Degree Project

Limited upstream dyadic integration of the Supplier Relationship Management process within the construction equipment industry in Sweden

An analysis of the sub-process integration from the manufacturer’s perspective

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Summary

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Title: Limited upstream dyadic integration of the Supplier Relationship Management process within the construction equipment industry in Sweden.

Background: The supplier relationship manager is one of the eight business processes of Supply chain management. There have been many researches carried out about the supply chain processes integration. However, a lack of theory has been noticed on the integration of the supplier relationship management process and no research has coped with a case study of the integration of this process between the manufacturer and its first upstream tier. The lack is also consequent when studying the obstacles to the supplier relationship management integration in Swedish construction equipment companies.

Purpose: In this research paper, the authors have intended to understand how the Supplier Relationship Management process can be integrated between the manufacturer and the supplier of the Construction Equipment industry in Sweden from the view of the manufacturer, as well as how the obstacles that are faced to integrate can be overcome. The authors have combined both literature and the empirical information to come up with their own analysis.

Method: In this regard, the authors have made a literature review in order to gather theoretical data on how to integrate the SRM process in a dyad. Further based on the theoretical chapter, which has been used to develop the interview guidelines, the authors have interviewed managers related to the relationships with the suppliers in five different companies. Combining the theoretical findings and the empirical results, the authors have developed a cross-case analysis of the five companies according to their own thoughts. Based on the cross-case analysis, the authors eventually came up with their conclusions, in which they answered to the research questions. After the recommendations, the authors have also tried to give recommendations for further researches and explained the limitations and obstacles that they have faced through the development of this thesis.
**Results and conclusions:** From the cross-case analysis, the authors of this thesis could conclude that the supplier relationship management process integration occurs through the integration of the supplier relationship management sub-processes. The integration of the strategic sub-processes has been proved as being informational, whereas the integration of the operational sub-processes was demonstrated as being mainly organizational. Moreover, most of the potential obstacles to an integration of the process were proved as resulting from a lack of trust, of commitment and of goal congruence between the manufacturing company and its supplier. A way to overcome the obstacles could be to increase the trust and commitment of the supplier towards the manufacturer through incentives. The authors of this thesis recommend to the manufacturers, whatever their size, to pursue integrative policies with their suppliers and particularly key suppliers.

**Keywords:** Supplier Relationship Management process, integration, Supplier Relationship Management process integration, sub-process integration, integration obstacles, Construction Equipment industry, cross-case analysis.
Acknowledgment

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Abbreviations

EDI: Electronic Data Interchange
ERP: Enterprise Resource Planning
ESI: Earlier Supplier Involvement
EVA: Economy Value Added
GTO: Global Trucks Operations
IPPS: Intraco Penta Prima Servis
ISRMS: Intelligent Supplier Relationship Management System
IT: Information Technology
ITO: Inventory Turnover
JIT: Just-In-Time
OEM: Original Equipment Manufacturer
POS: Point-Of-Sales
PPM: Parts Per Million
PSA: the Product and Service Agreement
QDC: Quality, Delivery, Cost
R&D: Research and Development
RFQ: Request for quotation
RTS: Review of Technical Specification
SAM: Supplier Account Management
SAP: Systems, Applications & Products
SCM: Supply Chain Management
SD: Supplier Development
SEM: Supplier Evaluation Model
SRM: Supplier Relationship Management
VMI: Vendor-Managed Inventory
VPS: Volvo Production System
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- Identify criteria for segmenting suppliers
- Provide guidelines for the degree of differentiation in the product and service agreement
- Develop framework of metrics
- Develop guidelines for sharing process improvement benefits with suppliers

Operational sub-processes
- Differentiate suppliers
- Prepare the supplier/segment management teams
- Internally review the supplier/supplier segment
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1. Introduction

1.1 Describes the general definitions about the overall concepts of the thesis.

1.2 Identifies the problem discussion of the research.

1.3 Defines the framework used for the entire research.

1.4 Explains the research questions that are intended to be answered through this research.

1.5 Clarifies the purpose of this research paper.

1.1 Background

1.1.1 Supplier relationship management

Nowadays, the intensive competition in the business environment encourages companies to have a more solid supplier relationship as a vital strategy that assists them to gain better competitive advantage (Tseng, 2014). In this regard, this relationship with suppliers increases the significance of a supplier relationship management (SRM) for establishing the strong ties between supplier and the customer (Ibid). SRM is aimed at relationship improvement on both sides as well as organizational performance enhancement (Ibid).

In these terms, Croxton et al. (2001) assert that SRM is one of the eight key business processes that are considered to be the core concept of supply chain management (SCM). In this context, the Global Supply Chain Forum defines the SCM as the coordination of key business processes that starts from final consumer until the original suppliers that provide the basic production material with the purpose of adding value to the customers and shareholders (Ibid).

Moreover, Novak and Simco (1991) and Croxton, et al. (2001) assert that the terms that are used by different authors for SRM are varied. Procurement, vendor relationship management and SRM are different terms that refer to this common definition (Novak and Simco, 1991; Croxton, et al., 2001).
As regards the definition of SRM, Lambert and Schwieterman (2012) state that this business process is used to organize the relationship with the suppliers and to maintain it. In addition, Novak and Simco (1991) say that SRM is the process of activities that are necessary to acquire a service or/and a good that is matching the customer requirements. Also, Simon, et al. (2014) define SRM as an important business process that identifies who are the vital suppliers for the manufacturer in terms of technology and quantity. SRM is used to understand how the buyer (manufacturer) should interact with the suppliers that are crucial for the manufacturing company (Ibid). Moreover, Moeller, et al. (2006) define SRM as the process that involves setting up, stabilizing, dissolving, and developing connections with in-suppliers and out-suppliers with the purpose to improve relationships values.

SRM is getting more and more important due to the requirement for cost efficiency, strong ties with suppliers who can assist to innovative product development and sustainability (Lambert and Schwieterman, 2012). SRM is considered to be strategic, cross-functional, value creating, and process oriented for both the customer and the supplier (Ibid). It is useful as a tool for having better financial performance (Ibid).

In this business process, manufacturing company should first identify the key suppliers that are important for the manufacturing process (Dryer, et al., 1998). Further, managers of the manufacturing company mark these key suppliers as a part of the firm's business mission (Lambert and Schwieterman, 2012). After that, the manufacturing company creates the supplier relationship team, which cooperates with the supplier for developing the product and service agreement (PSA) with the aim of highlighting the main business drivers on both sides (Ibid). In this situation, the supplier and the customer create the cross-functional team to achieve a higher level of coordination between themselves (Ibid). In this regard, Ramirez (1999), Lusch and Vargo (2006), Enz and Lambert (2012) and Lambert and Schwieterman (2012) say that cross-functional teams between the supplier and the customer are increasing the profitability of both sides through value co-creation.

Performance reports are developed in order to evaluate the influence of the supplier on the firm's (customer) profitability and vice versa (Lambert and Schwieterman, 2012). In this context, performance reports include financial results, which are quantifiable and can be used in order to measure the supplier's performance (Ibid). In this area, Enz and
Lambert (2012) provide a study that shows that a cross-functional team between the supplier and the customer creates more value for the both sides and in general, for the entire supply chain.

1.1.2 Supply chain integration

According to Croxton, et al. (2001), integration within the supply chain helps the integrated actors to decrease their costs and relatively improve their efficiency with the purpose of being competitive within the market. In this context, integration is defined by Forslund and Jonsson (2007) as a process in which two or more firms intend to jointly develop and agree upon their processes and activities within the supply chain.

Moreover, Croxton, et al. (2001) say that the integration of key business processes enables the supply chain to obtain competitive advantage against the rivals. In this regard, Berente et al. (2009) define the supply chain business processes integration as a synchronizing action that coordinates two or more organizational processes in order to enhance the performance.

Barua, et al. (2013) claim that the supply chain actors that are involved in developing the finished products are earning benefits from the business processes integration in terms of cost reduction, adding value to the shareholders and customers, and obtaining higher profitability. In order to enjoy the benefits that result from the integration, Forslund and Jonsson (2007) and APICS (2005) divide the process of integration into three steps. The first step states that a firm should have a focus on intra-organizational effectiveness and efficiency (Ibid). In the second step, the firm should emphasize a multi-functional intra-organizational effectiveness and efficiency rather than only one function (Ibid). In this step, the intra-organizational network should be developed (Ibid). In the third and final step, the firm should integrate its own intra-organizational network with the one of the supply chain partner that it intends to integrate with (Ibid).

For what concerns the types of integration, Prajogo and Ollhager (2012) assert that there are two types of integration, the first one is informational and the second one is materialistic. Integration between supply chain partners cannot be limited to either one of the informational or materialistic type, it should include both types (Ibid). In this context, Lee (2000), Bagchi and Skjoett-Larsen (2002) and Forslund and Jonsson (2007) also have categorized integration into two types, which are informational and
organizational. Organizational and materialistic integrations are the same concepts that are defined by various authors with different terms. Informational integration includes the exchange of knowledge, information, technology, resources, risks, planning, control, and process management within the integrated actors (Forslund and Jonsson, 2007). On the other hand, organizational integration consists of an exchange of ideas, trust, and organizational cultures, as well as developing the joint performance measure, problem solving and decision making progress (Ibid).

Despite the types, the scopes of integration are also varied, depending on the business environment (Harland, 1996; Mentzer, et al., 2001; Fabbe-Costes and Jahre, 2006). In this regard, Fabbe-Costes and Jahre (2007) classify the scopes of integration into limited and extended types.

Limited scopes of integration include:

- Limited dyadic downstream integration: is the integration of the focal company with its customers (Fabbe-Costes and Jahre, 2007).
- Limited dyadic upstream integration: includes the integration of the focal company with its suppliers (Ibid).
- Limited dyadic integration: contains the integration between the focal company and its suppliers on one side and customers on the other side. In a limited dyadic integration, the focal company integrates with both customers and suppliers but in separate dimensions (Ibid).
- Limited triadic integration: covers the integration of suppliers, focal company, and customers together. In a limited triadic integration, there is no differentiation between upstream and downstream relationships (Ibid).

The extended scope refers to the integration that consists of more than three supply chain actors. For instance, when suppliers' suppliers, suppliers, manufacturers/ producers, customers, and customers' customers are all integrated together (Fabbe-Costes and Jahre, 2007).
1.1.3 Construction equipment industry

The definition of the sector of construction equipment is rather fuzzy. As a matter of fact, previous literature reveals that several authors refer to this industry with different terms such as heavy construction engineering (Fu, 2013) or construction machinery (Machinery Industry Profile: Europe, 2013). It can also be noted, that the construction equipment segment is contained within the machinery market alongside other segments such as the agricultural machinery and the mining equipment (Machinery Industry Profile: Europe, 2013).

In a review of the history, Haycraft (2011) states that the year 1957 has been a turning point in the development process of the construction equipment industry, when the farm equipment manufacturers Deere and Case released the first products of the light construction equipment industry. According to the same author, the earthmoving equipment industry originally comes from the United States as a successor of the farm equipment industry and started booming after the Second World War in other industrialized countries (Haycraft, 2011).

Practically speaking, construction projects are nowadays, according to Waris, et al. (2014), highly mechanized and require a high level of equipment in order to attain high productivity and efficiency. Therefore, the choice of the equipment varies according to the kind of construction project (Ibid). In this regard, industrial projects mainly make use of machineries to dig, stabilize and pave (Gransberg, et al., 2006).

According to Cann, et al. (2003), heavy construction equipment in the construction industry consists of different sorts of machineries such as wheel loaders, off-road dump trucks, scrapers, skid steer vehicles, backhoes, bulldozers, crawler loaders, and concrete trowel vehicles. This equipment is used during different activities such as earthworks, steelworks, concreting, building, lifting and positioning of components (Mahbub, 2012). As explained above in the first paragraph, the heavy construction equipment can also be known as the construction machinery sector; which encompasses mainly the earthmoving equipment, the road equipment and concrete equipment (Machinery Industry Profile: Europe, 2013). Waris, et al. (2014) add that heavy equipment is crucial to increase the construction productivity especially within infrastructure works.
According to Fu (2013), earthworking or earthmoving activities are a central chunk of heavy construction engineering and encompass earth soil surface moving and processing. Moreover, it is noted that operations requiring earthmoving activities are usually carried out at the beginning of construction projects (Ibid).

An overview of the European machinery market shows a recovery after a decline in 2009 and shows a growth in 2011 of 13%, of 6.2% in 2012 (Machinery Industry Profile: Europe, 2013) and of 0.4% in 2013 (Machinery Industry Profile: Europe, 2014). According to the forecasts, this trend should continue until 2018 (Ibid). What is more, the total European machinery market revenues count $51.6 billion in 2013 (Ibid). Regarding the construction equipment segment, it has been calculated that the sector has total revenues of $26.5 billion in 2013 (Ibid). As a result, the construction equipment segment accounts for about 51.3% of the overall machinery market value over this period (Ibid).

In addition to this, as an industry highly reliant on its exports, the well-being of the segment of machinery and equipment in Sweden is profoundly dependent on an increase of the demand from the rest of the EU (Teknikföretagen, 2014a). As a proof of this, the level of production of the Swedish machinery and equipment industry dropped heavily in the first quarter of 2014 (Ibid). Low demand is a reality for Swedish machinery manufacturers given the fact that there is little activity on the export markets (Teknikföretagen, 2014b). To corroborate this statement, the new exports net balance is somewhat stagnating (Ibid). However the demand in the inner market appears to keep on growing after a promising previous quarter (Ibid).

1.2 Problem discussion

As a result of global competitive environments that led to an increase in the market competition, various authors (Simon, et al., 2014; Prajogo and Olhager, 2012; Glenn Richey, et al., 2009; Cao, et al., 2015; Danese and Romano, 2011) have suggested integration within the supply chain actors in order to earn competitive advantage and survive within harsh market environments. Also, authors have noted that integrating companies’ operations with suppliers is a way to enhance firm’s performance (Swink, et al., 2007; Singh and Power, 2009; Flynn, et al., 2010).
In this regard, researchers have provided different studies about the supply chain processes integration. Payne and Frow (2004) have studied the integration of customer relationship management process from a multichannel perspective. Croxton (2003) provided a research about order fulfillment process integration. Croxton, et al. (2002) also have made a study on the integration of demand management process within the supply chain. More so, Goldsby and Garcia-Dastugue (2003) studied the manufacturing flow management integration. Forslund and Jonsson (2007; 2009; 2010) have provided studies about performance management integration from various perspectives. Flynn, et al. (2010) researched about the supply chain integration between the manufacturer and its partners and it has been intended in their research to understand the actors' integration influences on the performance of the entire supply chain. Snow, et al. (2011) studied the collaboration and integration of several firms in terms of product development and commercialization.

Despite the attempts of several authors in order to contribute to the literature about the processes integration within the supply chain, there is a research gap within the studies of SRM integration. In this context, Park, et al. (2010) intended to provide a framework for SRM integration. Choy, et al. (2003) made a study about the integrated SRM, which is called intelligent supplier relationship management system (ISRMS) within the Honeywell Consumer Products companies in Hong Kong. Kato and Schoenberg (2014) made a research about the impact of integrated suppliers' relationship on the customers. Vanpoucke, et al. (2014) provided a study about the suppliers' relationship management as well as the triggers and the initiatives that take place within the supplier and buyer relationship. Perols, et al. (2013) have researched SRM integration and the integrated suppliers' relationship with respect to the time-to-market process within the healthcare and information technology (IT) industries. Zhang and Preechawipat (2012) made a study about the suppliers' information integration for mitigating supply risk in Chinese and Thai manufacturing industries. Also, Zubova and Arikainen (2012) made a quantitative comparative study about the procurement process integration between Swedish and Ukrainian companies that produce equipment, although they never mentioned which particular machinery industry they are studying. All these studies that have been discussed above are surrounding the concept of SRM integration in various industries. However, neither the scientific articles above, nor other researches in this area have made a case study about the integration of SRM between the manufacturer
and its first upstream supplier within the construction equipment industry in Sweden. In addition, the authors of this thesis could not find any previous research that provided a case study about the SRM integration within any Swedish industries. The necessity for researches about suppliers' relationship management integration has also been emphasized by authors such as Vanpoucke, et al. (2014) and Kato and Schoenberg (2014) by pointing out that there are few academic studies in this area.

Moreover, Forslund and Jonsson (2009) studied the obstacles to performance management process integration in dyadic relationships. Lam (2013) made a research on the supply chain integration barriers in liner shipping. Katunzi (2011) provided a theoretical study about the obstacles for manufacturers in order to integrate with other firms within the supply chain; this study does not cover any particular industry. Govindan, et al. (2014) studied the obstacles to the implementation of green SCM in Indian industries that are using analytic hierarchy process. Despite the existence of several studies about the obstacles to supply chain integration, supply chain implementation, and process integration within the supply chain in various industries, there is an empty spot within the researches that demonstrates the lack of available studies about the obstacles to SRM integration in Swedish construction equipment companies.

The researches on SRM integration and its obstacles are an opportunity for the manufacturer, whose perspective is taken in this work, to improve its performance. Integration can be understood as being the smooth flow between partners of the value chain leading to cost reduction, improvement and competitive advantage for all actors. For these reasons, it is necessary for the manufacturer to enhance integration with its upstream partner.

1.3 Framework for the thesis

The research in this thesis is carried out within a sole industry called the construction equipment, so that the analysis of the different cases is based on common grounds.

As explained in the problem discussion, the industry of the construction equipment has been chosen for this research due to a lack of literature in this area and also of literature that cope with SRM integration. The industry is also important in the Swedish industrial
landscape with large companies such as Volvo CE and Scania to cite few of them. Therefore, the authors of this thesis intend to add a theoretical contribution to the literature in this domain through empirical analyses. The research carried out is a case study of the Swedish industry, in which the headquarters of the investigated parties are located in Sweden.

The aim of the research is to compare how the different manufacturers integrate with their suppliers when it comes to their mutual relationships, in order to manufacture the product at highest possible quality and lowest possible cost within the supply chain. It is also targeted to study the obstacles toward this integration. In order to carry out the analysis of the case study, the authors will base their analysis on the supplier with which each manufacturer has the closest relationship with, regarding the different companies and draw conclusions.

The research questions 1 and 2 will be analyzed and further answered based on the data that has been collected through the literature review of previous articles, journals and books; as well as on the data gathered through interviews. The empirical findings also will be used to provide recommendations and suggestions to improve the SRM process integration.

Below in figure 1, the research authors illustrate the simplified supply chain of the construction engineering industry with two tiers of suppliers as well as two tiers of customers.

![Figure 1: The value chain of the construction equipment industry](image-url)
To ease the execution of the thesis, the study object of the research is shortened to a limited upstream dyad between the construction equipment manufacturer and its first tier of key suppliers. In fact, it is assumed that the respective manufacturers wish to keep the names of their suppliers under silence for confidentiality reasons. Thus, the study will be performed from the manufacturer’s perspective. The object and the perspective of the research are explained in the figure 2 as follows, which represents the research model of the thesis, and also encompasses the concepts of both research questions (integration and obstacles):

![Figure 2: Representation of study object in the studied limited dyadic supply chain from manufacturer's perspective](image)

Based on the research gaps that have been mentioned in chapter 1.2, the authors of this thesis develop two research questions in order to contribute to the existing literature and fulfill the research gaps. The research questions are as follows:
1.4 Research questions

1. How the supplier relationship management process is integrated between the manufacturer and its first upstream tier within the Swedish construction equipment industry?

2. How can the potential obstacles to an integration of the supplier relationship management process between the manufacturer and its first upstream tier within the Swedish construction equipment industry be overcome?

1.5 Research purpose

In this thesis, it is aimed to understand and to describe how SRM can be integrated between the manufacturing companies and their key suppliers as well as the possible enhancement of such an integration. It is also intended to understand the potential obstacles to the SRM integration between Swedish construction equipment companies (manufacturers) and their key suppliers.

The purpose of this research is to fulfill the research gap within the existing literature by providing a case study in five Swedish construction equipment companies to answer to the research questions.
2. Methodology

2.1 Explains the different research philosophies possible for a research paper.

2.2 Explains the different research approaches possible for a research paper.

2.3 Explains the different research methods possible for a research paper.

2.4 Explains the different research designs possible for a research paper.

2.5 Explains the different research qualities possible for a research paper.

2.6 Explains the data collection used in a research paper.

2.7 Explains the data analysis carried out in a research paper.

2.8 Explains the sampling possible in a research paper.

2.9 Explains the research ethics needed for a research paper.

2.10 Provides a summary of the methodology of this thesis.

2.1 Research philosophies

Saunders, et al. (2009) define the research philosophies as a concept that masters the knowledge development and relative nature of it. In this regard, research philosophies are divided into four types (Preechawipat and Zhang, 2012). These four types are interpretivism, positivism, pragmatism, and realism (Ibid).

2.1.1 Positivism philosophy

Positivism is a scientific approach that supports the status of natural science (Saunders, et al., 2009). In this context, Ashworth (2000) says that in positivist approach, characteristics of the real world are well defined and the goal of science is to formulate the world by connecting it to the theories. Moreover, Walliman (2011) asserts that in positivism, knowledge is collected through competitive analysis and experiments. Paqarizi and Hsu (2013) add that in positivist research, the answers result from the knowledge that already exists. Bryman and Bell (2007) also claim that positivism includes both inductive and deductive approaches. They further continue by saying that
in positivism, theory and research have clear distinction (Ibid). Positivist researchers mostly intend to work “with an observable social reality and that the end product of such research can be law-like generalizations similar to those produced by the physical and natural scientists” (Remenyi, et al., 1998, p.32).

