collection method is semi-structured interviews. We interviewed key people from each category responsible for both strategic decisions at the category-level and operative management of supplier relationships. Our interview guide had three sections: a) background information of the interviewee and the purchasing category, b) stimulating supplier innovation, and c) future outlook

and development needs. In addition we asked the interviewees to guide the selection of further interviewees. The section b) was divided into three open-ended lines of questioning which followed the three parts of our definition of stimulation of supplier innovation: i) enhancing suppliers' innovativeness, ii) guiding suppliers' innovation processes, and iii) encouraging suppliers to share their innovations.

The analysis started with familiarizing ourselves with the cases individually. One of our main goals was to acquire deep understanding of the characteristics of the purchasing categories: which factors in their operating environment affect the management within each category, what kind of supplier relationships are they engaged in, and what are the related value chains like. Another goal was to characterize the cases in terms of the three stimulation focus areas. We wanted to find out whether these focuses were present in the cases and if some of them had a higher priority than the others.

We focused on the three purchasing category characteristics that emerged from the interviews: i) the category's supplier base and its rate of innovation of the key suppliers, ii) fit between the buyer's innovation needs and key suppliers' innovation goals, and iii) evaluations of the buyer's general attractiveness to its key suppliers. These characteristics were chosen as they were mentioned by multiple interviewees and were suggested to be relevant for supplier innovation. We then determined the level of each of the characteristics based on the views of the interviewees. The results of this process were reduced into case descriptions and two tables, presenting the category characteristics (Table 3) and the stimulations focuses of the companies (Table 4).

Next, we proceeded to identify stimulation methods in use in the categories. In doing so we utilized an existing categorization derived from the relational view theory. According to Dyer & Singh (1998) buying firms may leverage relational assets by the means of knowledge-sharing routines and effective governance. *Knowledge-sharing routines* include interactions that allow the transfer, combination, or creation of new knowledge. It covers processes to maximize the frequency and intensity of inter-organizational learning, interactions which result in getting to know the other organization and its knowledge base, and mechanisms to promote transparency within the relationship. *Effective governance* is needed to reduce transaction costs and increase partners' willingness to engage in value-creation initiatives. Effective governance includes explicit contracts and equity arrangements, that increase the value of a relationship by aligning the incentives of the parties (Dyer and Singh, 1998; Williamson, 1985). It also covers formal safeguards, e.g. investments in specialized assets, that constitute bonds between partners and reduce opportunism, and informal safeguards, such as, trust and reputation, that are based on personal relationships between the members of the organizations. Informal safeguards reduce the need to monitor the other party's actions as they rely on self-monitoring agreements and assurances that value-creation initiatives will be rewarded (Dyer and Singh, 1998).

We further categorized the methods by adopting a distinction between *direct* and *indirect* methods to influence suppliers from the literature on supplier development (e.g. Krause et al., 2000; Monczka et al., 1993; Wagner, 2011, 2006). Direct methods refer to activities where the buyer directly involves itself in developing its suppliers, e.g. by training, education, temporarily dedicating personnel to the suppliers, or providing equipment or capital (Krause et al., 2000; Wagner, 2006). Typically, these methods require the buying firm to play an active role and make supplier-specific relational investments. In the case of supplier innovation, direct methods can be understood as part of short-term management that addresses specific development needs and innovation projects (Van Echtelt et al., 2008). Indirect methods, in contrast, emphasize encouraging suppliers' self-improvement by "assessing suppliers, communicating supplier evaluation results and performance goals, increasing a

supplier’s performance goals, instilling competition by the use of multiple sources or promising future business“ (Wagner, 2006, p. 557). Whereas direct methods seek specific actions or responses, indirect methods try to influence the suppliers’ goals and provide feedback on their performance giving them more freedom to determine the best courses of action (Wagner, 2011). Instead of collaborative joint actions, indirect methods typically rely on coercive and noncoercive power and cover approaches such as information exchange, recommendations and requests, promises and threats, and legalistic pleas. These activities require less investments by the buyer and belong more strongly to the strategic management arena of supplier innovation (Van Echtelt et al., 2008).

These direct links to extant theory in the analysis phase provided us two dimensions to categorize our stimulation methods with which increases the construct validity of our findings (Gibbert et al., 2008). Table 2 illustrates the logic of moving from raw interview data via stimulation methods to higher-level categories: we identified stimulation methods from the data and categorized them by using existing categories from the literatures on relational view and supplier development.

Table 2. The data analysis approach.

Quotation	Stimulation method	Relational view category	Supplier development category
“We want to know what [the suppliers] are doing, what they see as innovative and what’s coming up in their roadmap. [We engage in a] strategic discourse with the suppliers: what are their future investments, how do they see the market developing, and what are the key innovations from their side.”	Sharing and comparing roadmaps and future visions	Knowledge-sharing routines	Indirect
“We have long-term supplier partners with whom we have been working for a long time. Our aim has been to rather develop the collaboration with them to get the most out of the relationships, instead of switching suppliers all the time. Good relationships are a precondition for us to benefit from supplier innovation because, before we get to the point where we can share knowledge with the suppliers at the level that is needed for new innovations to emerge, we need to have mutual trust and communication with them.”	Long-term relationships	Effective governance	Indirect

By arranging the cases in various tables and conducting cross-case comparisons (Miles et al., 2013), we gained understanding of the individual cases and their similarities and differences. The quality of the research process was improved by involving multiple researchers both in the data collection and analysis. Based on the overview of the cases, we formulate propositions which address the adoption of specific stimulation focuses in the companies and provide insights on the use of various stimulation methods: direct and indirect knowledge-sharing routines and effective governance.

4. Case descriptions

4.1 Engineering Inc., Telecommunications category

The case company Engineering Inc. is a global engineering company working in building construction. The company offers new products, refines old solutions in buildings, and has a remarkable maintenance service.