2.1.2. Interpretivism philosophy

Interpretivism emphasizes that the subjective perspective should be taken into account in the research (Saunders, et al., 2009; Preechawipat and Zhang, 2012). In interpretivism, the roles within the society as well as the individual differences are considered as significant factors. Moreover, Blaxter, et al. (2006) say that the interpretivist approach declare that the social reality is developed through history and the culture of a society. Bryman and Bell (2007) state that in interpretivism, social logic can reflect the human differences more accurately rather than science, because institutions of humans are varied from usual sciences. The interpretivist approach emphasizes mankind action interpretation (Bryman and Bell, 2007).

2.1.3. Pragmatism philosophy

Pragmatism focuses on the practical applications as a more fruitful research approach in order to find the answer for the research questions (Saunders, et al., 2009). In pragmatism, the researcher selects multiple views to be able to integrate them in order to have comprehensive data interpretation and find the best answer to the research question (Ibid). Pragmatism considers both observable phenomena and subjective meaning as acceptable knowledge, depending on the research question (Ibid). In pragmatism, data collection is carried out through mixed methods (Ibid).

2.1.4. Realism philosophy

The realism approach emphasizes the objective perspective (Saunders, et al., 2009). In realism, the research takes place independently from individuals' thoughts and from the knowledge of existence, although the interpretation in this approach is through social conditioning (Ibid). Observable phenomena are considered as an acceptable knowledge in this approach (Ibid). Realism focuses on contextual explanation (Ibid). Depending on the subject, data collection method is chosen (Ibid).
2.1.5. Research philosophy in this thesis

As the concept of business process integration already is widespread, the philosophy that applies in this thesis is positivism. In fact, it is intended to provide knowledge about the SRM integration within Swedish construction industry as well as the obstacles to this integration, through competitive analysis that has been built by information that were collected through theories and interviews. In this thesis, it is assumed that the characteristics of business, which is part of the real world, are well defined.

2.2 Research approach

According to Bryman and Bell (2007) and Saunders, et al. (2009), there are two major approaches for developing a research, these two approaches are inductive and deductive.

2.2.1. Inductive research approach

The inductive approach includes the process of data collection and theory development by the means of data analysis (Saunders, et al., 2009). Inductive study requires collection of data through personal interviews or/and observation (Ibid). In this regard, Ghauri and Gronhaug (2005) say that in inductive approach, the process origins from observation, then observations enable the researcher to come up with findings and develop a theory. Inductive studies are carried out in order to contribute to the available theories by keeping them up-to-date (Ghauri and Gronhaug, 2005). In this regard, theory is a result that has been derived by following the inductive research approach (Ibid). Moreover, Bryman and Bell (2007) assert that in inductive approach, the main theme of collecting data is to be able to come up with theories. Nevertheless, Ghauri and Gronhaug (2005) assert that this study approach cannot provide precise conclusions, because the data that are used in the analysis of inductive research are based on individual interpretations.

2.2.2. Deductive research approach

The deductive approach contains the process that the hypothesis is selected by the researcher, who further intends to analyze and test the truthfulness of the chosen
hypothesis (Ghauri and Gronhaug, 2005). In this context, Bryman and Bell (2007) say that in a deductive approach, the theory is collected as basis, in order to come up with findings that are possible to be applied to fill the research gap. Moreover, Saunders, et al. (2009) claim that one of the major themes in deductive approach is to develop explanations about the certain characteristics of particular phenomena. In this term, Robson (2002) and Preechawipat and Zhang (2012) categorize the deductive research into five phases. The first phase includes the deduction of hypothesis from the theory (Ibid). The second phase contains the operationalization of hypothesis in a sense that connects two variables (Ibid). The third phase refers to the test of operationalized hypothesis (Ibid). The fourth phase consists of the examination of the specific inquiry outcome (Ibid). The fifth and final phase reflects the modification of theory with respect to findings in the case that it is necessary (Ibid).

2.2.3. Research approach in this thesis

The research approach in this thesis is deductive, because this research is aimed at filling the gap of study about the SRM integration and the obstacles to this integration. To reach this objective, this work is based on existing theories and knowledge over the integration concept. Therefore, theories and interviews information are collected to support the analysis providing findings in order to fill the research gap. It is targeted to develop a solid description about the integration between the supplier and the manufacturer as well as about the relative obstacles to it (characteristics), within the construction equipment industry (phenomenon). In this thesis, theories are used to build up the explanations about the certain characteristics of particular phenomena rather than to develop a new theory.

2.3 Research method

According to Bryman and Bell (2011), researches are categorized into quantitative and qualitative methods of research development.

2.3.1. Quantitative research method

The quantitative method emphasizes the objective sense of the social reality (Bryman and Bell, 2007). In this method, data collection and analysis that take place during the
research are gradually translated into the numerical outcome (Ibid). Survey is the major approach for developing a quantitative research (Ibid). In quantitative studies, data quantification takes place in both data collection and analysis chapters (Ibid). Quantitative method implicates positivist perspective (Ibid). Quantitative method emphasize on the testing of theories and hypothesis (Ibid). In this context, Kothari and Garg (2014) say that this method includes quantitative evaluation of certain features that are exploited to test a particular phenomenon.

2.3.2. Qualitative research method

The qualitative method analyzes the collected data in a way that is not possible to translate it into a numerical outcome (Parasuraman, et al., 2006). Qualitative study is more expressing the individuals' attitudes, experiences, and ideas rather than developing the conclusions based on solid facts (Kolb, 2008; Gillham, 2010; Merriam, 2009). Churchill and Iacobucci (2005) say that the personal interview is one of the major approaches for developing a qualitative research. Moreover, Gillham (2010) asserts that in qualitative research, the researcher is able to understand a particular phenomenon, to define certain issue, and to make possible explanations. The generalizability of qualitative research is relatively lower than the quantitative one (Björklund and Paulsson, 2012).

2.3.3. Research method in this thesis

The research questions in this thesis are limited to Sweden. As a result, the limitations expressed lead to a reduced accessibility to numerous companies. Following these arguments, the research method in this work is chosen to be qualitative. Another reason in favor of this method is that analyses are not expressed in numerical outcome and the collected data are reflecting the individuals' (interviewees) attitudes and experiences. Personal interviews, which are the major approach of the qualitative method constitutes the empirical study of this thesis.

2.4 Research design

According to Yin (2014), research designs include the relationship between the contextual conditions and "case". Based on this relationship, research design divides
into four types; these four types are holistic single-case, embedded single-case, holistic multiple-case, and embedded multiple-case (Ibid).

2.4.1. Holistic single-case research design

Holistic single-case design takes place when a research study contains one case and the unit of analysis is limited to only one level (Yin, 2014). For instance, when the research study is about one organization (case) such as hospital and the unit of analysis is solely limited to the hospital as an organization, the design of this research study is a holistic single-case (Ibid). This research design is highlighted, when there is no logical sub-unit to be identified, or the correspondent theory that constitutes the theme of the study has itself the holistic nature (Ibid).

2.4.2. Embedded single-case research design

Embedded single-case design refers to the research that includes only one case of study and the unit of analysis is more than one (Yin, 2014). In the example of hospital, if the hospital is considered as a single case of study but the analysis contains outcomes about different factors such as the clinical services and staffs employed, the research design becomes an embedded single-case (Ibid). Researchers that apply this research design should be cautious to prevent overemphasizing the sub-unit analysis, because it may reduce the focus on the larger unit analysis (Ibid).

2.4.3. Holistic multiple-case research design

Holistic multiple-case design applies to researches that have more than one study case with only one unit of analysis (Yin, 2014). For example, when the research is developed to study the school innovation (e.g. the usage of educational technology for better tutoring), the research may need to be structured with the number of schools as separate case studies that all cover a common topic which is the school innovation (Ibid). In this case, the research study includes multiple cases (Ibid). In the same example of school innovation, when the unit of analysis in each individual case is limited to only school innovation (one unit), the design of the research study is a holistic multiple-case (Ibid).
2.4.4. Embedded multiple-case research design

However, in the same example about the school innovation, if the unit of analysis is not just about the innovation of the school but also about the innovation impact on the performance of the students, the research design becomes an embedded multiple-case (Yin, 2014). An embedded multiple-case design covers the researches that have more than one study case which also include more than one unit of analysis (Ibid).

2.4.5 Research design in this thesis

Following the choice of a qualitative study for this work, a multiple case study will be carried out. More specifically, the research design in this thesis is an embedded multiple-case design, since the numbers of case studies are more than one; to confront the empirical information and gain relevance; and the units of analysis are two (the SRM integration and obstacles to this integration).

2.5 Research Quality

According to Bryman and Bell (2007), validity and reliability count among the most relevant criteria for the assessment of quality of the research. However, Golafshani (2003) states that these two concepts differ from qualitative research to quantitative research. Bryman and Bell (2011) further add that credibility can be considered as an alternative criteria used to evaluate qualitative research.

2.5.1 Validity

Methods, approaches and techniques are basis to a concept of validity (Blaxter, et al., 2006). For this purpose, validity can be explored in a research design aspect; both in an internal and an external perspective; as well as in a measurement aspect through measurement validity (Jha, 2008). Bryman and Bell (2011) assert that construct validity also is an important measure to assess.

2.5.1.1 Internal validity

Internal validity refers to the setting up of a causal relationship in which specific conditions result to the creation of other ones (Yin, 2009). The author explains that
causal relationships differ from spurious relationships (Ibid). Moreover, Bryman and Bell (2007) add that theoretical ideas should match the observations made by the researchers. A right match is a sign of internal validity (Bryman and Bell, 2007). For the case-study research method, inferences can become an issue for the internal validity of the research (Yin, 2009). To find a solution for these inferences, researchers use four specific analytic tactics (Ibid).

These tactics are pattern-matching logic, explanation building, addressing rival explanation and the use of logic models (Yin, 2014). The pattern-matching logic is a very appropriate method to cope with case study analyses (Ibid). This method compares a pattern developed through the empirical study with one defined before gathering the data (Ibid). A correlation between the results of both patterns will reinforce the internal validity of the research (Ibid). This tactic is pertinent for descriptive case studies (Ibid). The projected pattern should however be expressed before the data collection (Ibid).

The explanation building tactic is a kind of pattern matching with a more complex procedure (Yin, 2014). In a multiple-case study, its aim is to develop a general explanation valid for each case (Ibid).

Rival explanations are another acceptable possibility of interpreting the data (Yin, 2014). Yin (2014) adds that the research becomes even stronger when several rivals have been analyzed and excluded (Ibid).

The tactic, which is the use of logic models, applies a difficult chain of occurrences or events staged in repeated cause-effect-cause-effect patterns (Yin, 2014). Three types of logic models exist namely “individual-level”, “firm- or organizational-level” and “program-level” logic models (Ibid).

2.5.1.2 External validity

The concept of external validity focuses on the possible further generalization of the research results (Bryman and Bell, 2007). Therefore, the methodology of selecting the participants in the study becomes very important, in order to create a sample being representative of a research context (Ibid). The generalization of the results can solely be achieved through an external validity (Ellram, 1996). Yin (2009) explains that generalization in case studies differ from the one in survey research. Case studies rely
on analytic generalization whereas surveys rely on statistical generalization (Yin, 2009). Analytical generalization leads the researcher to generalize results to a further-reaching theory (Ibid). This concept helps to generalize the case study findings (Yin, 2013). This concept refers to the extraction of abstract ideas that can also sustain to other situations than these of the case study (Ibid). For this purpose, it is useful to identify overlaps of gaps between the analytic generalization and the studied literature (Ibid).

Moreover, Yin (2014) explains that the cross-case synthesis analytic technique is especially useful to develop external validity. The technique refers to the analysis of multiple cases (Yin, 2014). The author adds that to have more than two cases can support even more the findings and makes the analysis even than with a single case (Ibid).

The interviewees in this thesis are managers, decision-makers or purchasers in selected manufacturing companies within the construction industry sector. In addition to this, the choice of contributors was limited to the type of industry and the region being studied. From the analysis of the case studies, the authors of this thesis will carry an analytic generalization

**2.5.1.3 Measurement validity**

Measurement validity is usually used for quantitative research in order to define the right measures for the concept, and that will be used to carry out the research (Bryman and Bell, 2007). The defined measures should represent the hypotheses (Ibid). As a result, the choice of the right measures for the research is linked to the reliability of the research (Ibid).

**2.5.1.4 Construct validity**

According to Pennington (2003), the theorized psychological scientific construct should correlate with the scale set, to achieve construct validity. Ellram (1996) states that construct validity is built from multiple sources of evidence, through the formation of a chain of events as well as the assessment of the case study by main informers. Moreover, Yin (2009) describes construct validity as recognizing the right operative measures corresponding to the studied theories.
As this research uses several sources of evidence and is assessed by both academic persons and also the professional participants, the authors are aiming at building relevant construct validity.

2.5.1.5 Validity in this thesis

In this thesis, the source of evidence refers to interviews and data collected to understand the integration of the SRM and its obstacles. A chain of event has also been established from the definition of specific research questions to a conclusion putting an end to the research. The research has been reviewed repeatedly by a tutor and is assessed by an examiner. The veracity of the evidence explained in the case study is also verified by the interviewees.

During the analysis process, the authors will intend to make the theoretical ideas match the observations collected to achieve an internal validity. Moreover, following a case study research method, the thesis authors will carry out an analytic generalization instead of a statistical generalization, which is specific for surveys.

2.5.2 Reliability

According to Maylor and Blackmoon (2005), reliability is the concept of finding the exact same outcomes in case the study is repeated by another author. Nevertheless, Bell (2010) notes that similar conditions should be at stake to assess the reliability of a study through another research. Sachdeva (2009) draws a parallel between reliability and “consistency” and “repeatability”. Ellram (1996) adds that both the development of a procedure for the case study as well as the creation of a case study database allow the researcher to attain reliability for his work.

Gibbs (2007 cited in Creswell, 2009) establishes the following different reliability phases:

- Review the transcripts to avoid mistakes
- Maintaining the same definition of codes during data processing
- Communicate and share analysis in case of research in teams
- Review, check and compare analysis established by the different researchers
This thesis includes a protocol regrouping the procedures carried out for the case study as well as a database encompassing the various materials used for the execution of the research. All phases described by Gibbs (2007) will be followed to achieve the implementation of reliability.

2.5.3 Credibility

Bocking (2004) describes scientific credibility as the recognition of science as a trustworthy source of information. Yin (2003) adds that credibility is one of the factors aimed at assessing the quality of the research along trustworthiness, ability to confirm and data dependability. According to Bryman and Bell (2011), the execution of the research according to good practices and the confirmation of the findings by professionals gives credibility to findings.

In this thesis, the analysis of the empirical data is sent back to the interviewees for confirmation and agreement upon the findings. The research is also assessed by a tutor and an examiner.

2.6 Data collection

Many ways are possible to collect data (Bryman and Bell, 2007). As a matter of fact, interviews and questionnaires are the most common ones (Ibid).

2.6.1 Data collection methods

According to Bryman and Bell (2007), one can count focus groups, in-depth interviews and surveys, among the most common methods used to collect research primary data. Davies (2007) states that focus groups and in-depth interviews are rather used for qualitative research whereas surveys are more suitable for quantitative research.

Since the method used for this work is a qualitative approach, focus groups and in-depth interviews will be explained. A focus group is a method to carry out an interview based on a selected group of individuals, moderated by the researcher (Silverman, 2010). The participants are asked a set of questions that are further debated (Bryman and Bell, 2007). On the other hand, interviews are the most common method for conducting qualitative research (Bryman and Bell, 2007). They are also usually used in case studies.
(Yin, 2009). The preference given to them emanates from the high flexibility to arrange (Bryman and Bell, 2007).

The authors of this thesis selected interviews as the most feasible data collection method since the professionals targeted are located far away from each other. More so, due to their demanding schedule, it was not thinkable to arrange. For the planning of the interviews, the authors have taken into account the possibilities of the interviewees. The authors have provided an interview guideline, which determines the basis of the interview, but this interview will take place as an open discussion that the authors will moderate. In this regard, the interviews are considered as semi-structured.

The selection of in-depth interviews within given time frames for this thesis has also considered the low accessibility to companies and the limitation of the availability of managers.

2.6.2 Primary and secondary data

Kotler and Armstrong (2010) state in their work that data come either from primary or from secondary sources.

2.6.2.1 Collection of primary data

The authors explain that the collection of primary data occurs in researches carried in new subjects (Kotler and Armstrong, 2010). Primary data are picked right from the source and are information gathered directly by the scholar (Krishnaswami and Satyaprasad, 2010). The authors develop six steps of primary data collection (Ibid). These are namely ‘observation’, ‘interviewing’, ‘mail survey’, ‘experimentation’, ‘simulation’ and ‘projection technique’ (Ibid).

2.6.2.2 Collection of secondary data

Kotler and Armstrong (2010) note that secondary data is regarded the easiest and the less time-consuming to collect. Secondary kind of data is already existent and can be found in the literature (Ibid). Sachdeva (2009) explains that secondary data are reflecting the opinions of other researchers and thus are considered to be edited primary data.
2.6.3 Choice of data collection in this thesis

2.6.3.1 Choice of data collection

For this research, we have been using both kinds of primary and secondary data sources. In-depth interviews are the primary data collected from the meetings carried out with professionals, whereas scientific articles, books and corporate websites are used as secondary data. Both choices of data collection were necessary for the authors to respond to the research questions and to carry out the analysis.

Secondary data were found through the use of the following keywords: ‘supply chain management integration’, ‘supplier relationship management’, ‘supplier integration’, ‘procurement integration’, ‘supplier integration obstacles’, and ‘construction equipment industry’.

2.6.3.2 Interview administration in this thesis

In this thesis, the research authors and the interviewers are same legal entities. 5 interviews took place in order to provide empirical information for the support of the analysis. One common interview guideline (in appendix) is used for all 5 interviews.

During the interview, two voice recorders were used to document the interview contents. The guidelines of all interviews were semi-structured in which the main interview dimensions were mentioned in the guideline and the sub-dimensions came up spontaneously during the interview. The interview guidelines (in appendix) were sent to the interviewees between 2 and 4 days in advance in order for them to be able to prepare for the interviews. 2 out of the 3 authors of this thesis were interviewers of these interviews and both participated in the discussion of the interview.

2.7 Sampling

Basically, data collection has limitations because of the unlikelihood to interview everybody or to fill lots of questionnaires (Bryman and Bell, 2007). Therefore, researchers set limitations to ease the execution of the work through samples (Ibid).
2.7.1 Probability and non-probability sampling

According to Bryman and Bell (2007), samples refer to the population segment that the researcher decides to focus on. Researchers have to decide the sampling strategy that should be used before choosing the sample to study (Bryman and Bell, 2007). The sampling strategy is either probability sampling or non-probability sampling (Ibid). The non-probability sampling is commonly used for moderate-scale researches (Robson, 2007).

According to Gray (2009), qualitative research design with various case studies usually implicates so-called “purposive non-probability samples”. These samples aim at attaining specific details in given locations, contexts and time (Gray, 2009). The same author explains that researches using purposive non-probability samples focus on knowledgeable and influential people (Ibid).

2.7.2 Sampling selection

Denzin and Lincoln (2000) explain that case studies are commonly used in qualitative research. Moreover, Yin (2009) asserts that the size of the sample is not relevant when the topic is clear and the problem does not necessitate too high a degree of certainty.

Based on these aspects, it has been chosen to study 5 cases. The organizations are classified in terms of number of employees based on Statistics Sweden (Statistics Sweden 3, 2013).

2.7.3 Sampling in this thesis

In this research, the authors have studied five different sized companies in the construction equipment industry. According to the limitations set in the introduction, all of them are based in Sweden. Five interviews were conducted with professionals working in the purchasing sector, who are mostly managers.

Based on the statements given in chapter 2.8.1, this multiple case study thesis follows a non-probability purposive sample strategy since this work relies on information given by professionals exercising influence over their peers. Moreover, this study is a multiple case research and aims to get a broader knowledge of the studied area.
<table>
<thead>
<tr>
<th>Company</th>
<th>Interviewee</th>
<th>Position</th>
<th>Date</th>
<th>Duration</th>
<th>Interview technique</th>
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<td>Purchasing Manager</td>
<td>March 24(^{th}) 2015</td>
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<td>Phone</td>
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</tr>
</tbody>
</table>

Table 1: Sample in this thesis

### 2.8 Data analysis

Strauss (1987) defines the word ‘analysis’ as interpretation of information. Boyatzis (1998) adds that analyses have to be conducted consistently throughout the research to achieve reliability. The same author adds that in case the analysis is carried out by multiple authors, a common view should necessarily be taken to guarantee a reliable analysis (Boyatzis, 1998).

#### 2.8.1 Qualitative data analysis

Bryman and Bell (2007) states that, contrasting with the analysis of quantitative data, few rules regulate the analysis of qualitative data. However, general guiding principles are given for qualitative analyses (Okely, 1994). According to Miles and Huberman (1994), the analysis of qualitative data encompasses three main aspects, respectively ‘data reduction’, ‘data display’ as well as ‘conclusion drawing and verification’. Data reduction encompasses the collection, attention, simplification, and transformation of the information (Miles and Huberman, 1994). Data display focuses on the organization and simplification of information with matrices and charts for instance (Ibid). Last, thoughts are given on the conclusion during the whole data collection process but ends up with verified and valid conclusions (Ibid).
What is more, Stake (2006) points out that in case studies, researchers have to focus on each case with no preference in order to pick all vital information and fathom each one of the cases thoroughly.

2.8.3 Case study analytic techniques

According to Yin (2014), five explicit analytic techniques identified and described in order to enable the analysis of case studies.