The focused purchasing category, Telecommunications, includes basic information technology (IT) services, and all types of communications and network services, for example ensuring connections between the assembled infrastructure and the company to support preventive maintenance. For the Engineering Inc., developing know-how in telecommunications is not a key area of expertise, even though telecommunication solutions are becoming an increasingly important part of the company's offering. In this area, the case company is heavily dependent on supplier innovations, as the IT suppliers renew themselves more rapidly than the case company. In the interviews, the category was described to be fully driven by supplier innovation. Relevant supplier innovations in this category include new internet and communications technologies, which the suppliers develop and which can be used in diverse applications.

The supplier base of the Telecommunications category includes few large suppliers, categorized as partners or global strategic suppliers, and a large group of small 'niche' suppliers. Engineering Inc. has both limited possibilities and a low need to influence its suppliers' innovation development, as the IT sector is efficient in creating innovations that are easily applicable to the company's business. The category management is, however, concerned about getting access to new technological advancements. The suppliers are reluctant to offer Engineering Inc. their latest technologies because it could cannibalize their existing business.

As a large and well known company, Engineering Inc. is generally interesting to suppliers, but not a very attractive customer in this Telecommunications category. Consequently, its stimulation focus has been on encouraging the suppliers to share their innovations. In doing so, the managers have relied on long-term relationships with the same suppliers combined with intensive information sharing of Engineering Inc.'s innovation needs. As an example, they create service roadmaps to communicate their future goals to the suppliers and present them innovation challenges to motivate them for looking beyond short-term business targets. Interestingly, recently they have decided to shorten contract periods in the hopes of making suppliers compete with each other in innovating.

4.2 Pharma Inc., R&D category

Pharma Inc. operates in the pharmaceutical industry, where innovations are crucial for companies to maintain their competitive advantage. The industry is characterized by a continuous search for ideas and innovations through heavy investments in research and product development. In practice, this is reflected in a long-term orientation into basic research, discovery of molecules, and the development and testing of end products. The safety and efficacy of the end products are ensured by heavy regulation and drug approval processes by local authorities. This affects the dynamics in the industry, as it sets constraints to new product development processes that the buyers acknowledge in supplier selection.

In the R&D category, and in the company in general, suppliers are divided into different segments. The key supplier relationships are typically long-term due to the large amount of specific investment and trust that has built up in the relationship, as well as regulation, which makes supplier changes complex and expensive. The global supplier base in general is large and alternative R&D service providers are available, however in some specialized segments the alternatives are scarce. In R&D, Pharma Inc. maintains strong internal capabilities but purchases parts of development projects where it does not have expertise or equipment for from its suppliers. Relevant supplier innovations in this category include suppliers' ideas on how to improve and find new ways to investigate the properties of new molecules.

Pharma Inc. is generally considered as a moderately attractive company among its suppliers, and the suppliers consequently continuously offer new ideas and innovations it – hundreds every year. In the R&D category, there are decreasing possibilities to find new innovations and the number of relevant ideas is lower. Hence, Pharma Inc. needs to guide the suppliers to search opportunities from specific areas that are considered the most important (e.g. related to specific tools and technologies).

A sense of constant development characterizes the relationship between Pharma Inc. and its key suppliers. There are strong expectations for supplier innovations in exchange for a preferred supplier status. In addition to requirements such as technological expertise, the interviewees stressed the importance of soft values for suppliers to retain their openness to external guidance and goals. Pharma Inc. communicates their innovation goals and desires to its suppliers to make them aware of their innovation needs. To improve the suppliers' abilities to ideate in specific areas, Pharma Inc. sometimes organizes workshops to transfer know-how to them, and poses request to have specific talented researchers working in their projects.

4.3 Construction Inc., Complex projects category

Construction Inc. is responsible for roads, railways, and waterways and for the development of the whole national transport system. Construction Inc.'s current spend on ongoing projects is 4.4 billion euros, and the purchases form 25% of the total national infrastructure market size. Construction Inc. is a public organization and it operates under the public procurement law. It is the dominant player in the field in its geographical area, making Construction Inc. highly attractive to its suppliers.

The case category deals with the implementation of large infrastructure investment projects, with many challenges. The projects typically include high degrees of uncertainty and risk, multiple partners, and high costs, and they are characterized as complex, large, and having long term impacts on transportation solutions and the surrounding society. The supplier base includes designers and constructors. The number of the capable designers is limited, but there is lots of constructors available. The rate of innovation in the industry has traditionally been low. Construction Inc. actively drives the development of the whole sector and aims to motivate its suppliers to innovate more. Relevant supplier innovations in this category include technological solutions that improve project costs, duration, safety, usability, and/or public image.

To enhance its suppliers' innovativeness and find new ideas and solutions during high-risk infrastructure projects, Construction Inc. has adopted and further developed a specific project alliance model; a contract model where the client builds an alliance organization together with a designer and a main contractor. Through this alliance organization, all the risks and benefits of the project are fairly distributed among the parties, who become incentivized to focus their efforts to benefit the alliance project, not a single organization. The alliance members are tightly integrated with open knowledge sharing, innovation management practices, and training. The purpose of adopting a project alliance model is to improve the productivity of the entire industry, to change the construction culture into a more open and trusting way of working, and to improve the customer satisfaction for end products by running the project faster, cheaper and of better quality. The model is designed to promote the creation and implementation of new ideas during the projects. As the outcomes of the model are considered to require certain capabilities and attitudes from the suppliers, lots of effort has been put to careful supplier selection.

4.4 Construction Inc., Highway maintenance category

The second category from Construction Inc., Highway maintenance, covers the care and upkeep of paved roads, gravel roads, bridges, the road environment, and the adjacent equipment and structures

of highways. The operating area consists of over 50,000 kilometres of paved highways. Recently, road maintenance funding decisions – based on the annual budget by the country government – have strongly emphasized digitization and automated traffic modes. While the rate of innovation has traditionally been low in the industry, digitization opens new opportunities as it allows new types of data to be collected and shared from traffic and road condition, and making communication more frequent and accurate between actors operating in the sector. The supplier base of the category includes a few large players, who dominate the road maintenance market. In addition, there are local and regional contractors, who usually serve as subcontractors for the major players. Construction Inc. is the biggest client in the sector, making it a highly attractive customer for the suppliers. Relevant supplier innovations in this category include digital solutions and new operations models which increase the efficiency and quality of maintenance operations.