2.8.3.1 Pattern matching

Pattern matching is used to make a comparison between the empirical findings and the predicted results (Yin, 2014). This technique takes place with the purpose of analyzing if the empirical findings and predicted results match with one another (Ibid). If the results of these two patterns are matching, it shows that the internal validity can be enhanced in the case study (Ibid). This technique can be applied into both explanatory and descriptive case studies (Ibid). In an explanatory case study, pattern matching could relate to either independent or dependent variables (Ibid). On the other hand, in a descriptive case study, in case that the crucial descriptive conditions for the predicted pattern can be made before collecting the data, the pattern matching should be concerned as well (Ibid).

2.8.3.2 Explanation building

This technique is a particular style of pattern matching, with the purpose of analyzing data in the case study through establishing an explanation of the case (Yin, 2014). Unlike the pattern matching technique, in explanation building, there is no need to state ultimate explanation at the beginning of the research (Ibid). Generally, explanation building is conducted in a narrative manner (Ibid). As narratives might not be accurate, explanations can take place in a scientific case study in order to present theoretically important propositions (Ibid). The aim of multiple-case studies is to establish comprehensive explanations to cover every individual case based on their different characteristics (Ibid).
2.8.3.3 Time-series analysis

Time-series analysis technique is used in experiments and quasi-experiments (Yin, 2014). This technique is associated with the time-series analysis (Ibid). If the pattern used for collecting the data in a case study is stricter, it could be easier to find potential relationships and accurate results through using time-series analysis, which provides better foundations for the research (Ibid). This logic stands on the match between the empirical and the theoretical trends, and it is ahead of the research itself (Ibid).

2.8.3.4 Logic models

This model places the set of events in the chain within an extended time period (Yin, 2014). This chain of events is stipulated in the pattern of cause and effect repeatedly (Ibid). The logic models technique includes matching the empirical and theoretical findings in the sequential phases (Yin, 2009; 2014). This model is used in order to either test the change theory which is presumed as sequential events that is in the revitalization process, or evaluate an intervention (Yin, 2014). This technique can exploit both qualitative and quantitative data (Ibid).

2.8.3.5 Cross-case synthesis

This technique is applicable only on multiple case-studies analyses (Yin, 2014). It is very useful if the numbers of case-studies are at least two (Ibid). In this technique, cases are dealt with as separate ones, but at the end, the findings of each separate case are brought together (Ibid). By using this technique, the researcher will be able to have a general view over the cases on the basis of studying each case separately with the purpose of understanding whether different cases demonstrate similar results (Yin, 2003; 2012; 2014).

2.8.3.6 Data analysis in this thesis

The research encompasses five case studies, which makes the study of a multiple-case study. The authors of this thesis will carry out a cross-case analysis that will examine all cases combined. This cross-case analysis will aim to establish whether the different cases lead to the same results. According to the above statements, this analytic technique that will be used in this thesis refers to the cross-case synthesis.
2.9 Research ethics

According to Pimple (2002), research ethics can be divided into three parts. These three parts are true, fair, and wisdom (Ibid).

"True" refers to the competencies of the participants (Ibid). In other words, having competent participants means that the research strategy is true. Moreover, a research can be called as "Fair", when it contains a set of characteristics (Pimple, 2002). These characteristics are awareness of participants about the goals and aims of the research, voluntarily participations of participants in interviews and surveys, concealing the confidential data which has been gathered, and keeping the participants (in this research, interviewees) anonymous in the case that they desire it this way (Ibid). In addition, a research is "Wise" when the participants are becoming aware of the findings and the results of the research (Ibid). More so, Kumar (2006) asserts that in ethical research, the privacy of participants should not be disrupted.

2.9.1 Research ethic in this thesis

This thesis is true because all of the interviewees are professionals responsible for the relationship with the suppliers within their operative areas, which exactly matches the subject of thesis, which is about the SRM process. It is also fair because all four criteria of fairness have been reached. Wisdom also appears because interviewees are becoming aware about the findings of this thesis. It is also aimed at keeping the participants’ privacy undisturbed.
### 2.10 Summary of the thesis methodology

The methodology chapter can be summarized as follows:

<table>
<thead>
<tr>
<th>Research philosophy</th>
<th>Positivism</th>
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<tbody>
<tr>
<td></td>
<td>• Provides knowledge about SRM integration and its obstacles within the Swedish construction industry.</td>
</tr>
<tr>
<td></td>
<td>• Analysis based on information collected through theoretical review and interviews.</td>
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<tr>
<td></td>
<td>• Characteristics of business, which is part of the real world, are well defined.</td>
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<table>
<thead>
<tr>
<th>Research approach</th>
<th>Deductive</th>
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<tbody>
<tr>
<td></td>
<td>• Business process integration is a well-known concept.</td>
</tr>
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<td></td>
<td>• Theories and interviews are used to gather information in order to explain and fill the gap of study rather than to develop a new theory.</td>
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<table>
<thead>
<tr>
<th>Research method</th>
<th>Qualitative</th>
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<tr>
<td></td>
<td>• Case study with personal interviews is the major approach of the qualitative method.</td>
</tr>
<tr>
<td></td>
<td>• Personal interviews from five companies were carried out which constitutes the empirical study of this thesis.</td>
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<table>
<thead>
<tr>
<th>Research design</th>
<th>Embedded multiple-case research design</th>
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<tbody>
<tr>
<td></td>
<td>• Five case studies.</td>
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<td></td>
<td>• Two units of analysis.</td>
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<tr>
<th>Research Quality</th>
<th>Internally valid</th>
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<tbody>
<tr>
<td></td>
<td>• The theoretical ideas in this thesis will be matched with the data collected and observed.</td>
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<table>
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<tr>
<th>Research Quality</th>
<th>Reliable</th>
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<tr>
<td></td>
<td>• Protocol regrouping the procedures carried out for the case study</td>
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<td></td>
<td>• Database encompassing the various materials used for the execution of the research.</td>
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<th>Research Quality</th>
<th>Credibility</th>
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<tr>
<td></td>
<td>• Follow-up of good practices.</td>
</tr>
<tr>
<td></td>
<td>• Confirmation of the findings by professionals after analysis of the empirical data.</td>
</tr>
<tr>
<td></td>
<td>• The research is also assessed by a tutor and an examiner.</td>
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</table>

<table>
<thead>
<tr>
<th>Data analysis</th>
<th>Qualitative</th>
</tr>
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<tbody>
<tr>
<td></td>
<td>• Qualitative analysis of observations and information, gathered during the interviews, as a group.</td>
</tr>
<tr>
<td></td>
<td>• A common view for the analysis has been found.</td>
</tr>
<tr>
<td></td>
<td>• The analysis considers ‘data reduction’, ‘data display’ as well as ‘conclusion drawing and verification’.</td>
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</tbody>
</table>

| Data collection | In-depth interviews are the primary data collected from the meetings carried out with professionals |
|                | Scientific articles, books and corporate websites are used as secondary data. |

<table>
<thead>
<tr>
<th>Sampling</th>
<th>Five different sized companies in the construction equipment industry</th>
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<tbody>
<tr>
<td></td>
<td>All of them are based in Sweden.</td>
</tr>
<tr>
<td></td>
<td>The interviews were conducted with professionals functioning in the purchasing sector, mostly managers.</td>
</tr>
<tr>
<td></td>
<td>Multiple case researches with a non-probability purposive sample strategy aiming to get a broader knowledge of the studied area. The study also focuses on knowledgeable people in the sector.</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Research ethic</th>
<th>True</th>
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<tr>
<td></td>
<td>• All of the interviewees are professionals responsible for the relationship with the suppliers within their operative areas.</td>
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<table>
<thead>
<tr>
<th>Research ethic</th>
<th>Fair</th>
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<tbody>
<tr>
<td></td>
<td>• All four criteria of fairness have been reached.</td>
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<thead>
<tr>
<th>Research ethic</th>
<th>Wise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• Interviewees are becoming aware about the findings of this thesis.</td>
</tr>
<tr>
<td></td>
<td>• Keeps the participants’ privacy undisrupted.</td>
</tr>
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</table>

Table 2: Summary of the methodology choices
2.11 Methodical development of this thesis

The following figure explains the development of this work. First, the research questions expressed in the introduction chapter will lead to the elaboration of a theoretical chapter. After this, the authors will carry out a gathering of empirical data through different interviews. Then, a cross-case analysis of both the theoretical and the empirical findings will be performed which will eventually be followed by a conclusion and recommendations from the authors of this thesis.

Figure 3: Representation of the thesis development
3. Theory

3.1 Provides a literature overview of SRM process as well as its different sub-processes.

3.2 Provides knowledge about the integration of SRM process.

3.3 Provides information about the obstacles existing to integrate SRM process.

3.4 Provides the theoretical model for this thesis.

3.5 Explains how the research can be operationalized.

3.6 Shows the representation of the interview questions and the operationalization.

It must be noted that in the literature review in chapters 3.2 and 3.3, the authors of this thesis encountered various terms for defining SRM process integration. Based on this statement, the authors used the term SRM in order to unify the concepts reflecting similar contents.

Moreover, since the authors of this thesis could not find any literature that differentiates the SRM from the SRM process, the SRM process is taken as the generic term.

3.1. Supplier Relationship Management process

According to Hong, et al. (2005), companies need to develop a SRM in order to interact with suppliers. This process called SRM is necessary to achieve sustainable competitive advantage (Wagner, 2003). This competitive advantage is reached through connections between actors in the supply chain (Gadde and Snehota, 2000). Achieving a high level of control over the material flow and over quality of the products necessitates interdependency between the involved actors (Goffinet, et al., 1997).

3.1.1. Supplier relationship management sub-processes

According to Croxton, et al. (2001), each business process can be divided into sub-processes. Each one of them is composed of strategic and operational sub-processes (Croxton, et al., 2001).
More specifically, both strategic and operational sub-processes of the main SRM process are themselves divided into five strategic sub-processes and into seven operational sub-processes (Croxton, et al., 2001). Lambert and Schwieterman (2012) call these five strategic sub-processes and seven operational sub-processes ‘micro-level’ processes.

The strategic sub-processes define the setting up and the definition of the whole process by the management (Croxton, et al., 2001). The need for this process is to set common grounds to integrate with the suppliers within the larger supply chain (Ibid). On the other hand, the operational sub-processes refer to the execution phase that encompasses specific (Ibid).

Nevertheless, cross-functional and cross-organizational teams are needed to manage the execution of both strategic and operational processes (Croxton, et al., 2001). Therefore, a multi-disciplinary managerial team is formed of professionals from different activities; such as marketing, sales, finance, production, purchasing, logistics and research and development (R&D); to overview the procedure (Ibid).

Lambert and Schwieterman (2012) further explains that SRM, as well as each and every one of the other business processes has to interact with the other business processes. Below is the graph representing the interaction of the SRM process with the other business sub-processes.
3.1.1.1. Strategic sub-processes

Croxton et al. (2001) assert that the strategic sub-processes encompass five different micro-processes. These are useful to set the strategy to follow in order to implement an integration of the SRM process (Croxton et al., 2001). The same authors explain further that the process integration comes necessarily first with the execution of the strategic phase (Ibid).

The strategic part of the SRM process aims to determine the products and service components targeted, to find criteria to divide suppliers, to provide teams of suppliers with procedures in order to tailor the product and the service offering, to develop metrics frameworks, as well as to deliver guiding principles to share process improvement advantages with suppliers (Lambert and Schwieterman, 2012).

The figure below shows the strategic processes and their main activities:
3.1.1.1.1. Review corporate, marketing, manufacturing and sourcing strategies

The first of the micro-processes forming the strategic sub-processes is encompassing the review of corporate, marketing, manufacturing and sourcing strategies (Lambert and Schwieterman, 2012). The aim is to determine the supplier categories that are crucial for the further prosperity of the company are based on factors such as the lead-time, quality and cost of production (Ibid).

The reviewed strategies will influence the products quality, the availability of the products, the time to market, the accessibility to core technology, the flexibility as well as the sustainability (Lambert and Schwieterman, 2012).

Moreover, the identification of the key suppliers by the firm’s management is necessary (Lambert and Schwieterman, 2012). The authors state that long-term relationships need to be developed between the actors. Moreover, Choy, et al. (2003) state that the selection of the appropriate suppliers is one of the most important functions of the SRM process since it guarantees a sufficient production volume at a good quality.

3.1.1.1.2. Identify criteria for segmenting suppliers

Following the review of the strategies, the second micro-process is to identify the criteria for categorizing the suppliers (Lambert and Schwieterman, 2012). The managerial team establishes the criteria that are used to classify the suppliers into various segments (Ibid). The objective of such a segmentation is to decide with which suppliers the company will cultivate tailored PSA, as well as those that the firm will rather develop standard PSA with (Ibid). PSA is designed to meet both the firm’s and the suppliers’ needs and address main business drivers of both partners (Ibid).

To measure the accordance of the relationship objectives and actual individual profits of respectively the firm on the supplier and vice versa, performance reports are released (Lambert, 2004).

According to Croxton, et al. (2001) and later repeated by Lambert and Schwieterman (2012), the segmentation of the suppliers can occur over the following criteria: supplier’s profitability, growth and stability, criticality, the necessary service level, the sophistication and/or compatibility of the supplier’s process implementation, the supplier’s technological capability and compatibility, the volume purchased from the
supplier, the capacity available from the supplier, the culture of innovation at the supplier. In addition to this, further criteria have been added by researchers. Burt, et al. (2003) and Lambert and Schwieterman (2012) add the supplier’s anticipated quality levels, Enz and Lambert (2012) complement the list by adding the potential to co-create value, and Lee (2010) closes the list by adding environmental, social and economic sustainability.

For each one of the criteria, the managerial team defines the criteria to select and the assessment aspects to deal with in order to measure the suppliers (Lambert and Schwieterman, 2012). The suitable criteria should accord the particular corporate needs and goals (Croxton, et al., 2001). For this purpose, the team creates a classification pattern to select and segment the key suppliers (Ibid).

Lambert and Schwieterman (2012) assert that through getting a broader view of the supply chain, companies can reach important information on opportunities further in the chain (over the first tier of supplier) and thereby make important benefits.

### 3.1.1.1.3. Provide guidelines for the degree of differentiation in the product and service agreement

The following step is to develop guidelines to interact with the other process teams in order to assess the required degree of variation in the PSA and also to determine the methods to apply the implementation (Lambert and Schwieterman, 2012). Croxton, et al. (2001) add that the other process teams are needed to understand the likelihood of conceiving systems to sustain the alternatives.

According to Croxton, et al. (2001), guidelines are set up to assess the desirable level of customization for the relationships with the specific key suppliers. The managerial teams will select customized PSA for their interactions with key suppliers whereas standard PSA will be chosen for the other suppliers (Croxton, et al., 2001). The same authors explain that the guidelines take quality, cost inferences of the different customization possibilities into account (Ibid).
3.1.1.1.4. Develop framework of metrics

According to Lambert and Schwieterman (2012), the fourth micro-process belonging to the strategic sub-processes is to create a set of metrics in order to assess the profitability. This fourth step is particularly important in the SRM process according to Croxton, et al. (2001), since the metrics being implemented measure whether the relationships with the supplier are successful. Lambert and Schwieterman (2012) explain that these metrics have to be appropriate with those used to assess the other processes. Moreover, the metrics are said to demonstrate the effect of a supply chain integration to the management Croxton, et al. (2001) and to convey visibility to the management team so it can regulate and manage the integration and synchronization of the process (Croxton, et al., 2001; Lambert and Pohlen, 2001).

Therefore, the team needs to pinpoint the interesting metrics for the particular case and relate them to the impact of the supplier on the profitability of the company (Lambert and Burduroglu, 2000; Zablah, et al., 2005; Payne and Frow, 2005). The authors also assert that the procedure works both ways: the process should be carried out in order to evaluate the impact of the firm on the profitability of the supplier (Ibid). Therefore, implementing a framework of metrics can allow both partners to pursue goal congruence (Lambert and Pohlen, 2001).

The objective is to estimate the effect of the partnership on the financial performance of the firm (Lambert and Schwieterman, 2012). As a matter of fact, Croxton, et al. (2001) claim that evaluations on profitability analyses is essential to prove the supply chain activities value. Lambert and Pohlen (2001) state that economy value added (EVA) can be a means to assess corporate financial performance. This can be carried out in various ways (i.e. cost of goods sold, total expenses, inventory investment, other current assets and investment in fixed assets).

3.1.1.1.5. Develop guidelines for sharing process improvement benefits with suppliers

The last micro-process of the strategic sub-processes is to develop guidelines in order to share improvement benefits with the suppliers. In this step, Lambert and Schwieterman (2012) explain that the aim is to make the process improvements that have been reached a benefit for both actors. They continue by saying that if the process improvements do
not profit the supplier, it is likely that the supplier will not be willing to strive to fulfill its partner’s objectives (Lambert and Schwieeterman, 2012). Croxton, et al. (2001) go further and warn that the relationship is likely to melt if one partner does not find a benefit in the situation. Thus, the authors add that the team in charge of the process needs to measure the advantages of process improvements in financial terms (Lambert and Schwieeterman, 2012).

3.1.1.2. Operational sub-processes

According to Croxton, et al. (2001), the operational part as opposed to the strategic section, is responsible for the execution of the process after having been implemented. The operational sub-processes for the SRM sub-process consist of seven micro-processes (Lambert and Schwieeterman, 2012). According to the same authors, the process SRM refers to the development and implementation of the PSA (Ibid).

The figure below summarizes the operational processes, which will be developed afterwards:

![Figure 6: Operational processes of the SRM process (Lambert, 2008)]
3.1.1.2.1. Differentiate suppliers

In this first operational micro-process, the suppliers are categorized according to the criteria that have been decided in the strategic process (Lambert and Schwieterman, 2012). The purpose of this step is to determine the key suppliers for the company and as a result, establish categories of suppliers (Ibid). This differentiation occurs by performing a supplier profitability analysis and by assessing the potential growth, the strategic value of the supplier and the drivers for further growth (Ibid).

3.1.1.2.2. Prepare the supplier/segment management teams

In this second micro-process, the aim is to form specific teams that have definite responsibilities and that count a person designated for the relations with the supplier (buyer or supplier relationship manager) (Lambert and Schwieterman, 2012).

If, following the first micro-process ‘segment suppliers’, key suppliers are designated; a team is assigned to a specific key supplier, whereas a team manages numerous suppliers in case segments of suppliers are defined (Ibid). The team responsible for the key supplier arranges frequent meetings with their partner (Ibid). On the other hand, the segment team has the task to manage the PSA decided for the segment (Ibid). Either the teams responsible for key suppliers or the segment teams are constituted of a person in charge and of representatives of various functions of the company (Ibid).

3.1.1.2.3. Internally review the supplier/supplier segment

After having prepared the teams of either suppliers or segments, the assessment of the supplier’s role in the supply chain is carried out (Lambert and Schwieterman, 2012; Lambert and Pohlen, 2001). The assessment is done in a similar way for the segment of suppliers (Ibid). The assessment is executed by reviewing the product purchased, the supplier’s sales growth and its importance in the chain (Ibid).

The team assigned to the key supplier or to the segment of suppliers aims at determining the existing improvement opportunities through teamwork between both actors (Ibid). The authors also add that a review of the other seven SCM processes assists the teams to define possibilities for improvement (Ibid).
3.1.1.2.4. Identify opportunities with the supplier/supplier segment

According to Lambert and Schwieterman (2012), improvement can be developed through teamwork between teams and key suppliers or segments of suppliers.

These improvement opportunities can also be identified by the work carried out with the other process teams focused on the other SCM processes (Lambert and Schwieterman, 2012).

In their article, Croxton, et al. (2001) notes that the improvement opportunities are mainly focused on the potential increase in sales, the improvement in the service provided and the cost reductions. In fact, close relationship between partners allows firms to benefit from advanced manufacturing practices to upturn sales chances (Hall, 2000).

Moreover, Rackoff et al. (1985) assert that through a close collaboration with key suppliers, companies can enhance their service. Krause, et al. (2007) note that improvements related to product costs are mainly concern the supplier. However, collaboration between both partners is likely to increase their possibility to achieve the lowest cost and best process improvement since they gather bother their skills and competencies to achieve their common goal (Stank, et al., 2001).

3.1.1.2.5. Develop the product and service agreement and communication plan

At this stage, Lambert and Schwieterman (2012) state that each team, responsible for either the key suppliers or the segment of suppliers, develops their own PSA. For the key suppliers, a customized PSA is established, which requires negotiations beforehand, and for the other suppliers, standard PSA is developed which are not negotiable (minimum requirements for suppliers) (Lambert and Schwieterman, 2012).

In case key suppliers have been identified by the team in the earlier steps, the negotiation of a PSA, beneficial for both actors, is necessary (Lambert and Schwieterman, 2012). For the success of the negotiation, all company’s functions need to give commitment (Ibid). According to Prahinski and Benton (2004), supplier’s commitment is defined by the willingness of the supplier to deal further with the buying organization. Their definition englobes loyalty and longevity as well (Blau, 1964; Ring
and Van de Ven, 1994). The negotiation needs to be agreed upon at all levels of supplier’s internal functions (Ibid).

According to Lambert (2008), the Partnership Model and the Collaboration Framework offer tools to develop a PSA, and therefore to reach an agreement. Lambert and Schwieterman (2012) add that the PSA for key suppliers should encompass a communication and continuous improvement plan.

In the PSA, several aspects can be included such as cost savings initiatives, goals for spending with minority-owned businesses, open-book costing, key business reviews, diversity clause, written contingency plans as well as weekly volume and pricing reports (Lambert, 2008).

After having agreed on the PSA, partners need to define a communication and continuous improvement plan (Lambert and Schwieterman, 2012). According to Prahinski and Benton (2004), there is a necessity for the buying organization to measure and transmit the evaluation and goals to the supplier so the difference between the current supplier’s performance and the buying firm’s expectations can be solved. Deprived of actual measurement and communication system the coordination and improvement enterprises would be irrelevant (Prahinski and Benton, 2004).

3.1.1.2.6. Implement the product and service agreement

After having negotiated and later developed the PSA, its implementation follows (Lambert and Schwieterman, 2012). This implementation encompasses to arrange fixed planning meetings with key suppliers (Ibid).

The process team responsible for the SRM provides contribution to the other process teams that are influenced by the customizations in the PSA (Lambert and Schwieterman, 2012). The SRM teams are in charge of the implementation of the PSA that have been defined and they control their carrying out and evolution (Ibid).

3.1.1.2.7. Measure performance and generate supplier cost/ profitability reports

The last operational micro-process consists of identifying and informing over the process performance measures (Lambert and Schwieterman, 2012). The performance is assessed through metrics implemented by each of the other process teams (Ibid). These
metrics are used in order to establish supplier cost reports as well as profitability reports (Ibid).

Both kinds of reports give specific information on the value of the relationship to strategic management and to the suppliers (Lambert and Schwieterman, 2012). The assessment has to be carried out in a way that the value provided should be measured in a manner that fathoms the effects of the relationship on each organization’s profitability (Ibid). In order to measure profitability, the process improvement reports have to include factors such as the costs and the influence on sales to be regarded as important (Lambert and Pohlen, 2001). Lambert and Schwieterman (2012) add that the revenue, the costs, the profitability as well as other variables (such as the quality or the service) are also evaluated.

Moreover, the same authors add that other process teams transfer supplier-related performance information to the teams responsible for suppliers. The information will be further used to assess the profitability of the firm and the profitability of its suppliers (Lambert and Schwieterman, 2012).

3.2. Supplier relationship management integration

3.2.1 Evolution of the Supplier Relationship Management Integration

Empirical findings in 1980s indicated that sets of suppliers encompass the large amount of purchasing expenditures of producing/manufacturing companies (Håkansson, 1990; Håkansson and Snehota, 2006; Lamming, 1993; Holmen, et al., 2013). In this context, the relationship with these suppliers is often characterized by integrative spirit that encourages the establishment of long-term cooperation (Ibid). Since then, managers expressed higher tendency toward the integration with these suppliers (Ibid). Producing/manufacturing managers understood that it is important that they rely on their own distinctive competences and outsource activities that do not refer to those competences (Corsten and Felde, 2005; Gadde and Håkansson, 2001; Van Echtelt, et al., 2008; Holmen, et al., 2013). This importance about the SRM increased the attention toward the collaborative process that could lead to advantages and better performance for both the supplier and the manufacturer; this collaborative process is called as "SRM integration" (Ibid).
3.2.2 Definition

SRM integration includes jointly performance of activities that are referring to material-related acquisition, movement, and storage with the purpose of decreasing the cost (Smith and Rupp, 2013). In this regard, Narasimhan and Schoenherr (2012) named the SRM integration "integrated supply management practices" and define it as an integrated process of effective exploitation from the manufacturer of the suppliers' capabilities and qualified inputs to produce/manufacture high quality products as well as effective utilization of the suppliers' reputation for durability and reliability of the supplies, which can have a positive impact on the perception of the manufacturer's customers. Also, Vanpoucke, et al. (2014) termed SRM integration "inter-organizational relationship integration" and defined it as a long-run cooperative relationship that is aimed at increasing the performance of both the supplier and the buyer. Vanpoucke, et al. (2014) further emphasize that it differs from the traditional buy-sell contracts.

3.2.3 Areas of supplier relationship management process integration

Frohlich and Westbrook (2001) and Vanpoucke, et al. (2014) assert that there are three initiatives that trigger the integration between the manufacturer/producer and the supplier. These three initiatives are logistics responsiveness, usage of common resources, and knowledge exchange (Frohlich and Westbrook, 2001; Vanpoucke, et al., 2014). Knowledge exchange refers to access and share planning information, sets up information exchange system, provides the visibility within the supply chain (Vanpoucke, et al., 2014). Logistic responsiveness contains packaging customization and adaption to the customer requirement in terms of delivery frequency (Ibid). Common resources are the third initiative that is used by integrated partners in order to carry out the activities within the supply chain at lower cost and higher effectiveness (Ibid).
3.2.4 Supplier relationship management integration tools

3.2.4.1 Technology

According to Chandershaker, et al. (2007), emergence of new technologies, such as Internet, facilitated buyers to integrate their relationship management process with their suppliers in order to accelerate the process of supplying the required goods and services.

3.2.4.2 Establishment of trust

Mutual trust and common goal between buyer and supplier can be a key toward the successful SRM process integration (Smith and Rupp, 2013). Buying companies should consider the suppliers as the extension of their organization (Ibid). In this context, ethical actions such as presenting a gift to the integrated partner (e.g. giving a small manufactured piece to the supplier that supplied the raw material of that gift) can provide positive impact on the supplier relationship (Ibid). In this term, Day, et al. (2013) say that the creation of trust between partners that wish to integrate is one of the most necessary, meanwhile, very complex concept that needs to be carried out.

3.2.4.3 Having a stable supply order

Buying managers should also be cautious when they increase or decrease the demand for the supplies, because it can harm their relationship with the integrated suppliers (Smith and Rupp, 2013). It is due to the natural desire of suppliers to prevent any surplus or shortage of inventory (Ibid). In this regard, manufacturers can avoid any potential conflict with the suppliers by integrating through the development of common computer-based inventory and ordering system such as common point-of-sales (POS) or vendor-managed inventory (VMI) (Ibid). Common computer-based inventory systems enable clear communication between the manufacturer and the supplier to ensure that the material/components are available if needed (Ibid). It also allows the future manufacturer's orders to be automatically carried out (Ibid).
3.2.4.4 Having a common shipment solution

Moreover, the manufacturer can establish a solid relationship with the supplier through integration by agreeing upon the solution for shipment that benefits both supplier and manufacturer in terms of cost and time efficiency (Smith and Rupp, 2013).

3.2.4.5 Collaborative tools

Bayliss, et al. (2004), Olsen, et al. (2005), Eriksson (2008) and Eriksson and Westerberg (2011) claim that the SRM integration should be specified by "collaborative tools" between the manufacturer and the supplier in order to enable the joint actions to be performed. These collaborative tools are for example joint objectives, joint IT tools, joint risk management, and joint project office (Bresnen and Marshall, 2000; Rahman and Kumaraswamy, 2002; Eriksson, 2008; Eriksson and Westerberg, 2011).

3.2.4.5.1 Joint objectives

Integrated partners should develop joint objectives that enable the win-win condition that encourages both the manufacturer and the supplier to focus on achieving their common goal (Eriksson, 2008; Eriksson and Westerberg, 2011). During the development of joint objectives, integrated partners should design a success criteria which emphasizes the important aspects of performance, thus the performance in regard of these aspects improves (Swan and Khalfan, 2007; Eriksson and Westerberg, 2011).

3.2.4.5.2 Joint IT tools

Joint IT tools enable faster and better communication between both the supplier and the manufacturer (integrated partners), which result in cost and time saving (Yang, 2007; Woksepp and Olofsson, 2008; Eriksson and Westerberg, 2011).

3.2.4.5.3 Joint risk management

Having joint risk management enables the integrated partners to have better understanding about the potential risks (e.g. environmental risks) that can occur, therefore the negative outcomes of those risks that could take place will be either prevented or reduced (Zou, et al., 2007; Eriksson and Westerberg, 2011).
3.2.4.5.4 Joint project office

Joint project office consists in a team that includes members of both the manufacturer and the supplier who communicate with one another and have face-to-face interaction in order to facilitate the integrated performance on both sides in various terms such as innovation and environmental aspects (Olsen, et al., 2005; Alderman and Ivory, 2007; Eriksson and Westerberg, 2011).

3.2.5 Main consideration aspects of Supplier relationship management process integration

3.2.5.1 Cost and earning proportion between the integrated supplier and buyer

Praxmarer-Carus, et al. (2013) and Ivens, et al. (2013) say that the distribution of cost and earning between the integrated buyer (manufacturer) and supplier is one of the main aspects of integration that needs to be carefully considered. The case study that has been developed by Praxmarer-Carus, et al. (2013) with the sample of 38 suppliers and buyers in German speaking economies (Austria, Germany, and Switzerland) shows that the share of earning can have positive impact on suppliers' satisfaction (Praxmarer-Carus, et al., 2013).

However, the same case study indicates that the supplier's lack of competence can lead to a bigger gap in both sides' perception about their shares in earnings and costs (Ibid). In this situation, Praxmarer-Carus, et al. (2013) and Ivens, et al. (2013) suggest that the close interaction and intense communication with the suppliers who have lower level of competence, can contribute to improve the determination of buyer-supplier costs and earnings shares.

3.2.5.2 Manufacturer's network evaluation

Holmen et al. (2013) and Ivens et al. (2013) state that the manufacturing company should have a correct picture of its network. They continue by saying that the buying company (manufacturer) should manage its suppliers with respect to the contextual structure of the network (Ibid). The network picture is defined as the participants' views over the network itself that constitutes the basic concept of each one of the network participant's researches (Ibid).
3.2.5.3 Placement of cost-saving actions

Shen and Yu (2012) say that it is also significant that the integrated manufacturer and supplier collaborate to take on cost-saving actions at the supplier level where the supplies/components are developed to be transported to the manufacturing site (Shen and Yu, 2012). As a matter of fact, Shen and Yu (2012) assert that cost-saving attempts at the manufacturing level are similar to “closing the stable door after the horse has bolted”.

3.2.6 Supplier relationship management process integration benefits

An integrated SRM can create value for manufacturers in three terms which are cost saving, flexibility and responsiveness to customer requirements, and cycle time (Choy, et al., 2003). Value creation in these three terms can lead to faster time to market with high level of customization (Ibid).

Shen and Yu (2012) claim that the SRM integration can lead to faster product development, better product quality, and more effective technological development.

Moreover, Eriksson and Westerberg (2011) claim that the usage of collaborative tools within the integration of SRM process between the manufacturer and supplier improves the performance in terms of cost, quality, environmental impact, innovation, time, and work environment.

3.3. Supplier relationship management integration obstacles

Nowadays, a debate has arisen on the actual benefits of supply chain integration on company's performance (Danese and Romano, 2011). Several authors explain that the potential positive aspects of integration on performance have to be taken carefully (FabbeCostes and Jahre, 2008; Van der Vaart and Van Donk, 2008). In fact, Stock et al. (2000) assert that positive performance effects do not always come from external integration. This view diverges from the one of Frohlich and Westbrook (2001) that introduces the so-called “arcs of integration” and proves that the approach founded on developing the greatest arc of integration permits the best performance.
3.3.1 Costs of integration

Cousins and Menguc (2006) state that supply chain integration clearly has high costs and can also have the opposite effect than what was expected. In this regard, Das, et al. (2006) explain that collaboration through partnerships can lead to higher coordination costs and to a lack of flexibility. Some researchers also claim that close supplier-buyer relationships are not always appropriate (Cannon and Perreault, 1999; Heide and John, 1990; Noordewier, et al., 1990). In this regard, according to Heide and John (1990), close relationships are only relevant when specific resources and insecurity are at stake and reveal the necessity for protection and adjustment.

3.3.2 Impact on flexibility

Further in the literature, Sezen (2008) found out that information sharing and SC integration do not have relevant impact on flexibility, efficiency and performance (such as customer satisfaction and profit). This diverges from the view of Das, et al. (2006) who claim that integration with suppliers leads to corporate inflexibility, slowness to changes and less reactivity to uncertainties. This statement is corroborated by Schoenherr and Swink (2012) who assert that inflexibility and interdependence are consequences of integration.

3.3.3 Lack of willingness

Pohlen and Coleman (2005) state that information sharing is key to the success of supply chain integration and to take important decisions; however, the willingness of managers to share essential information is not always present. As such, Anderson and Narus (1990) as well as Forsslund and Jonsson (2007) assert that feedback and mutual participation in different aspects such as target setting and measurement, are necessary to attain supply chain coordination and integration. In this purpose, Prahinski and Benton (2004) come to the conclusion that the use of advanced communication methods is not related to the extent to which the information is shared between buyers and key suppliers. This theory is supported by Kraut, et al. (1999) and Leek, et al. (2003), who show that traditional communication methods are perceived to be more useful for sharing information between firms than advanced communication methods.
3.3.4 Lack of common tools

Gunasekaran and Ngai (2004) explain that the lack of available tools to assess joint performance might signify a barrier for the integration of the procurement process. Furthermore, according to Cox, et al. (2005), room for possible improvement can be determined through the sharing of information.

Faisal et al. (2007) claim that in order to reach higher supply chain effectiveness, companies rely on IT. They denote nonetheless several barriers existing that prevent companies to reach the goal of improving their effectiveness (Ibid). These barriers also have an impact on one another (Ibid). Among these obstacles count the lack of funds, discrepancy in partners’ trading capability (as stated by Narasimhan and Das (2001)), buying companies are more likely to bank on suppliers with good engineering, testing, manufacturing capabilities), the lack of trust and the anxiety about a possible information system breakdown (Ayers, 2001; Zhao and Xie, 2002; Li, 2002; Agarwal and Shankar, 2003). These issues (driving barriers) impact the implementation of an effective IT and other barriers are following from them (driven barriers) (Faisal, et al., 2007).

3.3.5 Barrier of security

Faisal et al. (2007) also imply security as a further obstacle. In fact, they claim that a cross-organizational information system application is expensive, laborious and unsafe (Faisal, et al., 2007). They also add the access privileges on top of the above explained barriers for implementing information systems technologies (Ibid). As a matter of fact, Dos Santos and Smith (2008) agree with that point and assert that illegal access and interference in company’s information by the competitors is a cause of important problems. Potential cyber-attacks targeting SCM systems are discussed in Warren and Hutchinson’s (2000) work.

3.3.6 Lack of commitment

Commitment from the top-management is essential for a successful integration of the procurement process (Wu, et al., 2004). In this regard, Gunasekaran and Ngai (2004) claim that as a means to enhance the process, information integration needs moral,
technical and financial support. Akyuz and Rehan (2009) add that managerial vision support and commitment are crucial for enabling and strengthening the integration.

Lack of commitment is equally an obstacle that prevents a partnership on the long run (Zineldin and Jonsson, 2000). In fact, the authors took the example of a company that happens not to have plans on a long-term partnership and that, as a result, tries to take short-term advantages at the expense of its partner (Ibid). These can be for instance a raise in the prices initiated by the supplier in times of product shortage; or the encouragement from the buying company to the supplier to proceed further investment even if the buying company knows that its supplier requirements are likely to be modified in the future (Ibid).

### 3.3.7 Lack of trust

Moreover, the same authors add that trust is an essential prerequisite to achieve commitment (Zineldin and Jonsson, 2000). Moorman, et al. (1993) defines trust as follows: “trust is defined as a willingness to rely on an exchange partner in whom one has confidence”. Ellram (1995) studied the factors that are obstacles to successful partnerships between a buyer and a supplier. Among others, lack of trust is defined as one of the most important obstacles to a fruitful collaboration (Ellram, 1995). Lack of trust also acts a barrier for the implementation of an IT system (Lee and Whang, 2000). In fact, some actors happen to be unwilling to share information with their partners (Ibid). Since the implementation of such a system is of strategic importance and a very expensive matter, a mutual trust on confidentiality and on the future of the partnership is required (Neuman and Christopher, 1996; Sohal, et al., 2001; Agarwal and Shankar, 2003).

Lack of trust and common goal between supplier and producer/manufacturer can lead to failure in SRM integration (Smith and Rupp, 2013). For instance, when the supplier emphasizes on the speed at which the material/component is supplied to the manufacturer while it allows the quality to be damaged, it could lead to the unsuccessful relationship in the case that the manufacturer put quality over the speed of supplying (Ibid). However, Day, et al. (2013) and Ivens, et al. (2013) assert that it is very naive to think that trust by definition can solely have positive impact on the outcome of the
relationship; therefore they suggest that the patterns of the trust as well as the relationship performance should be systematically conceptualized.

### 3.3.8 Lack of communication and common goals

In order to avoid obstacles, to enable successful cooperation and to achieve mutual goals between two partners, communication in a positive atmosphere of discussion, interdependence and shared constructive expectation is necessary (Zineldin, 1998; Larzelere, et al., 1980). In fact, goal congruence between supplier and buyer in the procurement process is necessary to enhance integration (Uyarra and Fanagan, 2010).

The lack of buyer-supplier communication between both partners is an obstacle to buyer-supplier cooperation and then to the integration of the supplier relationship process (Heide and Miner, 1992; Krause and Ellram, 1997; Kalafatis, 2000).

According to Hernández, et al. (2013), the implementation of information and communication technologies is one of the most important obstacles noticed by professionals. The absence of convenient interface may put an end to the relationship ambitions (Hernández, et al., 2014).

The implementation of such interfaces is complex and faces several issues (Hernández, et al., 2014). In fact, common standards need to be found although each type of business process needs specific technologies (Ibid). In this regard, the authors state: “Complexity lies in the need to consider common standards for information and decision exchanges, and for designing and implementing the right information and decision flow among supply chain members to support collaborative processes.” (Hernández, et al., 2014, p.235)

### 3.3.9 Specificities of the IT system

Lee and Whang (2000) bring up another obstacle for integrating the supply chain processes. According to them, disagreements on the implementation and on the specificities of the system (such as the Electronic Data Interchange, EDI) are likely to become issues for the partnership (Lee and Whang, 2000). In this regard, Faisal et al. (2007) assert that the success of supply chains using IT depends on the commitment of partner companies to use information for mutual benefits.
Poor IT infrastructure has been recognized as being an obstacle for supply chain integration (Monczka and Morgan, 1997; Gunasekaran and Ngai, 2004; Jharkharia and Shankar, 2005). According to Jharkharia and Shankar (2005), poor IT infrastructure refers to a driven obstacle which can be caused by either the lack of fund or the lack of commitment from management on the benefits of IT.

Differences in the organization of the supply chain between companies can lead to obstacles when it comes to integrate the supply chain based on IT (Cox, 1999). In fact, it may happen that the implementation of IT changes the structure of the tasks (Faisal, et al., 2007) and the hierarchy (Andraski, 1998; Jharkharia and Shankar, 2005); as a result, internal resistance may arise (Faisal, et al., 2007). This statement is confirmed by Jharkharia and Shankar (2005), who explain that integration with suppliers leads to organizational and IT changes, in terms of culture and work; therefore, personnel may hinder the new changes.

The complex formation of supply chains (independent businesses, distributors and vendors) brings many issues to their integration (Glenn Richey, et al., 2009). Katunzi (2011) claims that the main obstacles to supply chain integration are the lack of consistent IT, the lack of information sharing, the lack of trust, the demand alteration, the discordancy between information systems, the lack of understanding and the integration costs.

3.3.10 Lack of formality

Formality is also an obstacle to supply chain integration (Mohr and Sohi, 1995). In fact, the authors explain that formality leads to distortion and withholding of information (Ibid). In fact, according to the study of Bemelmans, et al. (2012) on the Dutch construction industry, the main factors thwarting an effective buyer-supplier relationship are the lack of formal and acknowledged supplier selection process, the lack of a supply base optimization plan through a supplier rating system, the lack of formal definition of the targeted suppliers categories, the lack of formal, documented and communicated corporate improvement guidelines (targets for reduction of lead times and throughput times), the lack of strategy for the process of value-creation (with the definition of the purchasing role), the lack of formal supplier performance assessment system and the lack of close attitude toward suppliers (visits and audits of
suppliers, assessments, communication of strategy and objectives). The authors add that these lacks enhance the inclination of firms to base their relationships on the short term rather than on the long term (Bemelmans, et al., 2012).

### 3.4 Theoretical model

The following figure 7 shows the development of the thesis after the theoretical part. The elaboration of the theoretical chapter will lead to the carrying out of the empirical chapter.

![Diagram of theoretical model](image)

**Figure 7:** Representation of the thesis development after the theoretical chapter
3.5 Operationalization

According to the above developed operationalization model that comes from the literature review, the integration of the SRM process takes place through the integration of sub-processes of SRM. In this context, the sub-processes are twelve, of which five are strategic and seven are operational.

On the other hand, there are sets of obstacles that are hindering the integration of the SRM process and need to be overcome. These obstacles are the lack of trust, lack of goal congruence, lack of communication and information sharing, anxiety about a possible information system breakdown, the disagreement on the implementation and on the specificities of the system, security issues, lack of fund and high costs, discrepancy in partners’ trading capability, lack of commitment, higher coordination costs leading to a lack of flexibility, corporate inflexibility, slowness to changes and less reactivity to uncertainties, reluctance of managers to share essential information, lack of available tools to assess joint performance, poor IT infrastructure, differences in the organization of the supply chain, internal resistance, lack of consistent IT, demand
alteration, discordancy between information systems, lack of understanding and formality.

It must be noted that the authors of this paper use the SRM sub-processes as a basis for the integration of the SRM process. In other words, the integration of each one of the sub-processes takes place in order to tend towards the integration of the entire SRM process.