In this category, the organization favours contract models that will give suppliers freedom to develop new technological solutions and products. Furthermore, Construction Inc. has a strong role in influencing the suppliers' innovation goals towards digitization. There are multiple ongoing data collection and sharing projects, such as dynamic traffic monitoring, and monitoring weather and road condition.

The relationships with the contractors are relatively long term, which allows the contractors to invest in equipment and capabilities. Even though the relationships may be close and tight with the contractors, the subcontractors, who in many cases do a remarkable share of the actual maintenance work, remain distant from Construction Inc. An identified problem is that all of the contractors' incentives to improve their services and quality do not convey to the subcontractors.

Construction Inc. is putting a lot of emphasis in developing its suppliers, especially in getting them to adopt digital technologies. Also, the way of setting goals has changed from input-based goals (how much resources are invested in road maintenance) to output-based goals such as road quality and safety experienced by the users. This way Construction Inc. promotes the development innovative product and service concepts.

5. Cross-case analysis

After looking at each of the cases individually, we compare them in order to identify differences and similarities between them. The comparison is done from two viewpoints. First, we look at three characteristics of the purchasing category in question: i) the key suppliers' rate of innovation, ii) the fit between buyer's innovation needs and key suppliers' innovation goals, and iii) the buyer's attractiveness (Table 3). Then, we consider how strongly the companies have focused on different types of stimulation: enhancing suppliers' innovativeness, guiding suppliers' innovation processes, and encouraging supplier to share their innovations (Table 4). Based on these focuses and insights from our case descriptions, we formulate propositions according to which the stimulation focus depends on the aforementioned category characteristics. Finally, we look at how companies actually stimulate supplier innovation in practice (Table 5).

5.1 Determination of the stimulation focus

By comparing the case characteristics with the stimulation focuses of the companies, we are able to develop propositions about how the companies' stimulation focuses can be explained. Our reasoning starts with the observation that the stimulation focuses of the companies vary (see Table 4). Engineering Inc., for example, did not consider enhancing its suppliers' innovativeness or guiding their innovation processes important in the studied category. Instead, getting the suppliers to share

their innovations was a high priority. In contrast, the Highway maintenance category within Construction Inc. had a strong emphasis in increasing the innovativeness of its suppliers and guiding their innovation processes towards digitization. We propose that such differences may be explained by the characteristics of the purchasing category.

First, we observe that the cases differ in the category's key suppliers' rate of innovation. The rates of innovation within the R&D category of Pharma Inc. and both of the categories of Construction Inc. are low. Whereas the pharmaceutical industry in general emphasizes innovation, within the R&D category, which addresses the outsourcing of the analysis and testing of new molecules, the suppliers have traditionally expected to receive very specific instructions on how to perform the analyses and they have been considered mainly as R&D capacity, not as sources of novel ideas. Similarly, the infrastructure construction and highway maintenance industries are characterized as very low in innovativeness: the suppliers are very traditional in their operations and new innovations are rare. The Telecommunications category of Engineering Inc. is, in contrast, considered to be very innovative. New technologies are developed in a rapid pace, even more so than in the Engineering Inc.'s own industry. By comparing the cases we find that those categories, where the suppliers are characterized by a low rate of innovation, have high priority on enhancing suppliers' innovativeness, whereas if the rate of innovation is already high there is no need to improve it. Therefore, we propose:

Proposition 1: If the key suppliers' rate of innovation in a category is low and the buyer, the buyer focuses on enhancing its key suppliers' innovativeness.

Our second observation considers the need for guiding the suppliers' innovation processes. We identify differences between how well the suppliers' innovation goals fit with the buyer's innovation needs. In the cases of Telecommunications category of Engineering Inc. and Complex projects category of Construction Inc., the buyers have little need to guide their suppliers' innovation processes. The innovations that the suppliers produce in these categories fit well with the companies' needs and they could be easily applied in their products and services (Engineering Inc.) and construction projects (Construction Inc.) The situation is, however, different in the other two cases. Interviews at Pharma Inc. revealed that there is frequently a mismatch between the company's needs and its suppliers' areas of expertise, which limits the suppliers' ability to produce ideas that Pharma Inc. requires. In the Highway maintenance category, Construction Inc. has identified significant innovation opportunities in new digital technologies, but consider its suppliers' interest in exploiting these opportunities low. Consequently, in both of these categories, the managers have in their interest to guide their suppliers' innovation processes to meet their needs. Therefore, we propose:

Proposition 2: If the key suppliers' innovation goals, in a category, do not have a good fit with the buyer's needs, the buyer focuses on guiding its key suppliers' innovation processes.

Finally, our third observation considers how the case companies' stimulation focus is related to encouraging suppliers to share their innovations. We find that there is some variety among the cases with respect to how intensively the companies encourage their suppliers for innovation sharing. For Engineering Inc., it is a high priority as receiving innovative technologies among the first customers may lead to significant competitive advantages. There is, however, competition for who receives the innovations and since Engineering Inc.'s attractiveness is relatively low in the Telecommunications category, it puts effort in encouraging the suppliers to share their new technologies with it. Based on the interviews, encouragement for sharing was considered less crucial in Pharma Inc. and Construction Inc., compared to the other focuses. These companies were also considered more attractive customers among their key suppliers. Therefore, we propose:

Proposition 3: If the buyer has low attractiveness in a category and there is competition over the suppliers' innovations, the buyer focuses on encouraging its key suppliers to share their innovations.