3.6 Operationalization and interview questions combined

Figure 9: Representation of the combination of the operationalization of the research and of the interview questions

The above figure 9 combines the operationalization (figure 8) and the interview questions (Cf. appendix). The interview questions include two dimensions of the SRM process. The first dimension refers to the way that the five interviewed companies
integrate the sub-processes of the SRM process with the supplier that has been selected based on the closeness of the relationship. Thus, the interview is carried out on the supplier that has the closest relationship with the manufacturer. The focus of this dimension is about the SRM process integration.

The second dimension reflects the potential obstacles that could occur against the attempt to integrate the process between the manufacturer and the supplier. It is intended to understand the SRM process integration obstacles from the perspective of the manufacturer. The obstacles to the integration of the SRM process are also referring to the supplier that has the closest relationship with the manufacturer.

4. Empirical findings

4.1 Provides the empirical results for Engcon.

4.2 Provides the empirical results for Sandvik.

4.3 Provides the empirical results for Volvo CE.

4.4 Provides the empirical results for Scania.

4.5 Provides the empirical results for Peab.

4.1 Engcon Nordic AB

4.1.1 Background

Engcon AB was established in 1990 (Engcon, 2014). The company is located in Sweden and over 100 employees work in this company (Ibid). Their turnover reached 535 million SEK in 2008, but decreased in 2009 due to the credit crunch (Ibid). The parent company, Engcon Holding AB, takes charge of the general product development, marketing and sales in new markets (Ibid). Engcon Nordic AB is a production subsidiary of Engcon Holding AB and has its head offices situated in Strömsund, Sweden (Engcon Nordic, 2014). Their main business products involve tiltrotators and quick hitch locks (Ibid). Engcon Nordic AB has established the most advanced and modern production equipment in order to make sure that the quality and capacity is the
best (Ibid). In addition, eligible staff and strict testing are required in the process of production (Ibid).

The group’s mother company is Engcon Holding. The organization encompasses 3 production companies namely Engcon Nordic, Mählers (valves) (Drivex has been sold a month ago) and Engcon Poland; as well as several sales companies, namely Engcon Sweden (50 employees), Finland, Germany, France, UK, Denmark, Engcon international (under Engcon Nordic, for smaller markets). Engcon’s biggest market is within the Nordic countries (Finland, Norway, and Denmark). They do not have huge market in some areas (south Denmark).

According to Sjölund (2015), the best to discuss the question is not to talk about the supplier that they have the highest purchasing value with but to focus on the partner with whom they have the closer or most integrated relations. Engcon has 5 key suppliers out of 87 active suppliers (all production companies included). Within these 87 suppliers, some of them are infrequent and about 45 are frequent suppliers. It can also be noted that Engcon uses an Enterprise Resource Planning (ERP) system called pyramid, which is in most cases used within company’s boundaries.

The studied supplier is called Alfta Kvalitetslego AB, which is located in the north of Stockholm and has been working with Engcon since the early 1990s. This supplier produces most of Engcon’s hydraulic components. The supplier also produces the “stomme” (frame), which is a core part of the tiltrotator. The tiltrotator is constituted of a bottom part “quick coupler”, of a frame “stomme” (yellow part-core), of an “upper coupler” (to attach to the machine). Hydraulic blocks are used to control everything. Alfta is producing the stomme and specific kinds of hydraulic blocks with holes inside along with valves on the top to control the rotation. For the product stomme, there is no customization, and the production is standard. Moreover, Engcon is the main customer of Alfta. This supplier also bought another production company to serve Engcon better.

On top of it, Engcon has a welding supplier, paint supplier and a machinery supplier. They use the painting supplier to carry out the delivery. Everything is supplied to this supplier, which afterwards delivers to Engcon, since they are located in the same building. To carry out the transportation, Engcon uses a “milk-run” daily truck that gathers everything that has to be transported. Neither Engcon nor the suppliers own the
trucks for the transportation of the goods. There is also a particularity at the production company Engcon Poland. This entity is also a supplier of Engcon Nordic. In Poland, there is no standard for the upper coupler; as a result, it is different from Germany, France or from the Netherlands. Therefore, they supply the frame to Poland that welds it according to what the supplier wants in Germany or somewhere else. There is only little assembling in Poland. Engcon has implemented a weekly transportation from Poland to Sweden.

### 4.1.2 Summary of Engcon’s empirical findings

<table>
<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Empirical findings in Engcon</th>
</tr>
</thead>
</table>
| **Review corporate, marketing, manufacturing and sourcing strategies** | • The strategy of the company is to have few suppliers with as much integrated processes and long-term relationships as possible and growth with fair quality and cheap prices.  
• They do not switch suppliers when the prices increase; they prefer to develop the products with the suppliers through dialogues.  
• Engcon has made a change from welding the products to casting them.  
• Engcon buys finished products from suppliers and assembles itself.  
• The delivery occurs after Engcon places the purchasing order, and assembles the product. Engcon does not use Just-In-Time (JIT), but a re-order point system.  
• Engcon notifies the supplier of the required lead-time. Engcon’s goal is to minimize the lead-time. They do not use forecasts. Basically they are able to see 2 weeks into the future. Everything that Engcon assembles is sold.  
• There is no market price for most of Engcon’s products. They own the production and the drawings.  
• Engcon chooses both the cheapest supplier and a big organization on which Engcon can rely on. |
| **Identify criteria for segmenting suppliers**                | • Engcon has a supplier base.  
• A criteria part of Engcon’s categorization of the suppliers is that the suppliers must have heavy machinery since Engcon has big products.  
• The suppliers that provide the components necessary for production (can lead to production stops) are considered to be the key ones.  
• Engcon chooses both cheapest supplier and a big organization.  
• Engcon should be able to trust the competence of the supplier.  
• Engcon’s construction department does not have to be an expert in the domain due to suppliers’ technical knowledge. |
| **Provide guidelines for the degree of differentiation in the product and service agreement** | • The purchasing department has close relationships with the production department. The production is the customer of the purchasing department.  
• The production department is responsible for notifying the sales person that the delivery of the product will have delay. |
| **Develop framework of metrics**                             | • Engcon uses the quality, delivery time, gross margin, number of products produced, start and stop of the production, delayed deliveries, purchased orders, inventory terms as for indicators.  
• The quality and delivery time are indicators that are integrated with the supplier. |
| **Develop guidelines for sharing process improvement benefits with suppliers** | • Engcon and the supplier do not agree upon the profits.  
• Engcon keeps all the benefits from the finished product.  
• Engcon has a preferred transportation supplier (fourth party), and the suppliers use their agreement in order to have a good deal. |
<table>
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<tr>
<th>Name of SRM sub-process</th>
<th>Empirical findings in Engcon (continued)</th>
</tr>
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</table>
| Differentiate suppliers | ●Engcon organizes regular meetings with their suppliers.  
●Engcon has 5 key suppliers that are important in terms of the critical need for the supply. All these suppliers provide different products to Engcon.  
●Alfa (a key supplier of Engcon) has larger series machines going 24h a day, whereas other suppliers produce rather handmade or in small series. |
| Prepare the supplier/Segment management team | ●Engcon’s purchasing department includes two managerial employees and one assistant. One buyer is responsible for the strategic purchasing, the other is responsible for the operational part and there is one administrative assistant.  
●Engcon provides coaching with the help of a consultant 4 times a year during the meetings. The purchasing manager meets the supplier more often and talk about the problems in person. The suppliers meet with one another and discuss business related issues during the meeting. |
| Internally review the supplier/Supplier segment | ●Engcon reviews the supplier’s ability to deliver on time.  
●When Engcon sends the purchase order, they agree upon 21 days lead-time. Within 2 days, Engcon receives an order acknowledgement with the date at which the supplier could deliver the product; in other words, the date at which Engcon has the product in their inventory.  
●Engcon has set a time-window. If 5 more days are counted more than what was expected, Engcon will require a discussion with the supplier. |
| Identify opportunities with the supplier/Supplier segment | ●Engcon includes a construction department. If the customers place an order for a product that Engcon has not produced before, their teams will draw a new plan.  
●The internal goals, targets and strategies of Engcon are communicated to the supplier. If the supplier reaches the goal set at 90% for the lead-time, Engcon will try to achieve a further goal of 92%. If a problem persists, representatives of the organization will talk to the supplier and eventually, Engcon will decide to change the supplier.  
●The most important incentive that Engcon can give to their all suppliers is stability. They can agree with a supplier that they will be customers for 3 more years. They also give a promise for a volume at the beginning of the year, to allow the suppliers to buy raw materials.  
●The suppliers are small companies so that the contact persons are the same no matter the functions and their needs.  
●Engcon finds itself in a growth period and they look at bigger companies to supply them. They will have better production capabilities. |
| Develop the product and service agreement and communication plan | ●To reduce the delivery performance for special products in the tiltrotator, the supplier has access to Engcon’s system. They see in their plan when Engcon enters an order.  
●Engcon is looking to develop a new integrated ERP system since the EDI function in their system is old. However, Engcon is facing internally some barriers. For instance, the integration of the processes internally remains difficult since the different entities at Engcon are not working the same way. The processes remain difficult to standardize. Engcon would need 3 to 4 years to streamline the processes.  
●Engcon sees the integration with the supplier mostly as a benefit. They can rely on the supplier if a problem occurs. They can trust the competence of the supplier and their construction department does not have to be an expert in the domain.  
●Engcon is setting goals. They try to achieve the 60% in two months, and then 70% in 4 months, etc. If the setting of goals does not work, Engcon will change the supplier. The supplier cannot continue to feel safe because they are located close to them. The internal goals, targets and strategies of Engcon are communicated to the supplier. |
| Implement the product and service agreement | ●Both partners accommodate each other in order to prevent problems.  
●Engcon and suppliers gather together and discuss over the product design in order to make it technically possible to produce, and at the same time, reduce the cost of production by providing suggestions in order to modify the product design.  
●Engcon sets meetings 4 times a year with all of their 5 key suppliers. There is also a knowledge exchange group occurring through the meetings. All the meetings have a theme.  
●Engcon tries to make their suppliers grow together. In this regard, the entities carry out an exchange of resources. |
| Measure performance and generate supplier cost/ profitability reports | ●Engcon displays the indicators as curves. Two curves of the trend and actual results are shown separately on the chart.  
●The quality and delivery time are indicators integrated with the supplier. For these assessment measures, Engcon has a window all suppliers agree upon and the key suppliers have their own internal indicators.  
●Engcon assesses all supplier performance each week. The reporting is carried out weekly. Monthly, the suppliers get an email with the report and following the reports, Engcon asks for explanation to explain the worst problems during the week.  
●Engcon has a web-based database that they send to the supplier, and that the suppliers need to answer within 10 days, when something does not happen according to plan. They will assess and judge the answer from the supplier. |

Table 3: Summary of Engcon's empirical findings
4.2 Sandvik AB

4.2.1 Background

Sandvik is a global engineering group founded in 1862 and the headquarters are located in Stockholm, Sweden (Sandvik, 2014). Approximately 47,000 employees are working at Sandvik and their invoiced sales are around 89 billion SEK in 2014 (Ibid). Europe is the main area that accounts for 38% share of all markets (Ibid). Sandvik Group is active in five different business areas for R&D, the production and the sales of their respective products: Sandvik mining, Sandvik machining solutions, Sandvik materials technology, Sandvik construction and Sandvik venture (Ibid). Their business concept stands on innovation, technology leadership and close, long-lasting customer relationships (Ibid).

Sandvik is also divided internally into product lines. The organization has a fairly high level of integration with a steel manufacturer that produces a special type of steel. Both actors have a long history together. In addition to being a very closely integrated key supplier, this steel manufacturer has also a high purchasing value, due to the fact that the kind of steel they produce is very specific. This supplier is very flexible and has very good capabilities. Also, the supplier owns the trucks for the transportation of the supply. As Sandvik has a better logistic and distribution network than the supplier, they take care of them. On the other hand, Sandvik tries to push the inventory holding on the supplier’s side.

This steel manufacturer is a Swedish supplier, to which Sandvik had come much closer over the years. The relationship has gone from being only transactional basis to also collaborate on a strategic level over the product development concepts. Sandvik and the supplier develop strategic processes together.

In their relation, Sandvik has more bargaining power than the steel manufacturer. To produce the steel, the manufacturer needs about 8 weeks. Therefore, they need to keep stocks. If Sandvik decides to make the supplier reduce the lead-time, the stocks will increase and keeping stocks will lead to more costs for the supplier to bear.

Sandvik already uses an ERP system. On top of it, they also have an EDI connection with their supplier concerning the orders.
Sandvik gives forecasts to the steel manufacturer so it knows how many goods they have to produce. However, the forecasts are not at an optimal level. Sandvik has storage facilities but they prefer to order JIT to keep very low levels of inventory.

The integration with the supplier does not have any impact on the green production so far. On the other hand, safety is an aspect they are closely working together on; Sandvik integrates safety standards and applies them at the supplier’s location.

4.2.2 Summary of Sandvik’s empirical findings

<table>
<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Empirical findings in Sandvik AB</th>
</tr>
</thead>
</table>
| Review corporate, marketing, manufacturing and sourcing strategies | • The supplier’s production is located close to Sandvik. It makes the supplier even more reliable. In case something happens, Sandvik will be able to react more quickly.  
• Sandvik noticed through a benchmarking that the supplier was not competitive anymore and that they had to do something differently. They found out that the cost base was too high and they led discussions internally to determine where the pricing should be. It is very difficult to make Swedish companies compete only on costs against eastern companies. It has been decided to sort things out on other areas.  
• Sandvik is looking for new sourcing opportunities coming from other countries in order to have more negotiation power with the supplier.  
• With Sandvik works particularly closely on the R&D section with their supplier. Sandvik is especially expecting the suppliers to help them on the technical side. Sandvik totally relies on their steel manufacturer’s capabilities and skills. |
| Identify criteria for segmenting suppliers | • Sandvik considers the production capacity of the supplier in order to assess whether the supplier could produce the volume needed by Sandvik. Sandvik then regards the closeness of the facilities, which is for the company a factor of reliability.  
• The competitiveness of the supplier is assessed according to its pricing and its attractivity against other suppliers, as well as its technical knowledge. |
| Provide guidelines for the degree of differentiation in the product and service agreement | • Sandvik might use the same supplier for several business areas (technology, machining tools, construction and mining).  
• Sandvik is separated internally into product lines, which leads the different internal departments to work closely with each other. To produce this specific kind of steel, the manufacturer needs about 8 weeks.  
• Sandvik gives a lot of freedom to their key suppliers concerning their technical and production skills. |
| Develop framework of metrics | • Sandvik develops a framework of metrics that are bound by the contract they have with the supplier.  
• The most important ones are the on-time delivery that should be at 95%, the product rejection of 9 % and the lead-time of 5 days. |
<p>| Develop guidelines for sharing process improvement benefits with suppliers | • Sandvik does not develop any formal agreement concerning the payment and the sharing of the benefits. |</p>
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<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Operational sub-processes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Differentiate suppliers</td>
<td>• Sandvik segments its suppliers according to the criteria developed at the strategic stage and categorize the suppliers regarding the strategic importance of the supply and its complexity to produce.</td>
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</tbody>
</table>
|                         | • Sandvik has implemented a Supplier Account Management (SAM) structure in order to regulate the relationship. The key account manager is responsible for the communication and the coordination. If the cost targets cannot be achieved directly throughout the product development activities, the key account manager has the task to look upon the supplier’s processes to see what can be improved, copied and implemented.  
• The task of the key account manager is to gather the right people to discuss the issues. They implement a cross-functional team that aims to improve the product, through product development activities, and the cost. In some cases, the only goal of the cross functional team is only to reduce the costs. The cross-functional teams are formed of 2 or 3 employees from the R&D as well as an R&D manager from both sides, a product line manager, an employee for the quality, an employee for the production, and an employee for the sourcing. There are about 16 persons to attend to these meetings. The bigger team is divided into smaller teams to work in a more efficient way. |
| Prepare the supplier/Segment management team | • The supplier had an experience of not reaching the targets set by Sandvik in the past. They used other suppliers to recover from the issue. Since the supplier managed to correct the inefficiency, Sandvik makes sure that the supplier has a back-up solution in case of issues. On top of this, Sandvik has its own internal back-up.  
• Sandvik analyzes internally the criticality and the technicality of the supply and the supplier to establish the section of the supplier. |
| Internally review the supplier/Supplier segment | • Sandvik analyzes internally the criticality and the technicality of the supply and the supplier to establish the section of the supplier. |
| Identify opportunities with the supplier/Supplier segment | • Sandvik disposes since a couple of years of dual sourcing for every product that they buy from the suppliers, the suppliers have lost a lot of volume, and they want to keep Sandvik as a customer to get rid of their remaining volumes, this is an incentive for the supplier to integrate more with Sandvik.  
• For the performance measurement, Sandvik uses Excel spreadsheets instead of an ERP system. However, they are currently working on implementing an integrated ERP system that will encompass the performance measurement.  
• Sandvik wishes to develop more areas to work closely together with the supplier on, such as different processes, logistic solutions etc. |
| Develop the product and service agreement and communication plan | • Sandvik sets each year targets, such as reducing the cost by 5 % along with the suppliers. This goal is communicated to the suppliers and its implementation is followed up during the meetings. |
| Implement the product and service agreement | • The key account manager of Sandvik plans regular meetings with the supplier, about once a week, and is the one that constantly has a look at the contract.  
• Sandvik organizes meetings with their strategic suppliers once a year to discuss the price and whether it’s possible to reduce it.  
• Sandvik and its supplier have together a full insight into each other’s operational processes. In this regard, technical employees come to their facilities to look at their processes. |
| Measure performance and generate supplier cost/ profitability reports | • Sandvik carries out a reporting and transfers it to the supplier once a month. In case the reporting shows necessary correction, Sandvik reacts after a quarter (3 months) and talks to the supplier to fix the problem. For the reaction to deviations, there is a need for prioritizing the corrections. In fact, in case 3 suppliers are below 60% on the on-time delivery, the priority is on them rather than on the one at 90%.  
• Sandvik integrates their metrics with their supplier for the last couple of years. They dispose of a certain “supplier scorecard” to know exactly the performance of the supplier. Internally, the supplier might have also other metrics. |

Table 4: Summary of Sandvik’s empirical findings
4.3 Volvo Construction Equipment AB

4.3.1 Background

The Volvo group is at the leading organization within global manufacturers of trucks, buses, construction equipment, marine and industrial engines and solutions for both financing and services (Volvo group, 2015). Globally, there are about 100,000 employees working at Volvo (Ibid). Volvo Construction Equipment (Volvo CE) is a subsidiary of the Volvo Group (Ibid). Its headquarters are located in Eskilstuna, Sweden (Ibid). The number of Volvo CE’s employees accounts around 15,000 (Volvo construction equipment corporate presentation, 2015). Volvo construction equipment’s business area involves a series of wheel loaders, hydraulic excavators, articulated haulers, motor graders, soil and asphalt compactors, pavers, backhoe loaders, skid steers and milling machines (Ibid). Volvo Construction Equipment received three certifications for quality, environmental protection, health and safety (Volvo construction equipment quality, environmental care & safety, 2011).

The company does not really have one integrated supplier. However, Nilsson (2015) asserts that Volvo CE has close contact with the suppliers. The interviewee explains that the suppliers in the vehicle business are usually large companies. Volvo CE has a supplier base, and they evaluate the suppliers accordingly. This assessment is used and is visible by all Volvo companies.

Some years ago, there was a more demanding role from the customer, and a more following role from the supplier side. The customer still has the bargaining power. Nowadays, a more collaborative relationship is needed to be beneficial. A good relationship between the customer and the supplier is always better. In some cases, the supplier is much bigger than the customer. In this case, it is the opposite, Volvo CE is depending on them, and they do not need them.

Volvo and its suppliers share a deep relationship but they do not develop integrated processes together. They rather develop parts of their products together. For this purpose, Volvo is helping the suppliers with the system called Volvo Production system (VPS). The VPS process is used at the supplier’s location. The supplier development
(SD) is part of the purchasing organization. Volvo CE in Braås produces 1300 machines a year, which is a quite low volume.

Volvo CE has a complex purchasing and organizational structure. They have a global director, sub-regional director for Europe, Asia and America. However, they are not based on site needs. The purchasing department in Braås is not supplying all parts of the production. The organization is commodity organized. The department is buying some commodities: plastics, castings, welded and machined parts for this plant and 7 more. They have 4 plants for CE.

When they adapt the engine for their products, they design parts to be fitted on the engine as well as the gear box. They have the responsibility to source these parts as well for 8 plants. In Braås, Volvo CE produces articulated haulers, wheel loader, excavators and transmission components.

In Braås, they assemble the complete products. They are also in contact with the suppliers of raw material. They have a welding plant in Braås where they weld the front frames, the rear frames, and the hitches among others. They buy for this the raw materials as sheet plates. The commodities bought in Braås are not scarce.

When they receive an order from the customer and they accept it, it’s planned into the production. It broken down in the production plant into parts and pieces needed for the machine in the ERP system. The system automatically sends out delivery schedules to the supplier. They are not really buying parts day to day here. The system generates for the whole plant.

Volvo owns SDLG, which is a Chinese supplier they have been cooperating with. Volvo is manufacturing machines there under their brand, sold there as such. They are not Volvo machines because they serve different customer segments. Moreover, Volvo bought Terex for the rigid haulers. They have rigid haulers up to 200 ton load capacity. They did not want to develop these themselves. They have not performed very well in the last years. Swecon is the local dealer partly owned by Volvo.