Table 3. Category characteristics in the studied cases

	Engineering Inc., Telecommunications	Pharma Inc., R&D	Construction Inc., Complex projects	Construction Inc., Highway maintenance
The key suppliers' rate of innovation	The suppliers are more dynamic than the case company in this sector, and innovations are frequent.	Pharmaceutical industry is very innovation and research oriented, and companies are competing with innovations. In the R&D category there are, however, decreasing possibilities to find new innovations.	The rate of innovation in the road construction sector has traditionally been low.	The rate of innovation in the highway maintenance sector has traditionally been low.
Fit between buyer's innovation needs and key suppliers' innovation goals	Telecommunication solutions are becoming an increasingly important part of the buyer's offerings. Suppliers develop suitable solutions but are not necessarily willing to share them with a relatively small customer, such as Engineering Inc.	Pharma Inc. needs to guide the suppliers to search opportunities from specific areas (e.g. related to specific tools and technologies).	When suppliers innovate, the innovations typically relate to ongoing projects.	Digitization offers new ways to develop the field and Construction Inc. has interest in related data collection and sharing projects, such as dynamic traffic monitoring, and monitoring weather and road condition. The suppliers are not as eager to invest in innovations in this domain.
Buyer's attractiveness	Buyer is dependent on the solutions and innovations from suppliers. As a large and well known company, the buyer is generally interesting to suppliers, although not a very big or attractive customer in the Telecommunications category.	Buyer has a good reputation, remarkable own R&D resources, and purchases mainly such parts of development projects where it does not have expertise or equipment for. Suppliers are continuously offering new ideas and innovations to Pharma Inc., and it receives hundreds of them a year, although in the	Construction Inc. is the biggest client in the sector making it highly attractive.	Construction Inc. is the biggest client in the sector, making it highly attractive..

		R&D category, the number of relevant ideas is lower.		
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Table 4. Focuses of stimulation of supplier innovation in the studied cases. The main stimulation focuses of the companies are bolded.

	Engineering Inc., Telecommunications	Pharma Inc., R&D	Construction Inc., Complex projects	Construction Inc., Highway maintenance
Enhancing suppliers' innovativeness	Focus: - Explanation: The telecommunications field is innovative and there is no need to further enhance suppliers' innovativeness.	Focus: To encourage the suppliers to produce more ideas. Explanation: Pharma Inc. needs and wants suppliers to suggest new ideas, but is at the same time cautious because of quality concerns.	Focus: To increase the suppliers' innovativeness. Explanation: A project alliance model is applied, with a purpose of strengthening the innovativeness of the alliance consortium members.	Focus: To strongly increase the suppliers' innovativeness. Explanation: Construction Inc. is aiming to develop the whole road construction industry. It has a position with a lot of power and aims to motivate the suppliers to innovate and support them in doing so.
Guiding suppliers' innovation processes	Focus: - Explanation: Engineering Inc.'s needs are in line with other customers' needs. Hence, innovations developed in the telecommunications industry are in-line with Engineering Inc.'s needs and no guidance is needed.	Focus: To point out selected (underdeveloped) areas important to the buyer and motivate the suppliers to innovate in them. Explanation: As Pharma Inc. has overlapping know-how with the suppliers, they know the areas in need of development, and what to demand from suppliers.	Focus: - Explanation: Alliance projects have ambitious performance targets, and a structure to tie all actors to them, but no detailed directions are determined for the contents of desired innovations.	Focus: Enhance the adoption of digital technologies and use of big data. Explanation: New technologies offer innovation opportunities that are not yet realized.
Encouraging suppliers to share their innovations	Focus: To make suppliers share their newest technology with Engineering Inc." Explanation: Suppliers need to be motivated to offer new technologies to their existing customers, as these customers may also be offered older solutions.	Focus: - Explanation: Specialized suppliers proactively provide their ideas to Pharma Inc., if and when generated.	Focus: - Explanation: The innovations mostly address project-specific needs so there is no competition for them.	Focus: - Explanation: Construction Inc. does not need to compete for the ideas with other customers.

Based on these observations, we suggest the following 3D-matrix (Figure 2) to illustrate the relationship between buyers' stimulation focuses and three category characteristics: rate of innovation and the fit between the key suppliers' innovation goals and the buyer's innovation needs in a purchasing category, and buyer's attractiveness. If the rate of innovation is high, there is only low need to enhance the suppliers' innovativeness (top quadrants). Similarly, if the suppliers already have their innovation processes directed towards the buyer's needs, there is no need to guide their innovation activities (right quadrants). Encouraging the suppliers to share their innovations is considered to be important in situations where there is competition over the suppliers' technologies and the buyer has low attractiveness (front quadrants). If the buyer is attractive enough so that the suppliers choose to share their innovations with it, there is less need for such encouragement (back quadrants). The figure does not show the lower left quadrant of the back matrix, which has the contents "1. Enhancing suppliers' innovativeness, 2. Guiding suppliers' innovation processes".

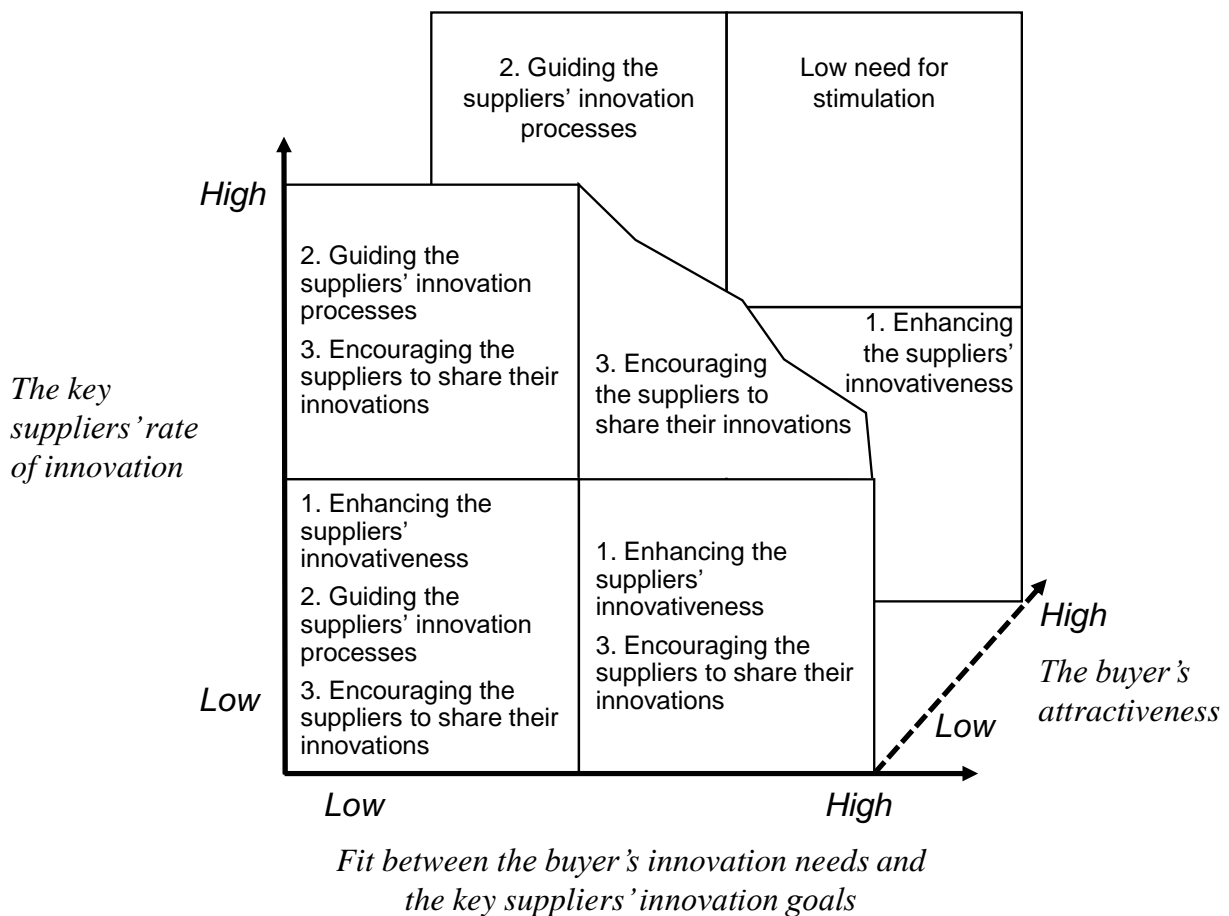


Figure 2: Buyer's main focuses of stimulation of supplier innovation.

5.2 Stimulation methods

5.2.1 Knowledge-sharing routines

The case companies apply a variety of methods to stimulate supplier innovation, categorized into indirect and direct forms of knowledge-sharing routines and effective governance (Dyer and Singh, 1998; Wagner, 2006) (Table 5). We identified a range of indirect knowledge-sharing routines in use in the studied companies. First, companies may inform their suppliers of their innovation needs in terms of direction and ambitiousness to make them aware what kinds of innovations are sought. In practice, this may include frequent communication and meetings with suppliers at multiple levels and

revealing long-term strategies to them. Alternatively, communication with suppliers and learning about their innovation capabilities and interests may be used to collaboratively define development goals for the suppliers. Second, a buyer may have an important role in facilitating knowledge exchange between different suppliers and between the suppliers and the buyer. This facilitation may take different forms: connecting suppliers with each other to promote the creation of innovative partnerships, and lowering the barriers to daily communication between the buyer and its suppliers. Buyers may also set up systems to collect and openly share data, e.g. of maintenance needs, with the suppliers, which may help them improve their operations.

In addition to these indirect methods, direct forms of knowledge-sharing were identified. Buyers may organize workshops or training sessions on specific topics to increase the suppliers' technological capabilities and hence promote their ability to innovate. They may also support the suppliers' idea development by putting effort in integrating interorganizational project teams and their respective knowledge bases.

5.2.2 *Effective governance*

Several indirect governance methods used to stimulate supplier innovation are found from the cases. One of the most important method is supplier selection. When choosing a supplier, the companies may use extensive selection criteria and evaluate past innovation performance or qualities, such as collaboration ability, that are considered antecedents of future innovations. Buyers may also provide incentives to encourage the suppliers to innovate. The incentives can be positive, such as monetary rewards for supplier-developed innovations, or negative, such as lower compensation if innovation targets are not reached.

Buyers can set requirements that may promote innovation for the suppliers. Such requirements can address, for example, performance goals in projects or specific technological systems. Ambitious performance goals may promote innovation as they cannot be reached with existing solutions, and the adoption of new technological systems may generate opportunities for innovations and guide suppliers in specific directions.

We identified two contract design approaches that were considered to stimulate supplier innovation. Engineering Inc. aimed to increase competition between its suppliers by shortening contract periods. The logic is that the suppliers may want to secure their position by sharing more innovations with Engineering Inc. In the Highway maintenance category, Construction Inc. adopted flexible contract models which allow changes to how the suppliers conduct the maintenance operations and how they are compensated. This flexibility is considered to stimulate innovation as it allows for a rapid implementation of new innovations during a contract period.

Finally, buyers may maintain long-term relationships with their suppliers. This arguably increases inter-organizational trust and goodwill which makes the suppliers more willing to invest in the development of relation-specific assets (Dyer & Singh, 1998; Wagner & Bode, 2014), such as innovations that address the buyer's needs.

While the majority of the governance methods were indirect, a few direct methods could be found. In the Complex projects category, Construction Inc. implemented innovation management practices to ensure that supplier-generated ideas are identified, developed, and implemented. They also had a hands-on approach to promoting innovation culture during the projects. Furthermore, Pharma Inc. requested changes to their suppliers' use of human capital to get specific employees with most innovative potential to work in their projects.

Table 5. Stimulation methods in the cases.