They do not have any storage facility in Braås, but the Volvo uses the backyard of the plant in Braås to stock finished products. The machines to see are customer machines; they are trying to build a stock now of 40 to 50 machines. Some are stocked outside at the dealer’s.
### 4.3.2. Summary of Volvo CE’s empirical findings

<table>
<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Empirical finds in Volvo Construction Equipment AB (Volvo CE)</th>
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</table>
| Review corporate, marketing, manufacturing and sourcing strategies | - Volvo CE has different ways of working with the suppliers depending on the parts they are sourcing.  
  - The strategy of Volvo is not to switch the supplier after 2 months. The aim is to develop close relations with the suppliers that offer the highest value products. The longest lead time is probably new engines, transmissions; new tyres are very long to develop (1 year).  
  - Volvo CE evaluates the supplier through Supplier evaluation model (SEM) during 2 or 3 days go through production, organization, finances, etc. and give them a rating. Different stop parameters are described in their ethical chart such as forbidden chemicals, child labor. The supplier is then integrated into their supplier base, and can be seen by all Volvo companies throughout the world.  
  - Volvo CE is producing the drawings, developing the parts that they are going to source from their suppliers.  
  - Volvo CE has divided all parts into different commodities and divided the purchasing of the commodities into different purchasing offices.  
  - Volvo CE has one buyer in each area, for the same commodity they could be heavy components, like a part that can be fitted on the frame.  
  - Volvo CE has single sources. They also have cases with dual sourcing, when they know that it takes time to have/ move the parts.  
  - Volvo CE is looking to increase their gross margin.  
  - Volvo CE is a price leading company in the market, and they set a standard price for the market. They need to reduce costs in the purchasing and in the production.  |
| Identify criteria for segmenting suppliers                 | - Volvo CE has a big supplier base. The basic requirements on the suppliers are that they should have standards (ISO 9000, 14000, etc.), the delivery performance should be at 98% and the quality 280 parts per million (PPM). They are also looking at how many suppliers are supplying one part number as they look to segment their suppliers.  
  - Volvo CE needs to be seen as the first priority for the suppliers. In case there is capacity issue, Volvo CE wants to be the priority.  |
| Provide guidelines for the degree of differentiation in the product and service agreement | - Volvo CE has a framework agreement with Volvo’s general purchasing conditions, which is signed with the key and standard suppliers. Volvo CE also has very long term suppliers, with which it’s difficult to force such an agreement into the relation since they have been working for a very long time together.  
  - Volvo CE has a Quality, Delivery, Cost (QDC) contract through which they formalize the quality demands, deliveries and the cost. They work on a 2 or 3 year basis with them.  
  - Regarding the fluctuation in the demand, there is an agreement regarding how quick Volvo CE can change the delivery schedules. The suppliers have to be able within 3 months to increase 30% of the volume. Volvo CE does not promise to buy volumes from their suppliers.  |
| Develop framework of metrics                              | - Volvo CE has a supplier scorecard (performance measurement tool) for all their suppliers. It evaluates the suppliers through this tool monthly, and the suppliers get a measurement.  
  - The metrics used are the delivery performance, the inventory turnover (ITO), the price reduction and the non-conforming inspection reports.  
  - Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them.  |
| Develop guidelines for sharing process improvement benefits with suppliers | - The suppliers can suggest improvement on the parts they develop rather than on the production plant as Volvo CE is doing with their hydraulic supplier.  
  - Volvo CE uses penalties as incentives if the suppliers do not perform as agreed. When they have workshops together on certain occasions, they share the cost improvements together. It profits to the suppliers if they make 3% cost reduction, Volvo CE allows them to keep it.  |
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<tr>
<th>Name of SRM sub-process</th>
<th>Empirical finds in Volvo Construction Equipment AB (Volvo CE) (continued)</th>
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<tbody>
<tr>
<td><strong>Operational sub-processes</strong></td>
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</table>
| Differentiate suppliers | • Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them.  
• Volvo CE evaluates the supplier through a tool called SEM, when a supplier is picked. |
| Prepare the supplier/Segment management team | • The cooperation for the new product development is carried out through cross-functional teams.  
• Both partners have meetings together, with the buyers, design engineers, supply developers together with the sales persons. These meetings happen weekly or biweekly. |
| Internally review the supplier/Supplier segment | • Volvo CE has a supplier base and they once had about 2800 suppliers. Since 2009, they want to reduce the supplier base.  
• Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them. |
| Identify opportunities with the supplier/Supplier segment | • Volvo CE implements an earlier supplier involvement (ESI), which leads to a deeper relationship with supplier.  
• Volvo is helping the suppliers with the system called VPS. The VPS process is used at the supplier’s location. The SD is part of the purchasing organization.  
• Volvo CE use the VPS system as Volvo CE employees can come at the supplier’s site to develop the production in order to be more cost efficient.  
• If Volvo CE sends a request for quotation (RFQ) to the supplier and say this is how they designed it, they expect the supplier to send back a review of technical specification (RTS) where they agree upon the design, and that they give feedback with suggestions on how it would be easier for the supplier to produce it more cost efficiently.  
• Volvo CE helps other suppliers to buy steel on the same agreement that they have. |
| Develop the product and service agreement and communication plan | • Volvo CE has a framework agreement with Volvo’s general purchasing conditions, which is signed with the key and standard suppliers.  
• One of the hardest parts in the day-to-day work is to carry out efficient and enough communication. There are internal and external issues for communication. It is easier to communicate with a person that they have a good relationship with. Volvo CE prefers to use the telephone rather than a common database.  
• Volvo CE should have a fully integrated EDI with delivery schedules, deliveries, and invoices. They should be able to receive messages from Volvo CE and be able to send messages into their system. They use automotive industry standards. If they do not have that, they should be able to use the web EDI, when they are not integrated. They can log in in their portal and get the information into another form. |
| Implement the product and service agreement | • Volvo CE is not taking the full process to implement it at the supplier’s location. Instead, they try to use parts of it when it’s necessary and transform it into a kind of VPS.  
• There is a frozen period of time of ten days, in which Volvo CE freeze the orders, with the volume and time. They have 60 days when they take the responsibility.  
• Volvo CE has a 10 to 12 months forecast in which they predict and plan. The forecast is transparent for the suppliers; they get a delivery schedule showing at least 12 months ahead (which is not for sure).  
• They have news about the market, in order to know if the market is stable or still uncertain. In this regard, if the forecast changes, the suppliers are prepared.  
• Volvo CE does not have big stocks since 2008. However, the suppliers have the same agreement.  
• Volvo wants the suppliers to be cost efficient, so that they need to move parts away from them. It is easy for Volvo to say that the supplier and Volvo CE have an agreement. But Volvo CE needs to understand what the supplier aims at. Then Volvo CE might find cost savings by moving the parts away. |
| Measure performance and generate supplier cost/ profitability reports | • Volvo CE implements the metrics of the supplier scorecard and give the suppliers a score over the product development, through which they assess how well the suppliers perform in new product development; over the environment and quality and over the delivery performance.  
• All suppliers receive this evaluation automatically every month; nothing needs to be executed manually. Systems, Applications & Products (SAP) sends the report out and the suppliers can receive it through the supplier portal made by Volvo AB. |

Table 5: Summary of Volvo CE’s empirical findings

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4.4 Scania CV AB

4.4.1 Background

Scania is a Swedish leading manufacturer founded in 1891 (Scania, 2014). The headquarters of the organization are situated in Södertälje, Sweden and there are more than 42,000 employees all over the world working at Scania (Ibid). In 2014, their sales reached 92,051 million SEK (Ibid). Scania’s main products are heavy trucks and buses (Ibid). Moreover, industrial and marine engines are also being manufactured at Scania (Ibid). The objective of Scania is to provide the products and services with the best quality for its customers during the life cycle of their products, such as optimized heavy trucks and buses, engines and delivering services (Ibid).

Scania has direct contact with their suppliers on a daily basis. Each material planner has on average around 40 suppliers. It means that the material planners have quite close relations with the different suppliers.

Scania has a classical internal ERP system. With the suppliers, the IT communication is carried out through EDI.

The supplier does not receive the order instantly after Scania receives order from its customers. Their order to delivery cycle is of roughly 20 days. They have a booking system in which the customer gives the order in, with the specification. they check in their production plan when they can fit this order in. the customers say we want to have the product at this day but Scania may say no we have already booked an order for this day but they can do it for instance in 1 week after that day, if the customer accepts, Scania confirms the booking that the customer will receive the delivery on that agreed day. After the confirmation of the order, Scania freezes the order batch. They say that they need these wheels according to the assembling sequence based on these specifications. From this point, they have a frozen point that they know what they should exactly produce and when. Up to this point they had only forecast.

Scania also uses a JIT system and they do not store the components in a storage facility.
The products that the studied supplier provides are tyres for all vehicles (construction trucks, busses, etc.). Although depending on the vehicle, the tyre is produced in their different production plants.

### 4.4.2 Summary of Scania’s empirical findings

<table>
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<tr>
<th>Name of SRM sub-process</th>
<th>Empirical finds in Scania CV AB</th>
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<tr>
<td><strong>Strategic sub-processes</strong></td>
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</table>
| Review corporate, marketing, manufacturing and sourcing strategies | ● Scania has dual sourcing within segments of production. So it is possible within weeks or months to move from one supplier to another and to get the production running within the specific lead-time, but that is something that the logistic function at Scania cannot manage in the short term.  
● For the production plant, the vision is made toward a short-term planning, so it does not matter that much if they can switch to another supplier in a couple of months. For Scania it is important that the stoppage of receiving certain supplies does not stop the production.  
● Scania is always trying to solve the situation rather than to switch the supplier. They have also deep relationship with the supplier that they have already long term relationship with.  
● Scania made a strategic change about the sourcing strategy several years ago. They had one supplier that they were heavily depending on. Scania wanted to decrease the dependency on this supplier and also wanted to have closer relationship with the second tier of suppliers, suppliers of tyres and wheels. Scania has contract with several suppliers for steel and aluminum wheel as well as for rubber tyres. One company is assembling these tyres and wheels together and delivers the product sequence to them. Scania had half a year to switch to the new supplier if they stop the relationship with the old supplier. The new one had to prepare for a much higher supplying capacity than initially expected and they bought from them. The old assembling company was receiving the component from the second tire of suppliers, assembly it, and send it to Scania. They had commercial relationship with this second tier of suppliers. But the assembling company had a very confidential information flow with the second tier of suppliers that was preventing Scania to have information transparency.  
● Scania wants to have an integrated information system with the second tier of suppliers, as this will take away the confusion over the responsibilities between them when it comes to logistic problems related to these companies.  
● Scania had misled the IT structure. It took around one year and a half to make it right. |
| Identify criteria for segmenting suppliers | ● The size of the supplier is important for the supplier relationship of the production plant. The turnover can be also interesting but more for purchasing rather than for the logistic department.  
● For the logistics, it is still the product that is important, Scania has the product or they do not, they produce or they cannot produce, that is most important for them.  
● The level of complexity of the supplier relation is important, which can be translated in the worst case as the number of deviations.  
● For the supplier that has more deviation in the flow, there is the need to establish a good relation. For the suppliers with the fewer deviations, Scania has a supply chain set up that makes it go forward so they do not need any closer relation.  
● Both the old and the new supplier have different processes in supplying this product. Before agreeing upon the cost, quality, and lead-time, Scania should understand how they work based on the agreement upon cost, quality, and lead-time. |
| Provide guidelines for the degree of differentiation in the product and service agreement | ● Both sides should be satisfied when the agreement is made. Scania cannot state anything to the suppliers except a few things such as the quality level, the logistic set up, and specifications.  
● If Scania has a lot of requirements, the price of the supply will be higher so they cannot have too much of them. |
| Develop framework of metrics | ● The delivery performance is the most important metric for Scania.  
● The lead-time is fixed and is agreed with the supplier only at the implementation phase. Scania has with relative suppliers an agreement of 13 days lead-time for delivering the supplies. 6 days from the second tier to the first tier of supplier, and 6 or 7 days from first tier (assembling company) to Scania. |
| Develop guidelines for sharing process improvement benefits with suppliers | ● Scania provides technical and knowledge support for the assembling company, and the second tier of suppliers.  
● Scania told that the assembling company should only work with the second tier of suppliers when it comes to their supplying product. |
Differentiate suppliers

- Scania addresses deviations and solve problems. But there is no room to have a deep relation with these standard suppliers.
- The suppliers that have strategic components are more critical, especially those whose performance deviation is more directly influential for production.
- Whether the supplier is unique or not might not affect the logistics department that much.
- For the purchasing department, the relation becomes more crucial if the supplier is unique: it makes a big difference. On the strategic level, the suppliers are very important for Scania.

Prepare the supplier/Segment management team

- Scania has succeeded in carrying out the supplier changes. They made most changes in the information flow. In the new structure, one material planning for each production flow handles the flows.
- There is one person for each production unit who takes care of the coordination of the first and second tier of suppliers. Each deviation that happens in the suppliers’ performance will be reported to him and he reports to Scania.
- With this supplier, Scania does not have any cross-functional team in the design phase, because the product is standard.
- There is one area that they improved a lot, which is the level of coordination that has been enhanced after they used a Scania employee for coordination process.
- The coordinator and the supplier meet physically couple of time a year and have contacts on a weekly basis.

Internally review the supplier/Supplier segment

- Scania has contracts with several suppliers for steel and aluminum wheel as well as for rubber tyres. One company is assembling these tyres and wheels together and delivers the product sequence to them.
- The old assembling company was receiving the component from the second tire of suppliers, assembly it, and send it to Scania. They had commercial relationship with the second tier of suppliers. But the assembling company had a very confidential information flow with the second tier of suppliers that was preventing Scania to have information transparency. Scania had to listen to the assembling company to know if the second tier of suppliers works correctly or not.
- Scania wants to have an integrated information system with the second tier of suppliers; this will take away the confusion over the responsibilities between them when it comes to logistic problems related to these companies.

Identify opportunities with the supplier/Supplier segment

- Scania connected the second tier of suppliers to the older supplier from the beginning so they do not get replaced.
- Scania had relationship with the second tier of supplier but they also wanted informational relationship since they did not have it since beginning.

Develop the product and service agreement and communication plan

- Scania has contract with several suppliers for steel and aluminum wheel as well as for rubber tyres.
- Scania has with relative suppliers an agreement of 13 days lead-time for delivering the supplies. So they know exactly what and when they should produce the supply.
- Scania is responsible for the logistic transportation from the second tier of suppliers to the first and from the first to Scania, but it is only in this case. In other cases, they are only responsible for logistic transportation from first tier of supplier to us.
- Scania wants to have an integrated information system with the second tier of suppliers; this will take away the confusion over the responsibilities between them when it comes to logistic problems related to these companies.
- Scania has a classical internal ERP system. With the suppliers, the IT communication is carried out through EDI.

Implement the product and service agreement

- Scania developed a very strong logistic integration with the new set up. The coordinator from Scania has regular meetings with both the second and first tier of suppliers to follow up the performance and to fix problems.

Measure performance and generate supplier cost/ profitability reports

- One employee from Scania for each production unit takes care of the coordination of the first and second tier of suppliers. Each deviation that happens in the suppliers’ performance will be reported to him and he reports to Scania.
- The first and second tiers of suppliers are responsible for their own coordination, not Scania. Scania sends them the forecast beforehand; they start the actual production after Scania makes an order to them. If any of them has deviation in performance, the other supplier reports to the coordinator.

Table 6: Summary of Scania’s empirical findings
4.5 Peab Bildrift AB

4.5.1 Background

Peab is a Nordic construction and civil engineering company, which was founded in 1959 (Peab, 2014). The headquarters of the company are situated in Förslöv, Sweden (Ibid). Besides being present in the Swedish market, subsidiaries are also set up in Norway and Finland (Ibid). Nowadays there are more than 13,000 employees working at Peab and their net sales are over 43 billion SEK in 2014 (Peab sustainability report, 2014). Peab has four business areas, namely project development, industry, civil engineering and construction (Ibid). According to the operative net sales by business area, the construction and civil engineering areas account for respectively 46% and 22% of all business areas (Ibid). Furthermore, the Swedish market occupies about 82% of the market based on operative net sales by geographical markets (Ibid). Peab’s business idea is to take quality in the first position at each step of the construction process (Ibid).

The business area Construction equipment at Peab is responsible for the purchasing of the basic goods. There are also many extras to the specific requirement needed for the operations of the company. Peab buys the product in total, and they do not assemble it. The construction equipment industry is a highly specified industry in which everything has to be detailed.

Peab’s customers are their own internal companies; they have about 90 different companies part of the group. Peab does not go out on the common market to sell machines to anyone, but they supply their own group. The production unit produces for both Peab and for external customers.

The order making follows an internal process. The order should appear in the budget first, and should be approved before making a reservation in the production. The different companies usually do not resell on the market, only the ones they have been used or are needed to be exchanged.

Usually, Peab buys all units at once. Therefore there is no deviation in the purchases from the forecasts. In 2008, the supplier handled very well the fluctuation in the demand due to the economic crisis.
### 4.5.2 Summary of Peab’s empirical findings

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<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Empirical finds in Peab Bildrift AB</th>
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<tr>
<td><strong>Strategic sub-processes</strong></td>
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<tr>
<td>Review corporate, marketing, manufacturing and sourcing strategies</td>
<td>• The first step for the selection of the supplier is to look at the demand that the organization has. The process starts well ahead of the equipment being delivered. It starts in autumn for April the year after. From this process, Peab gets a number of suppliers.</td>
</tr>
<tr>
<td>Identify criteria for segmenting suppliers</td>
<td>• The criteria used for the first selection and categorization of the suppliers are the credit line, the financial requirements, machinery requirements from the supplier to produce the goods, the suppliers have to be registered, whether they can achieve the total running time they need, whether the machinery is approved on the market, the service net should fulfill Peab’s requirements, whether the cost of production of the supplier matches Peab’s requirements. The selection is narrowed down during the second selection. • For the spare parts, the cost of the product, the lead-time to have the delivery of the spare part done and the lead time for the service (crucial for them) are evaluated. • The cost of the machinery and also the cost for running the machinery (repairs, guarantee) are important.</td>
</tr>
<tr>
<td>Provide guidelines for the degree of differentiation in the product and service agreement</td>
<td>• The good is ordered JIT. The ordering is regulated by the frame agreement. The ordering of the spare parts is regulated through the producer of the machines. • Peab has a yearly price agreement based on the expected number of units that they intend to take out. So the price is fixed. They are still constantly looking at the agreement on the costs of repair to allow costs improvements.</td>
</tr>
<tr>
<td>Develop framework of metrics</td>
<td>• The lead-time is a crucial indicator: If the good is not in time, the supplier provides Peab with spare machinery to run the operations. • The cost is also important: the cost of all spare parts (the price is indicated as soon as they follow the supplier), the cost of repairs and other unexpected repairs.</td>
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<tr>
<td>Develop guidelines for sharing process improvement benefits with suppliers</td>
<td>• The achievement of integration is personal relations and commitment from both sides. • For Peab, integration in bound by contract and is carried out through frequent meetings.</td>
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<td><strong>Operational sub-processes</strong></td>
<td></td>
</tr>
<tr>
<td>Differentiate suppliers</td>
<td>• To establish the categorization between key supplier and standards suppliers, the following criteria are used: cost of the machinery, expertise of the supplier, previous conducting on the market, supplier’s service net, lead-time for service and repairs, R&amp;D, fuel consumption and total cost of ownership.</td>
</tr>
<tr>
<td>Prepare the supplier/Segment management team</td>
<td>• The meetings involve around 5 to 6 persons, from which at least one person is from the operations. These meetings are happening every second months (sometimes every third month).</td>
</tr>
<tr>
<td>Internally review the supplier/Supplier segment</td>
<td>• Volvo construction equipment is a key supplier for Peab. They provide Peab with full machinery but there are lots of extras to add. • Peab maintains a close relation with Volvo CE. The relationship that Peab has with Volvo CE is a very long time relationship that exists through commitment/openness from both parties. The commitment of the actors can be shown through regular/frequent meetings. Their relationship is as transparent as open books. Even though they do not look over each other processes very closely with Volvo CE, if certain issues occur, the partners reserve themselves the possibility of suggesting potential improvement solutions. Peab’s agreement with Volvo involves together the management of Volvo CE and of Volvo trucks. The management of both partners is highly committed.</td>
</tr>
<tr>
<td>Identify opportunities with the supplier/Supplier segment</td>
<td>• Peab and its key supplier can make use of common resources. • Peab maintains a close connection with the steel manufacturer SSAB that they connect with their supplier to gain in costs (steel supplier with the producer of the machinery).</td>
</tr>
<tr>
<td>Develop the product and service agreement and communication plan</td>
<td>• Peab also has very good relations with SSAB (steel manufacturer). Even though Peab is not as far into their production process as with different suppliers, their integration is carried out through constant meetings with them, an exchange of feedback: when it comes to new material. There is only little transfer of knowledge, because this supplier has a deep knowledge of their production. • Peab only requires that the supplier is able to produce the products together with them and that they listen to their input carefully. • Peab organizes meetings on a regular basis with all of their suppliers.</td>
</tr>
<tr>
<td>Implement the product and service agreement</td>
<td>• Peab has a supplier key account management, which is formalized in the frame agreement that is carried out through the meetings. • Peab has frame agreements for all suppliers. Peab needs to secure the supply in these cases and ensure that they have the desired machine.</td>
</tr>
<tr>
<td>Measure performance and generate supplier cost/profitability reports</td>
<td>• Peab carries out the follow up of the assessment during meetings. • Peab does not use any standard form to send out to the supplier about the assessment. They have no report for the performance. • The performance is a topic discussed during the meetings, and everything is documented during these meetings.</td>
</tr>
</tbody>
</table>

Table 7: Summary of Peab's empirical findings

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5. Cross-case analysis

5.1 Provides the cross-case analysis for the strategic sub-processes.

5.2 Provides the cross-case analysis for the operational sub-processes.

5.3 Summarizes the findings of the cross-case analysis.

5.4 Shows the figure representing the development of the thesis after the analysis.

5.1 Strategic sub-processes

5.1.1 Review corporate, marketing, manufacturing and sourcing strategies

According to the theoretical findings, the manufacturing company reviews in the first sub-process its corporate, marketing and sourcing strategies in order to set up optimized strategies that provide them with an opportunity in order for them to succeed in the market (Lambert and Schwieterman, 2012). In addition to this, Holmen et al. (2013) and Ivens et al. (2013) claim that the manufacturing company should develop a clear picture of its business network (including its suppliers) in order to set better strategies for a better performance.