	Engineering Inc., Telecommunications	Pharma Inc., R&D	Construction Inc., Complex projects	Construction Inc., Highway maintenance
Stimulation focus	Encouraging suppliers to share their innovations	Enhancing suppliers' innovativeness and guiding suppliers' innovation processes	Enhancing suppliers' innovativeness	Enhancing suppliers' innovativeness and guiding suppliers' innovation processes
Direct knowledge-sharing methods	None	Workshops for know-how transfer to suppliers on specific development issues.	Ensuring the flow of knowledge in the projects by e.g. sharing all available project knowledge at an early stage, including innovation in meeting agendas, open communication about project-specific innovation needs and problem solving workshops. Training all project members.	Training suppliers and subcontractors on new technologies and operations models Facilitating knowledge exchange between the buyer and the suppliers by using social media platforms.
Direct effective governance methods	None	Requesting certain expertise to be included in the supplier's project team.	Implementing innovation management practices , e.g. shared working spaces and thorough idea management process.	None
Indirect knowledge-sharing methods	Information exchange on innovation needs by e.g. including innovations in meeting agendas, and sharing and comparing technology roadmaps. Innovation requests , e.g. presenting suppliers with innovation challenges and frequent feedback on suppliers' performance. Facilitating knowledge sharing among suppliers by organizing supplier days to connect suppliers with each other.	Information exchange on innovation needs by regular meetings at both strategic and operative levels, by revealing future plans and visions in meetings and at supplier days, and by giving constructive feedback for unfit ideas.	Raising the suppliers' awareness of the alliance model and its potential in order to gain a good reputation among suppliers and to promote supplier innovation.	Involving suppliers in defining innovation goals by frequent communications with suppliers and visits to suppliers to understand their R&D. Providing suppliers access to data by implementing new information systems and opening relevant databases to suppliers. Sharing examples of successful innovations among suppliers.
Indirect effective governance methods	Fostering competition between suppliers by shortening contract periods and thus reducing dependency on suppliers. Increasing trust and goodwill by long-term relationships.	Supplier selection: including innovativeness as a supplier selection criterion, and measuring supplier performance. Increasing trust and goodwill by long-term relationships.	Increasing the ambition level of innovations by e.g. emphasizing the need for innovations during project orientations and promoting innovation through posters and weekly bulletins. Supplier selection: thorough supplier	Supplier selection: including continuous development of expertise, communication quality and frequency, and collaboration quality with subcontractors in supplier selection criteria.

		<p>Increasing the expected benefits from innovation by informing suppliers of new business opportunities related to innovations.</p>	<p>evaluation in which the teams' collaboration, leadership, problem solving, and ideation abilities were evaluated in test situations by psychologists. Also assessment of evidence of previous innovations, and descriptions of innovation processes in use.</p> <p>Monetary incentives to innovate, including equitable sharing of rewards for innovations developed in the project (savings and IPR), equitable sharing of risks, and monetary rewards and public acknowledgements for good ideas.</p> <p>Setting requirements so high that existing solutions do not suffice.</p>	<p>Monetary incentives to innovate, e.g. monetary rewards for innovations in the contract, sharing costs of technology pilots with suppliers and incentivizing improvements in work safety and environmental effects.</p> <p>Setting requirements by e.g. communicating demands of IT system application programming interfaces.</p> <p>Flexible contracts to enable reactions to new ideas.</p>
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5.2.3 Overview of stimulation methods

By comparing the methods in the studied categories with their distinct stimulation focuses (Table 4), some observations about the choice of stimulation methods can be made. First, making suppliers aware of the innovation needs of the buyer appears to form the basis of stimulation. If changes to suppliers' behaviour are wanted, they must be informed of it. Methods related to this were identified in all cases.

Second, it is apparent that stimulation is dominated by indirect methods regardless of the stimulation focus. Indirect methods rely on suppliers' voluntary actions and typically do not require high investments. Therefore, they are likely to be widely usable for reaching strategic goals at a purchasing category level. A significant part of the identified methods aim to influence suppliers' goals and provide them feedback of their performance, giving them freedom to determine the best course of action (Wagner, 2011). In contrast, direct methods are found to address specific projects or specific technologies or expertise and therefore have a more concrete and short-term concentration compared to indirect methods. With a more hands-on approach, the buyer may enhance its suppliers' innovativeness in specific areas and guide their innovation processes towards a clearly defined direction. Buyer may, however, not always have the authority to apply direct methods. Engineering Inc.'s Telecommunications category is a good example of such situation. Due to its relatively low attractiveness, Engineering Inc. is unable to directly pull innovations from its suppliers. Instead, it needs to indirectly motivate the suppliers to share their innovations. The other case categories, which were evaluated as more attractive, also direct methods were available.

Third, both knowledge-sharing and effective governance methods are used in all cases. Stimulation seems to combine methods that i) provide suppliers understanding of innovation needs and relevant technological and market knowledge and data, and ii) enforce both contractual and goodwill based

incentives. These two types of methods can be considered as complementary, both contributing to benefits from supplier innovations via different mechanisms (Dyer and Singh, 1998).

Fourth, it seems that it is natural to combine the focuses of enhancing suppliers' innovativeness and guiding suppliers' innovation processes. Enhancing suppliers' innovativeness may provide a good chance to influence also the contents of the developed innovations. Such combinations were found in Pharma Inc.'s R&D category and Construction Inc.'s Highway maintenance category. In Construction Inc.'s Complex projects category that also focused on enhancing suppliers' innovativeness, the fit between buyer's innovation needs and suppliers' innovation goals was ensured by specifying the projects' contents so no additional guiding was required.

6. Discussion and conclusions

This study has three main theoretical contributions. First, we contribute to the literature on supplier innovation by proposing the concept of stimulation of supplier innovation that addresses a research gap on the push model of supplier innovation (Wagner and Bode, 2014) and connects existing discussions on ESI, supplier development, and customer attractiveness. Second, we elaborate the literature on supplier development by discussing the use of direct and indirect supplier development methods in the innovation context. Third, we elaborate the relational view by discussing how stimulation can be used to generate relational rents.

6.1 Benefiting from suppliers' innovativeness

Today, innovation is increasingly a collaborative effort (Chesbrough, 2003) and suppliers are among the most important sources of innovations (Un et al., 2010). The management of external relationships with innovation partners is, nevertheless, still a key barrier that limit's companies' ability to benefit from collaboration (Chesbrough and Brunswicker, 2014). In this study, we bring forward the concept of stimulation of supplier innovation to extend the discussion of innovation in buyer-supplier relationships beyond its strong focus on ESI (Schoenherr et al., 2012) and addressing the push model of supplier innovation where suppliers voluntarily share their innovations (Wagner and Bode, 2014). Figure 3 illustrates our main contributions to extant theory on i) how stimulation focus is determined and ii) what kinds of stimulation methods are available. The push model has been neglected in extant research (Wagner and Bode, 2014) and this study contributes by describing the focuses and methods of stimulation of supplier innovation that address this research gap in particular.