Lambert and Schwieterman (2012) also state that the firm’s management should identify the key suppliers. According to Choy, et al. (2003), selecting the most appropriate suppliers and develop long-term relationships with them is crucial for the company in order to allow the company to produce sufficiently with a good quality.

The combination of these statements can be interpreted in the way that the manufacturing company should have clear information about its network for a better evaluation that will lead to the setting of its own corporate, marketing and sourcing strategies. For this purpose, there should be a clear and accurate mechanism of information exchange between the manufacturer and the potential suppliers. Based on this interpretation, the manufacturing company should integrate with those potential suppliers in order to convince them to share their internal business data with the
manufacturer. In order to achieve this target, the manufacturer should offer incentives to motivate the supplier to integrate and share the business related information.

Following this theoretical analysis, the empirical findings of Engcon show that the first priority of the organization is to be able to receive the products on time from the suppliers (refers to the lead-time). After this first priority, the quality and prices of the supplier’s product are also considered to be vital for Engcon. It is important for Engcon to have the supply at the right quality with a fair cost and at the correct lead-time.

The empirical findings of Sandvik show that the company focuses primarily on improving the quality and cost performance. To enable the best performance, the findings gathered on Sandvik show that the organization needs a close integration with its key suppliers.

Moreover, the empirical findings of Volvo emphasize that the organization aims at being the first priority of its suppliers, so that in difficult times the organization remains supplied on time and with the same delivery quality. Volvo’s strategy is to increase their gross margin, which means that the organization prioritizes the purchasing and production cost reduction.

The empirical findings of Scania demonstrate that the organization regards the conveying of the supplies from the suppliers within the specific lead-time and without deviation in terms of quality, as one of the top priorities.

The empirical results from Peab show that the company defines that for the spare parts, the cost of the product, the lead-time to be delivered and the lead time for the service are crucial aspects which are part of the corporate and sourcing strategy. In addition to this, the cost of the machinery as well as the cost for running the machinery (including the repairs and the guarantee) is significant.

The review of the corporate, production and sourcing strategies of Engcon, Sandvik, Volvo CE and Scania show that having the cost and being delivered on time are common strategies to all studied companies. However, Peab was the only case in which the quality performance has not been expressed as an upper priority.

From the review of the empirical findings as well as from the theory, the authors of this thesis can analyze that, in order to achieve the cost, quality and the delivery targets,
Engcon, Sandvik, Volvo CE and Scania should know in advance the production capability of the potential suppliers to be able to select among them. This achievement can be met through having correct information about the suppliers’ production capability in terms of capacity, quality, cost of product, flexibility and speed of production. To have correct information about the supplier’s capability, the companies could provide incentives for the supplier to motivate them to share their detailed information accurately. For instance, they can offer an agreement of 3 years to the potential supplier in case they share their business-related information thoroughly and that they are qualified to supply them.

Nevertheless, there is a potential obstacle arising from an attractive long-term relationship offer. It might tempt the suppliers to embellish the information related to their capabilities in order to get qualified to work with the respective manufacturers. In order to overcome this potential obstacle, the studied companies should give particular attention for any deviation on the performance from the contract agreement terms by adding a clause into the contract that refers to this situation.

Moreover, the empirical findings demonstrate that Engcon, Sandvik, Peab and Scania all use a dual sourcing strategy to receive the supplies although this strategy is not prioritized by all the studied companies. Whereas Peab, Engcon and Sandvik strive to create and to keep a dual sourcing for every part they source instead of a single sourcing strategy, Volvo CE uses usually single sources. They prefer not to have many suppliers supplying one part number in order to keep the number of suppliers as low as possible. At Volvo CE, cases of dual sourcing are rare and occur in the case the product is long/difficult to manufacture or to deliver. For instance, Volvo has one single supplier for engine and transmission parts due to the level of technicality of the product. As for Scania, the company carries out dual sourcing for a few specific supplies, most generally within segments of production. Scania decided to change its sourcing strategy for its supply of wheel by setting up a dual sourcing to diminish its dependency on the wheel assembly.

From these findings, it can be interpreted that in order to set a dual sourcing strategy, the companies should integrate with their respective suppliers by having access to the suppliers’ production capacities, to the suppliers’ technical skills (in order to be able to manufacture the same product) and to the suppliers’ transportation facilities if available.
However, there is the potential obstacle that, after having signed an agreement with two different suppliers for one supply or part, a recurring deviation from one supplier occurs in the on-time delivery leading to the part being delivered late. To remediate to this potential obstacle, the suppliers should not be at their limit of capacity, in order for the manufacturers to move a part of the planned production to the other source. The possible increase or decrease of the suppliers’ production compared to the forecast should be included in the agreement. The example of Volvo can be taken, as it requires from its single source suppliers to be able within 3 months to increase 30% of their volume.

5.1.2 Identify criteria for segmenting suppliers

It can be noted that the second strategic sub-process includes two parts. According to the literature, the first part refers to the identification of the criteria for categorizing the suppliers into key suppliers and standard suppliers (Croxton, et al., 2001). For this purpose, certain characteristics of the supplier’s capability such as profitability, growth and stability, criticality, sophistication of the supplier’s process implementation and service level of the suppliers should be evaluated (Croxton, et al., 2001; Lambert and Schwieterman, 2012). The second part of the second strategic sub-process refers to the design of the PSA that is meeting the needs of both the supplier and the manufacturer (Lambert and Schwieterman, 2012).

On the other hand, according to the empirical findings from Engcon; it can be seen that Engcon categorizes its suppliers based on the critical and strategic need of the components. This means that the suppliers that provide the strategic components that are highly necessary for the production of Engcon are categorized as key suppliers. This part of Engcon’s SRM process refers to the first part of the second strategic sub-process that has been mentioned in the previous paragraph.

Moreover, empirical studies about Sandvik shows that the suppliers' production capacity, the production plant closeness of the supplier to the one of Sandvik, the supply price, and the suppliers’ technical knowledge are criteria that are used by Sandvik in order to categorize the suppliers into the standard and key ones.

For Scania, the number of supply deliveries, the suppliers' turnover, the suppliers’ deviation (the more deviated the suppliers are, the higher the need for a closer...
relationship), the commercial value of the supplier for the purchasing department and the cost of the supply (the tyres and wheels are very important and quite expensive components) are important criteria for the suppliers’ segmentation. Scania should also understand how suppliers work, based on the agreement upon cost, quality and lead-time.

For Peab, the criteria used for the selection and categorization of the suppliers are the credit line, the financial requirements (the reports must look respectable), the machinery requirements from the supplier to produce the goods, the registration of the suppliers, the ability to achieve the total running time Peab needs, the approval of the machinery on the market, the fulfillment of the supplier’s service net regarding Peab’s requirements, the match of the supplier’s cost of production regarding Peab’s requirements. For the spare parts, the cost of the product, the lead-time to have the delivery of the spare part done and the lead time for the service (crucial for them) are evaluated. It can also be noted that the cost of the machinery and also the cost for running the machinery (repairs, guarantee) are important. These are criteria that Peab uses for segmenting their suppliers.

The criteria for the suppliers’ segmentation at Volvo CE differ from Sandvik, Scania, Peab, and Engcon. Volvo CE has the policy of reducing the number of suppliers since 2009 because they had 2800 suppliers, which they could not manage anymore. They intend to maintain their relationship with the suppliers who have standards such as ISO 9000. Volvo CE increased the acceptable delivery rate to 98%. They also demand quality of 280 PPM. They also do not want many suppliers to supply one part; it means that they are more oriented toward having one or very few suppliers for one part. For Volvo CE it is also vital to be considered as the first priority of the supplier, specially, when it comes to production capacity issue. It can be added from the empirical findings of Volvo CE that the longer the lead-time, the more important the supplier is regarded by the manufacturer. A longer lead-time to produce a part leads to a higher value for Volvo CE. The example of the heavy tooling suppliers for exterior plastic parts that take between 6 and 12 months to develop, or even the production of heavy casted parts like the hitch, defines for Volvo CE’s key suppliers. For Volvo CE, the cost of the supplies is an additional criterion to categorize a supplier as a key supplier since the parts and the tooling are very costly.
Based on the association of theoretical results with the empirical findings of the five studied company, it can be analyzed by the authors of this paper that for Sandvik, Scania, Peab, and Engcon, this first part of the second strategic sub-process regarding the identification of the criteria for the supplier segment, requires information that has been gathered from the suppliers in the first strategic sub-process. Therefore, further integration for better performance in the first part of the second strategic sub-process is not required. However, this statement may be slightly altered for Volvo CE since they already have enormous number of suppliers that they work together already with, for certain period of time. This means that they already have required information about the suppliers' capabilities from their previous experiences. Nevertheless, this situation does not change the fact that integration is not required for this first part of second strategic sub-process.

More so, Sandvik, Scania, Peab, Engcon, and Volvo CE demand that their suppliers produce the products that match their needs. For example, Alfta, which is the producer of the stomme (frame) for Engcon, should integrate with Engcon for designing the PSA in the way that meets the demand of both sides. This refers to the second part of the second strategic sub-process. In the second part of the second strategic sub-process, the PSA should be designed in the way that satisfies the needs of both business partners. Poor PSA design leads to the interruption in the performance of either partner. For instance, it always happens that Scania has a fluctuation in the demand. For this reason, Scania always tried to take corrective action with the older supplier (wheel assembler), because they always had problem with the supply production and delivery. This problem ultimately led to the termination of their partnership. From these expressions of the Scania interviewee, it can be interpreted that the PSA design between Scania and the older wheel assembler has been developed poorly and lacked of a contract clause about the fluctuation of the demand. This shows that the design of the PSA is significant in the long-term relationship therefore it should be developed accurately and comprehensively. For a better development of PSA design, the business partners can integrate by attending the cross-functional meetings in which they discuss how high the service and the best product possible can be offered.

However, there is a potential obstacle, which is that the supplier may be reluctant to offer its maximum capability for producing the best product and deliver the best service
to manufacturer. In order to overcome this obstacle, manufacturing company should motivate the supplier to give its best effort to provide an optimized product and service. This incentive can be to give to the supplier a proportion of the profit that manufacturer earns when the supplier achieves a cost reduction and/or higher quality and/or faster lead-time. This gives to the manufacturer a higher competitive advantage in the market in order to sell more and earn more profit. These statements can be supported by the assertion from Praxmarer-Carus, et al. (2013) and Ivens, et al. (2013) who say that the correct sharing of the cost and earning between the integrated suppliers and customers (manufacturer) can lead to an optimized performance of both integrated partners. Nevertheless, empirical results show that none of the studied manufacturing companies (Sandvik, Scania, Peab, Engcon, and Volvo CE) share any profit that result from an improvement on the supplier’s side in terms of cost, quality and lead-time.

### 5.1.3 Provide guidelines for the degree of differentiation in the product and service agreement

The third strategic sub-process can also be divided into two parts. The first part refers to the interaction and the coordination between different departments of the manufacturing company in order to internally agree on the degree of variation in the PSA (Lambert and Schwieterman, 2012).

On the other hand, the empirical results of Engcon show that the purchasing department responsible for the relationship with the suppliers has a close relationship with the production department. This department is the customer of Engcon’s purchasing department. The production department is responsible for notifying the salesperson that the delivery of the product will be delayed. In case the supplier is somewhat late, the end customer will not be affected, due to the stocks on finished products. If the delivery is late, Engcon can assemble with the stock the company maintains, since Engcon keeps stocks and so have the suppliers.

Moreover, the empirical findings of Sandvik show that the company includes four different business areas, such as technology, machining tools, construction and mining. They might use the same supplier for several business areas. For instance, Sandvik can source steel from the same key supplier for the construction area as well as for the mining area. More so, Sandvik is separated internally into product lines, which leads the
different internal departments to work closely with each other. To produce this specific kind of steel, the manufacturer needs about 8 weeks. Therefore, Sandvik needs to keep stocks for this product.

Volvo CE has organized internally according to commodity segments. The company is not based on site needs. This complex organizational structure necessitates a close interaction between the different sites regarding the same commodity. For instance, the purchasing department in Braås is responsible for plastic and casting commodities as well as for welded and machined parts for this plant and 7 more. What is more, the purchasing department in Braås is not supplying all parts of the production in Braås. They do not have any storage facility in Braås, but Volvo uses the backyard of the plant in Braås to stock finished products. The machines to see are customer machines; they are trying to build a stock now of 40 to 50 machines. Some are stocked outside at the dealer’s. It can be noted that Volvo purchasing organization is split since 2009 into strategy project and production purchasing. Therefore Volvo’s departments are interacting together.

At Scania, the purchasing and the logistics department are working closely together. In fact, in the case that the organization wants to move the production from one supplier to another within a few weeks or a month without causing any changes in the lead-time, the logistics and the purchasing together are managing the issue together. A real concern for Scania is to keep the production running and thus to prevent that the delays in the deliveries do not stop the production.

Peab Bildrift AB is one entity of the Peab Group, which is responsible for all the purchases of the group. Peab’s customers are exclusively their internal companies. Therefore, strong ties and interaction between the departments across the different entities are necessary. Moreover, when Peab orders products from a supplier, they mostly want to receive the supplies directly on site. This requires a high level of collaboration between the operations activities and the purchasing.

The association of the theoretical and empirical findings shows that the internal relationships and the organizational structure of Engcon and Sandvik give the purchasing department more freedom of choice to set the terms of the PSA with their respective suppliers. This flexibility gives more bargaining power to the purchasing
department towards its suppliers so the manufacturers are less dependent from the suppliers. For instance, empirical results show that in the case that suppliers have delay in the delivery of the products, the production of Engcon does not stop and the customers of Engcon will not be affected because Engcon keeps stocks. The same happens for Sandvik that keeps stock of the specific kind of steel due to the long lead-time. This characteristic allows Engcon and Sandvik to set the lead-time for the supplier within a reasonable time-window and this situation could enable the manufacturers to bargain over the price of the supply since the conditions within the agreement are not strictly set for the supplier. However, the analysis differs for Scania, Volvo CE and Peab for which a deviation in the deliveries can affect the production. As a matter of fact, the empirical findings of Volvo CE show that the organization does not keep other stocks than the few machines they keep in the yard that are already customers’ machines. At Scania, the deviations from the on-time deliveries are a real concern. As for Peab, they do not keep stocks as they want the machines they source to be directly sent to the operations. A deviation for the supply to arrive might lead to a significant delay for the project.

Despite the explanations above, concerning the integration, this first part of the third strategic sub-process cannot be integrated with the supplier since it reflects the internal relationships and structure of Engcon.

The second part of the third strategic sub-process refers to the level of customization that the manufacturer offers to the supplier (Croxton, et al., 2001). In other words, it refers to the advantages that the manufacturer gives to the supplier during the agreement set-up (Ibid).

According the empirical findings, Engcon customizes the PSA for its key supplier Alfta in the way that the organization agrees to be customer for a longer term. For example, they can agree to be customers for three more years. Engcon also gives a promise for a volume at the beginning of the year. This is a customized agreement that they have with Alfta, which is a key supplier that is sourcing necessary materials and/or products to Engcon.
Sandvik gives a lot of freedom to their key suppliers concerning their technical and production skills. This freedom is notified in a customized PSA that Sandvik implements with their key supplier of steel.

Volvo CE develops parts of its own system (VPS) at the supplier’s location; this leads to process improvement on the supplier’s side. Nevertheless, Volvo CE does not provide any customization of the PSA for their relation with their key suppliers. They have a framework agreement with Volvo’s general purchasing conditions, which is signed with the key and standard suppliers. They have a QDC contract for all their suppliers through which they formalize the quality demands, deliveries and the cost.

For Scania, both sides should be satisfied when the agreement is made. Scania puts a lot of efforts to support these first and second tiers of suppliers for instance after the new set up in which they decided to implement a new supplier to the supply flow. They have a SD department at Scania who takes care of improvement of the suppliers; this department is also responsible together with the purchasing department for the level of customization that Scania can offer to the key supplier. Scania can offer a better insight in their processes to their tyres and wheel producer, which is important for a more fruitful relationship between the partners.

According to the empirical findings, Peab customizes the set-up of the PSA for the key suppliers. Peab has frame agreements for all supplies but for these necessary for the organization, the frame agreement regulates the many extras to the specific requirement needed for the operations of the company in addition to the ordering of the products. Moreover, Peab offers a supplier key account management, which is formalized in the frame agreement.

From the declarations above and in regard of this part of the third strategic sub-process, it can be noted that all studied companies except Volvo CE develop a customized PSA with their key suppliers. The studied companies and their suppliers can integrate by having a comprehensive communication over the requirements of the suppliers. They can discuss until they come to a common understanding about the level of points and advantages that they should provide for the suppliers. An example of integration between the manufacturer and their key suppliers is that both actors can communicate with one another and during the negotiations; the key supplier can provide its
requirements that the manufacturer considers before providing its feedback. They can continue their negotiations until they come up with a common agreement over the expectations and responsibilities from both sides. By following this integration through a negotiation cycle, they can enable a higher satisfaction in their agreement for both actors.

However, the potential obstacles for this integration can be that the supplier pushes strictly on its requirements and is not willing to reduce its expectations in order to come up with a common agreement with the manufacturer. In this case, the more bargaining power that the manufacturer possesses throughout the negotiations and within the agreement, the fewer difficulties will occur from the supplier. In this regard, the internal structure and relationships of the studied companies provide higher opportunities for the purchasing department to increase its power.

5.1.4 Develop framework of metrics

According to the theoretical findings, developing a framework of metrics is necessary to evaluate the profitability and the success of a relationship between the organization and its supplier (Lambert and Schwieterman, 2012). Moreover, Croxton, et al. (2001) assert that the metrics should ensure the profitability of both the supplier and the manufacturer.

On the other hand, empirical results show that Engcon uses the quality, delivery time, gross margin, number of products produced, start and stop of the production (for example, the production cycle time can be 2.5 h), delayed deliveries, purchased orders and inventory terms (it refers to the number of times that the company uses the whole stock per year; it can be understood as ITO as metrics. In addition to this, quality and delivery time are indicators that are integrated by Engcon with the key suppliers.

Moreover, according to the empirical findings, Sandvik uses a rather fewer number of metrics with its suppliers than Engcon. Sandvik settled the metrics and added them in the PSA. These metrics are On-time delivery of 95%, Product rejection of 9 %, and the lead-time of 5 days.

Volvo CE settles the same metrics for all the suppliers for both key and standard ones and it does not differentiate on how to measure these suppliers. The metrics of Volvo
CE are the delivery rate, ITO, the price reduction, and the non-conforming inspection reports.

The empirical findings also show that Scania holds the suppliers' delivery rate as its main metrics for the measurement. The lead-time is agreed with the supplier at the implementation phase. For instance, the wheel assembler should deliver the tiers to Scania within 13 days which is the agreed lead-time. Before they agree upon the lead-time for setting it as the metrics for measurement, they need to get to know each other's processes.

For Peab, the empirical results demonstrate that the lead-time is the crucial metric indicator. If the supply is not delivered on time, the supplier provides Peab with spare machinery to run the operations. The costs of supply, spare parts, and repairing services are also significant metrics for Peab to be measured.

The association of the theoretical and the empirical findings enable the authors of this thesis to assert that the agreement over the metrics indicators (e.g. lead time, delivery rate, costs, etc.), with the purpose of satisfying both partners, require a good understanding of each partner's capabilities and demands. For this understanding, each partner should share its intra-organizational data in detail with its counterpart. This exchange of information forms the integration that has been taking place in the first strategic sub-process. However, in order to avoid the settlement of unrealistic metrics for the supplier, the supplier and the manufacturer can have face-to-face meetings with the purpose of agreeing upon feasible metrics that could be carried out to assess the performance accurately. It is also less likely to occur that the supplier deviates from the metrics that have been set together with the manufacturer. The integration for setting the metrics with the supplier has been emphasized by the interviewee of Engcon who explained that the quality and delivery time are indicators that are significantly important to be integrated with the supplier. It also has been mentioned by the interviewee of Engcon that the product stomme, as a strategic supply, requires a high level of integration with the supplier in order to be delivered at the right quality, cost and time. This statement demonstrates that Alfta, that produces the stomme for Engcon, should integrate with Engcon in order to agree upon the common realistic metrics that can be used to carry out the performance accordingly. Also, Scania support this way of integration by asserting that before they agree upon the lead-time for setting it as the
metrics for measurement, they get to know each other's processes. This means that the information about supplier's capabilities allows Scania and its supplying partner to set realistic standards and metrics for achievement.

This integration can also work as an incentive for the supplier to perform at its maximum capacity since they participate more in the discussion process to select the metrics. Thus, the sense of belonging of the supplier increases and therefore leads to a better commitment from its side in the relationship.

However, such an integration can bring up a potential obstacle. The supplier can be willing to lower the metrics standards in order to ease its performance by giving underrated information about their production and delivery capacities. In order to overcome this obstacle, the manufacturing company should establish stronger ties and more trust between both sides by sharing more of its intra-organizational information and by increasing the supplier sense of belonging.