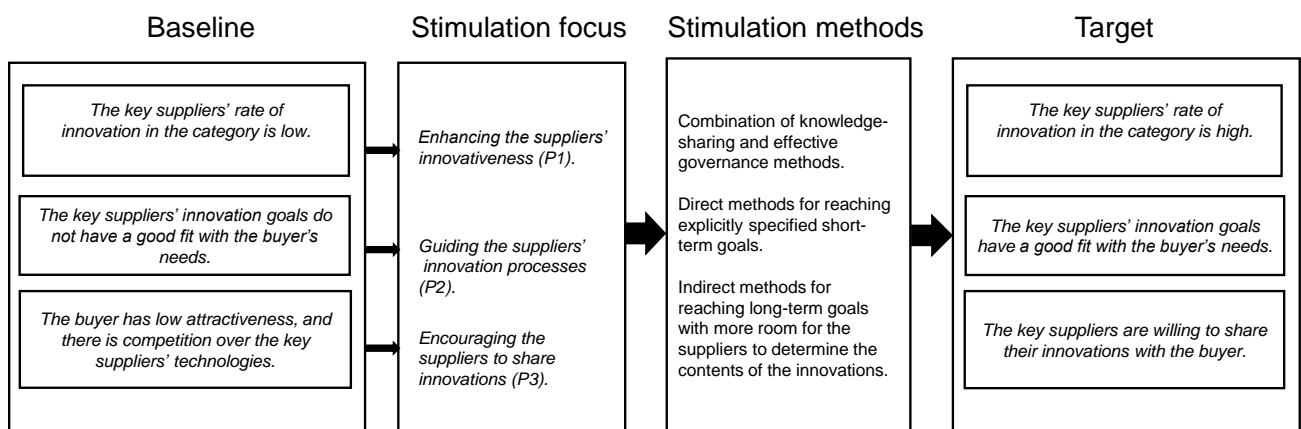


Figure 3: Overview of the findings.

We contribute to the supplier innovation literature by proposing that there are three necessary conditions for the buyers to benefit from their supplier's innovativeness: i) the suppliers must be

innovative, ii) the suppliers must develop innovations that have relevance to the buyer, and iii) the suppliers must share their innovations with the buyer. If the suppliers' rate of innovation is low, the first condition may not be fulfilled. Consequently, the buyer may wish to enhance its suppliers' innovativeness by e.g. engaging in supplier development. If the fit between the buyer's innovation needs and the suppliers' innovation goals is low, the second condition may not be fulfilled and it may be in the buyer's interest to guide its supplier's innovation processes. Finally, the third condition may remain unfulfilled if the buyer is not attractive enough as a partner (Pulles et al., 2016; Schiele, 2012). In these situations, the buyer can start shaping attractiveness and encouraging the suppliers to share their innovations. We further propose that stimulation comprises a combination of knowledge-sharing routines and effective governance.

6.2 Direct and indirect forms of stimulation

The study contributes to the supplier development literature by investigating how supplier development methods may be applied in the context of supplier innovation, specifically examining the distinction between direct and indirect methods (cf. Krause et al., 2000; Monczka et al., 1993; Wagner, 2011, 2006). Based on the cross-case comparison, some observations can be made. First, the majority of stimulation seems to rely on indirect instead of direct knowledge-sharing and governance methods. This means that the innovation outcomes are highly dependent on the suppliers' voluntary actions. In this respect, these early findings on stimulation contrast and complement the literature stream on ESI that strongly focuses on direct methods such as organizing ESI workshops (Zsidisin and Smith, 2005) and establishing interorganizational development teams (Lawson et al., 2009), and where the buyer often is an active party and makes relation-specific investments (Song and Di Benedetto, 2008). It can be concluded that stimulation mainly addresses the *push* model of supplier innovation (Wagner and Bode, 2014) where the suppliers voluntarily share their innovations, whereas ESI belongs to the *pull* model.

That being said, some direct stimulation methods were also identified. These methods were related to specific projects and development needs and aimed to quickly increase suppliers' innovativeness in certain areas. Among the stimulation methods, it can be noted that when the scope of stimulation becomes wider (cf. Sako, 2004) more indirect methods are used. Direct methods target clearly specified short-term outcomes (Van Echtelt et al., 2008) whereas indirect methods have long-term orientation and leave more room for the suppliers to determine the contents of the innovations. On a more general level, it can be argued that similar tendency is found between the pull and push models of supplier innovation, where the pull model typically addresses specific innovation projects and uses direct methods and the push model relies on indirect methods and specifies innovation targets on a more general level (Wagner and Bode, 2014). By complementing the pull model (ESI) with the push model (stimulation), buyers may gain access to knowledge and innovations beyond what they are able to specify and identify by themselves which may increase their novelty and diversity (Bessant et al., 2014). If the suppliers share their innovations voluntarily, the buyer does not need to "identify or obtain innovation from their suppliers" (Wagner and Bode, 2014, p. 74) nor know "what and where critical expertise resides within each firm" (Dyer and Singh, 1998, p. 665).

6.3 Generation of relational rents

Although the relational view is an important theory for explaining how companies may acquire competitive advantages from relationships with their suppliers, it has rarely been applied to the supplier innovation context (see Azadegan (2011) and Inemek & Matthyssens (2013) for exceptions). Our study elaborates the relational view theory in terms of horizontal contrasting (Fisher and Aguinis, 2017). Contrasting the findings of a theory with observations from a different context improves its

logical and empirical adequacy (Bacharach, 1989). Our findings suggest that by implementing knowledge-sharing mechanisms and effective governance, buyers may influence the creation of valuable ideas and innovations that are complementary to the buyer's own and gain access to them. Furthermore, buyers may guide their suppliers to develop innovative assets that are relation-specific. Therefore, all the four determinants of relational rents as proposed by Dyer & Singh (1998) are validated in this context.

Drawing from the relational view, Mesquita et al. (2008) suggest two approaches to handling supplier networks. Buyers may engage in supplier development or try to free ride on suppliers' knowledge that results from interactions with other customers. If supplier innovations are redeployable (usable by other average customers), investments in resource-intensive direct supplier development may have poor payoffs because of spillover effects (Mesquita et al., 2008). Alternatively, a free rider strategy may be adopted where buyers aim to access innovation outcomes from suppliers that benefit from other customers' development activities. The benefits of this approach may, however, be limited as other customers may guide suppliers' innovation processes to their specific needs that do not fully match others' needs.

Our study proposes that customer attractiveness is a key factor in enabling the generation of relational rents. Attractive customers are likely to receive more innovations to start with. Furthermore, they may have more stimulation methods in their use than non-attractive ones and will consequently be more likely to reap the benefits from enhancing suppliers' innovativeness and guiding their innovation processes that will generate complementary resources and capabilities and relation-specific assets that are key determinants of relational rents (Dyer and Singh, 1998).

6.4 Managerial implications: the choice of stimulation focus and methods

Our managerial implications are twofold. First, we propose that managers should analyse i) whether their suppliers are innovative, ii) if they develop the right kind of innovations, and iii) if they are willing to share their innovations. The resulting insights can be used to decide on effective stimulation focus. Second, we propose a managerial tool that companies may use to stimulate supplier innovation. By setting available stimulation methods against the three stimulation focuses, it is possible to compile a collection of stimulation methods that a company should use. In Table 6, we have provided an example of such a collection based on the methods found from our empirical cases. While it is reasonable to assume that there are methods that are beneficial for multiple focuses, we have collected the most evident associations in the table.

We encourage managers to incorporate activities related to stimulating supplier innovation as a part of their purchasing category strategy. Purchasing category formation aims at dividing purchases into manageable entities, and thus offers a formal structure to define and communicate ways to develop the category (Heikkilä et al., 2018), and a platform for organizing supplier management activities (Monczka and Markham, 2007). Identifying the three focuses of innovation for a specific category, category managers can select the actual methods for the needs of the category (Table 6), and thus target the management efforts effectively to provide the innovation outcomes desired in each category.

Table 6. Examples of suitable supplier innovation stimulation methods.

Focus of supplier innovation stimulation		1. Enhancing suppliers' innovativeness	2. Guiding suppliers' innovation processes	3. Encouraging suppliers to share their innovations
Knowledge-sharing routines	Direct	<ul style="list-style-type: none"> ➤ Share know-how with suppliers ➤ Train and educate suppliers 	<ul style="list-style-type: none"> ➤ Train and educate suppliers 	<ul style="list-style-type: none"> ➤
	Indirect	<ul style="list-style-type: none"> ➤ Communicate innovation needs effectively ➤ Facilitate knowledge sharing with the suppliers ➤ Facilitate knowledge sharing among suppliers 	<ul style="list-style-type: none"> ➤ Communicate innovation needs effectively ➤ Make specified innovation requests to suppliers ➤ Provide suppliers access to data 	<ul style="list-style-type: none"> ➤ Communicate innovation needs effectively
Effective governance	Direct	<ul style="list-style-type: none"> ➤ Implement collaboration practices that support innovation 	<ul style="list-style-type: none"> ➤ Request certain human capital expertise from the supplier 	<ul style="list-style-type: none"> ➤
	Indirect	<ul style="list-style-type: none"> ➤ Select the right suppliers ➤ Set high requirements ➤ Incentivize development of innovations ➤ Deploy flexible contracts 	<ul style="list-style-type: none"> ➤ Select the right suppliers ➤ Set high requirements ➤ Incentivize the development of innovations 	<ul style="list-style-type: none"> ➤ Foster competition between suppliers ➤ Increase trust and goodwill ➤ Shape attractiveness in the eyes of the suppliers

6.5 Limitations and suggestions for future research

The study is subject to some limitations. First, we found data collection on stimulation methods to be challenging as stimulation methods often have indirect effects on the suppliers' innovation activities and it may be more difficult for the interviewees to identify such methods compared to methods that have direct effects. Open-ended questions and a semi-structured interview guide allowed us to explore a wide range of stimulation methods. Nevertheless, the data collection relied on the interviewees being able to comprehend the impacts of their actions comprehensively. Hence, it is possible that the studied companies have also other stimulation methods in use than those reported in this study. There is need for more explorative research on stimulation methods and for studies that test the effectiveness of the methods and their combinations.

Second, based on our four cases we identified several category characteristics that have effects on how companies stimulate supplier innovation. Based on extant research, we know that there are differences between industries in how companies collaborate for innovation (Chiaroni et al., 2010; Huizingh, 2011; Spithoven et al., 2011). Investigating more industries could reveal more contingencies and help understand the boundary conditions of stimulation of supplier innovation more comprehensively. In particular, we propose that relationship-specific characteristics such as dependency and power may be important contingencies and deserve further research.

Third, two out of three of our case companies operate in highly regulated settings: pharmaceuticals industry (Pharma Inc.) and public sector (Construction Inc.) Contrary to our expectations, our data suggests that regulations do not significantly limit the companies' ability to stimulate supplier innovation or strongly determine available methods in doing so. An exception was Construction Inc.'s somewhat limited ability to use long-term relationships to promote goodwill since public procurement

laws require competitive tendering. Nevertheless, we cannot rule out that regulations may have also some other impacts on the companies' actions.

Fourth, the unit of analysis of the study is key suppliers in a purchasing category. While this choice allowed us to acquire strategic insights about the management of a particular supply base, arguably some subtleties of specific buyer-supplier relationships were missed. Detailed investigations into supplier relationships, e.g. the mix of goodwill and formal control (cf. Brattström and Richtnér, 2014) in the context of stimulation could be beneficial.

Finally, the question of which stimulation methods are used to achieve specific stimulation focuses could be validated and elaborated by future studies. While some of them evidently address mainly certain focuses, it is reasonable to assume that while there are methods that are beneficial for multiple focuses.

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