5.1.5 Develop guidelines for sharing process improvement benefits with suppliers

According to the literature findings, the fifth strategic sub-process refers to the development of guidelines for sharing the benefits that result from process improvement for the supplier’s performance (Lambert and Schwieterman, 2012). In case the manufacturer does not share the profits with the supplier when they achieve process improvement, the supplier will be reluctant to fulfill partner’s objectives (Ibid).

On the other hand, the empirical results of Engcon show that the company does not share its profits with the supplier if they make any process improvement. The benefits of the process improvement received for the finished products are kept by Engcon.

The empirical findings of Sandvik and of Scania demonstrate that no formal agreement concerning the payment and the sharing of the benefits is developed with the supplier.

As for Peab, integration in bound by contract and is carried out through frequent meetings, but no guideline for the sharing of the benefits is expressed.

Regarding Volvo CE, the empirical findings highlight that when the manufacturer and its key supplier carry out workshops together on certain occasions, they share the cost
improvements together. As a matter of fact, in case the supplier achieves for instance a 3% cost reduction, the profit generated is kept by the supplier.

The statements above demonstrate that only Volvo CE elaborates a profit sharing on certain occasions with its key suppliers. The combination of these findings with the theory leads the authors of this thesis to interpret that that it is vital that the studied companies share the profits that result from the supplier’s process improvements. This integration has been pointed out in the second strategic sub-process during the settlement of the PSA. This means that, if during the development of the agreement, the process improvement profits is planned to be shared between both partners, it can result in a higher motivation for the supplier to fulfill the established metrics.

Moreover, according to the empirical results, the lead-time is one of the most significant criteria and one of the upper priorities for the companies. Therefore, any improvement in the lead-time by the respective key suppliers should be rewarded by sharing the profits that derive from this improvement. Through the improvement of the lead-time, the manufacturers will become more flexible, and will be able to positively respond to the customers’ faster delivery demands. This, as a result, will increase the customer satisfaction, which may lead to an increase in the number of sales and to more profit for the company. This profit sharing integration also can lead to stronger ties between the supplier and the manufacturer.

A potential obstacle coming from this situation is that the improvement of the lead-time by the supplier is difficult to relate to the improvement of the number of sales and to the profit earned by the manufacturer. Nevertheless, this obstacle can be overcome by adding a clause in the agreement referring to a certain percentage that the manufacturer would give to the supplier if the latter achieves a specific improvement of the lead-time for the delivery of the key supplies.

5.2 Operational sub-processes

5.2.1 Differentiate suppliers

According to the theoretical findings, the first operational sub-process includes the differentiation of the supplier into key and regular suppliers depending the criteria that have been identified in the second strategic sub-process (Lambert and Schwieterman,
This differentiation occurs by performing a supplier profitability analysis and by assessing the potential growth, the strategic value of the supplier and the drivers for further growth (Ibid).

For such an assessment over the supplier, the manufacturer requires to collect different information than what has been collected for the second strategic sub-process. This information includes the supplier’s growth rate, the drivers for further growth, the profitability and the strategic value of the supplier. In order to obtain such information, the manufacturer should integrate with the supplier and ask for the related accurate data. Moreover, the manufacturer should motivate the supplier to share such information. In this purpose, the manufacturer should provide financial incentives to the supplier in order to attract the supplier for sharing the information. However, the potential obstacle that can be faced by the manufacturer is that the supplier may be reluctant to share the respective information due to confidentiality concerns. In order to overcome this obstacle, the manufacturer should strive to establish strong ties and trust between both partners by sharing information with the supplier about certain specificities such as competences and technologies. This exchange of knowledge and information can unify both partners.

This theoretical analysis can be associated with the empirical findings of Scania, Peab, Sandvik, Volvo CE, and Engcon in order to enable the authors of this paper to say that all of the progress in the first operational sub-process regarding the suppliers’ categorization and the respective information collection depends on the willingness of the manufacturing company (buyer) for such a categorization. In this context, Scania, Peab, Sandvik, and Engcon carry out a categorization of their respective suppliers into key and standard ones, because they intend to treat each supplier based on its importance for the firm. They intend to establish deeper relationship with the key suppliers because they are vital for the manufacturing process. Scania, Peab, Sandvik, and Engcon intend to have, to some extent, exchange of knowledge with their suppliers, with the purpose of being more familiar with the suppliers’ capabilities in order to be able to treat them accordingly. This statement can be supported by the interviewee of Engcon that claims that the organization trusts its suppliers and that they are ready to exchange their financial records and drawings with their key suppliers such as Alfta.
But, such a categorization and treatment is not applied at Volvo CE. Volvo CE categorizes all its suppliers either key or standard ones into one common group. The authors of this thesis interpret this relationship management from Volvo CE as being the result of its self-consideration as a brand that holds a higher bargaining power. However, this way of treatment of Volvo CE towards its suppliers can cause a lower level of performance than the actual capability of the suppliers. The suppliers might fulfill their agreements with Volvo CE, but they are not motivated for further process improvement on the longer run. The suppliers may even achieve process improvement but be rather reluctant to share this improvement with Volvo CE. These expressions encourage the authors of this thesis to recommend for Volvo CE to categorize their suppliers in order to be able to treat each one according to its significance for the firm.

5.2.2 Prepare the supplier/segment management team

According to the literature findings, in the second operational sub-process, the manufacturer should create separate teams for both their key suppliers and standard suppliers (Lambert and Schwierterman, 2012). For each key supplier, there should be a management team constituted in order to carry out the PSA and perform according to the agreement clauses (Ibid). A same team with the same responsibilities should be created in order to deal with the standard suppliers (Ibid). However the difference is that there is one team (called the segment team) for all standard suppliers, whereas one team for each key supplier is implemented (Ibid). Each team has a person in charge as a leader and a representative of the various functions of the manufacturing company (Ibid). It must be noted that, in this sub-process, the main theme is to create this managerial team and to prepare the team to carry out the PSA that will take place within the sixth operational sub-process.

The empirical results show of Engcon that the management team regarding the relationship with its suppliers is operating in the form of a purchasing department that includes two managerial employees and one assistant who are constantly working with both key and standard suppliers. This empirical result shows that Engcon does not have different management teams to cope with different types of suppliers either key or standard suppliers.
The empirical findings of Sandvik demonstrate that the organization has set up a SAM structure in order to regulate the relationship with their key suppliers. This SAM structure results in one single person, named the key account manager who is responsible for the communication and the coordination between Sandvik and the key supplier. Sandvik has decided to develop this configuration due to the prior lack of a complete picture of the relationship with their key suppliers. The targets for the relation between the organization and the key supplier are set by the manufacturer’s higher management. For instance, in case the usual product development activities do not suffice to reach the cost targets, the key account manager is assigned to review and to improve (if necessary) the supplier’s processes. The key account manager also is responsible of the formation of the cross-functional team that will discuss the specific issues. The cross-functional team aims at achieving product and/or cost improvement. The cross-functional team includes most importantly two or three employees from the R&D along with an R&D manager from both sides, a product line manager, an employee for the quality, an employee for the production, and an employee for the sourcing. In total, sixteen persons attend these meetings. Besides these group meetings in which broad subjects are discussed and targets are expressed, the cross-functional team is divided into smaller teams in order to work in a more efficient way on a daily basis. The smaller group works particularly lead to a transfer of knowledge.

The empirical findings of Volvo CE highlight that cross-functional teams are implemented in order to cooperate on the development of new products. In this situation, both partners schedule weekly or biweekly meetings together. The teams encompass buyers, design engineers, supply developers along with sales persons. Besides the implementation of cross-functional teams, Volvo CE has set up since 2009 a supplier host, who attends to these meetings and has the responsibility to be the sole contact with the suppliers.

As for Scania, the empirical findings stress out that the company has deployed one person at each production unit who coordinates the flow between the second tier of suppliers (both the tyres and wheels key suppliers) with the assembling company in order to have an overview of the relationship to react quicker in case of deviations or problems. The interviewee noted that, with these suppliers, Scania has not implemented
any cross-functional team in the design phase since the product is in this situation
standard.

The empirical findings of Peab show that the company has implemented a cross-
functional team for its relationship with the key suppliers. In addition to this, Peab
schedules meetings every second or third month with their key suppliers. The meetings
involve around 5 to 6 persons, from which at least one person from the operations is
included.

After the review of the different empirical findings, it can be noted that all companies
except Engcon have a cross-functional team when it comes to the relationships of the
company with the key suppliers. This situation is due to the smaller size of Engcon
compared to the other studied companies. Therefore, it is a much more complex task for
Engcon to handle all the suppliers since they have only three employees in the
purchasing department. Due to this fact, Engcon should integrate with both its standard
and key suppliers, by trying to involve them in the team in order to jointly carry out the
PSA in further operational sub-processes. It can also be noted that Volvo CE and Scania
set up a cross-functional team only for non-standard product in order to develop the
product along with the supplier. Volvo CE, Scania and Peab should apply a key account
management structure in order to form management teams responsible for the well
carrying out of the PSA. None of the studied companies have set up a team for the
segments of suppliers (standard suppliers).

Through this structure, the inter-organizational team implemented would enable the key
supplier (respectively the standard suppliers) and the manufacturer to share their
resources together to perform the PSA and it also is helpful to execute the activities
such as the performance measurement (carried out in the seventh operational sub-
process). Thus it is easier for them to track deviations and to take up the corrective
actions. In this regard, the empirical findings demonstrate that Engcon follows this
integration process by having consistent meetings with their suppliers 4 times a year and
by sharing each other’s technical knowledge and resources. These meetings also
encompass discussions about the issues with the purpose of jointly overcoming them.

However, after the review of the empirical findings, the authors of this thesis have noted
some obstacles. First, Engcon’s results show that the company has joint inter-
organizational meetings with its 5 key suppliers rather than having independent meetings with each one of them. These jointly conducted meetings can be interpreted as being a segment of key suppliers. This way of carrying out the integration on a segment of key suppliers (or of standard suppliers) can contain 2 potential obstacles. The first obstacle is that the suppliers might be competitors to each other, because they might produce the same product (besides the one they produce for Engcon) as other key suppliers in the meetings. This situation can lead to destructive meetings rather than constructive ones. The second potential obstacle is that the suppliers can integrate together; step forward and take over Engcon’s role in the supply chain, which can be a threat for Engcon. Engcon can overcome these obstacles by having separate meetings with each supplier except in the situation that the supplies produced by the suppliers are related to the design of the final product that includes these key supplier’s components. In other words, the shared meetings of the supplier should only be in the situation in which the suppliers should discuss the design of the final product that Engcon produces with the purpose of decreasing the cost of the production.

The authors of the thesis do not recommend to the companies to have jointly conducted meetings with their key suppliers, as it can be a threat for the future success of the company. However, they should develop cross-functional teams through a key SAM structure on the model of Sandvik, in order to integrate and later being able to carry out the PSA together with each key supplier.

**5.2.3 Internally review the supplier/supplier segment**

According to the literature, the third operational sub-process includes the assessment of the supplier’s role in the supply chain (Lambert and Schwieterman, 2012; Lambert and Pohlen, 2001). The assessment takes place by reviewing the purchased product from the supplier and the supplier’s sales and growth as well as its significance in the supply chain (Ibid). The managerial team that is assigned to deal with the key supplier and the standard suppliers is responsible for the evaluation of the suppliers and for determining the improvement opportunities through teamwork (Ibid).

On the other hand, the empirical results show that Engcon assesses its suppliers on the basis of the ability of the supplier to deliver the product to Engcon on time. In addition to this, the interviewee mentions that the product stomme is a strategic component of
the production of Engcon. Without this product, Engcon will experience a production stop.

Also, Sandvik analyzes internally the criticality and the technicality of the supply and the supplier. In addition to this, the empirical results show that Sandvik has deep relationship with its supplier of special steel that Sandvik uses in its production. This supply is very important and critical for the production of Sandvik.

Moreover, the empirical results show that Volvo CE has a large number of suppliers that work with them. The current structure at Volvo CE shows that there is no categorization of standard and key suppliers. The company assessment over its suppliers does not differentiate the key suppliers from the standard ones.

Furthermore, the empirical findings about Scania show that the firm assesses the wheel assembler as its key supplier and reviews its supply chain role as well as its sales and growth. The wheel assembler is critical for Scania, because without it, Scania's production stops. The importance of the wheel assembler role for Scania in the supply chain is even higher, since it is only the assembler of wheel for Scania.

More so, according to the interviewee of Peab, the firm’s key suppliers such as Volvo construction are considered to be vital for the manufacturing and production process of Peab. Peab also assesses and reviews its supplier’s role in the supply chain as well as their sales and growth.

The association of the literature and the empirical findings enables the authors of this thesis to analyze that, since four of the manufacturing companies (Engcon, Sandvik, Peab, and Scania) have key suppliers that are crucial for their production and manufacturing process, it means that these manufacturing companies also assess and review the contribution of each of these key suppliers to the supply chain. The manufacturing companies assess and review their key suppliers as the significant players within the supply chain. For instance, as the product stomme is of critical importance for Engcon’s production, Alfta will be assessed as a crucial actor within the supply chain.

For such an assessment and review, the management team that has been prepared in the second operational sub-process should strive to determine opportunities for the enhancement of the performance and for the development of the relationship between
both actors (manufacturing company and key supplier). This enhancement is significantly important for manufacturing companies in order to establish a deep relationship with their key suppliers. This development requires that the manufacturing company obtains accurate and comprehensive information about the key supplier that has been gathered in the second strategic sub-process and in the first operational sub-process. Thus, it can be said that no supplier integration takes place in this sub-process. This is also due to the fact that this sub-process refers to the internal review and assessment of the supplier. This assessment and review also takes place for the standard suppliers; however, it may occur in smaller dimensions and less accuracy.

The same statements as above can be applied to Volvo CE, which does not have any categorization of key nor standard suppliers. Volvo CE should also use the information about the suppliers that has been gathered in the first operational sub-process and in the second strategic sub-process for reviewing and assessing the suppliers. Moreover, since the review and the assessment of the suppliers is an internal process for Volvo CE, no integration with the suppliers is required in this sub-process.

5.2.4 Identify opportunities with the supplier/supplier segment

According to the theoretical findings, in this fourth operational sub-process, the management team that has been discussed in the second operational sub-process works with the key suppliers in order to identify opportunities for improvement and development (Lambert and Schwieterman, 2012). In addition to this, Croxton, et al. (2001) explain that the improvement opportunities are mainly emphasizing the potential increase in sales, cost reduction and the improvement of the service provided.

With respect to these theoretical findings and to the analyses carried out for the previous sub-processes, the team implemented is rather inter-organizational than intra-organizational. It means that the supplier is rather part of the team than only a collaborative partner. This can lead to higher commitment in order to find ways for performance improvement in the terms mentioned in the above paragraph.

The empirical findings of Engcon demonstrate that concerning the process improvement, the organization is willing to develop its impact on the environment by optimizing the transportation and the shipment of the materials. It also has been stated that the first priority for Engcon is the supplier’s lead-time while the second and third
priorities are the cost and quality of the product. On the other hand, the empirical results show that Engcon wishes to increase their standards every time they reach their previous objectives. For instance, if the supplier reaches the goal of 90% in terms of lead-time, they set the goal further up to 92%. This lead to an improvement of the service provided due to fewer delayed deliveries.

The empirical findings of Sandvik highlight the fact that the company identifies opportunities regarding the performance measurement. The implementation of an integrated ERP system (instead of the current Excel spreadsheets) that will encompass the performance measurement, which would be beneficial for the carrying out of the seventh and last operational sub-process, is currently on process. This opportunity will potentially bring cost and performance improvement to both Sandvik and the integrated key supplier. Further opportunities for Sandvik are to work closely with the supplier on different areas, processes, logistic solutions and also on the identification of the potential risks and assets. Another opportunity for both partners is to develop the relationship further on the planning and product development process. For this purpose, they use common resources and carry out a transfer of knowledge in terms of technical matters. Sandvik uses the knowledge from the supplier that they do not have themselves.

Regarding the empirical findings of Volvo CE, the interviewee has stated that a development opportunity will be to involve the supplier in an early phase, in order to develop parts of the products together; this configuration is called early supplier involvement (ESI). For this purpose, Volvo is helping the suppliers with the system called VPS. Parts of the VPS process are used at the supplier’s location, which brings an opportunity of service improvement, due to the fact that the system is shared between Volvo CE and the supplier, so the informational flow becomes smoother. The usage of a VPS system at the supplier’s location brings a further opportunity for Volvo CE as manufacturer’s staff can come at the supplier’s site to develop and support the supplier’s production in order to be more cost efficient. An ESI is needed for the suppliers to know the plastic parts functions, how they will fit on the carrying structure underneath. An earlier involvement of the supplier will affect the cost and the production performance of the part. This is an opportunity for the supplier to give support and feedback over the design of the product/machine through a RTS. This will
enable future cost and performance improvement through knowledge exchange. A further opportunity for the supplier is an increase in the production volume of Volvo CE, which would make the whole industry increase at the same time due to larger numbers of sales and will lead to investments from the suppliers. Another important opportunity coming from Volvo CE towards the suppliers is that Volvo CE can make them benefit from the agreements that the company has. For instance, Volvo AB makes agreements on high tonnage of steel; therefore it has preferential prices for this specific material.

As for Scania, the organization connected the second tier of suppliers to the older supplier from the beginning to enable cost improvement. On top of the technical and knowledge support that Scania provides the assembling company with, the manufacturer also connected them to the second tier of suppliers, and thus shared their resources with them in terms of connections and networks. A large opportunity for Scania’s suppliers is that the manufacturer supports these first and second tiers of suppliers strongly and that Scania has implemented a SD department at Scania who takes care of the improvement of the suppliers. The quality level and the volume output are areas in which Scania supports the suppliers most. In some case, Scania’s employees can assist the supplier at the supplier’s location during weeks or months. The findings of Scania also show that the opportunity of Scania to build stronger informational ties with the second tier of suppliers (the tyre manufacturer Michelin) leads to better reliability between the partners and as a result to an improvement of the service. Furthermore, a potential opportunity for Scania’s suppliers’ segments might be that Scania makes use of its wide European network to create opportunities for the suppliers, since the organization has agreement and contracts with transportation companies around Europe.

Regarding the empirical findings of Peab, it can be added that Peab also makes use of common resources with its key suppliers, since the organization maintains very good relations and a close connection with the steel manufacturer SSAB. This use of common resources enables the supplier to achieve gain in costs as Peab connects the steel supplier with the producer of the machinery. A support opportunity is also provided by Peab to the suppliers in case of potential issues.

The combination of the empirical findings of the five studied companies demonstrates that all companies provide support to their key suppliers in case of issues. Moreover, it
can be added that all manufacturers are willing to make use of their own relationships, close connections and preferential agreements with certain suppliers and to connect them with a supplier that produces a supply for the manufacturer in order to reduce costs. In addition to this, developing integrated logistic solutions (such as an integrated transportation network) as well as creating a joint risk management will lead to cost reduction and improvement in the lead-time (regarding the number of deviation) as well as preventing both partners to struggle with some issues. Thus, this will undeniably lead to an improvement in the service provided.

Moreover, the combination of these statements and of the theory can lead the authors of this thesis to interpret that the cost, quality, environmental affect and delivery performance (with the deviation from the agreed lead-time) are key performance indicators for the manufacturers; although the environmental impact is not for all companies an apparent opportunity that the manufacturers are tending to with their suppliers. Therefore, the manufacturers jointly look for opportunities together with the suppliers in order to improve these 4 factors. In order to reach this achievement, in each case, both the manufacturer and the supplier can integrate through the implementation of the inter-organizational team that has been created in the second operational sub-process. In these terms, Rackoff, et al. (1985) support this integration by saying that through close collaboration with the key suppliers, both collaborative partners can perform better.

In this integration, through the inter-organizational meetings, both partners can work towards process improvement through an exchange of their resources, knowledge and transportation facilities that are considered as three initiatives for triggering the integration (Frohlich and Westbrook, 2001; Vanpoucke, et al., 2014). By using these three initiatives, the manufacturers and their suppliers can improve in terms of cost reduction, quality, environmental aspect and lead-time. It must be noted that the integration in this sub-process is not anymore about creating and preparing the managerial team, but rather about performing the task of this inter-organizational team which is to cooperate to achieve performance improvement. It also must be noted that, in this sub-process, the major theme is about the building the bases for the further implementation of the PSA that takes place in the sixth operational sub-process.
The potential obstacles for the manufacturers could be that the supplier might be reluctant to share its resources and/or its knowledge and/or its transportation facilities (respectively to use the manufacturing company’s transportation agreements), due to a potential lack of commitment and trust towards the manufacturers. In order to overcome these obstacles, the different manufacturing organizations should strive to establish strong ties and trust between with their suppliers in order to encourage them to fully be committed in the performance improvement process.

5.2.5 Develop the product and service agreement and communication plan

According to the literature findings, Lambert and Schwieterman (2012) say that in this operational sub-process, the outcomes of the negotiations over PSA that took place in the third strategic sub-process will be drafted and further, written in the agreement. The PSA, which is referring to the key supplier, requires beforehand a negotiation with that supplier (in third strategic sub-process), whereas the PSA that refers to the standard supplier does not need any beforehand negotiation since it contains minimum requirements from the supplier (Lambert and Schwieterman, 2012). The PSA should be beneficiary for both sides of the agreement, especially if the manufacturer is dealing with the key supplier (Ibid). For the success of the agreement, both partners should be fully committed, longevity oriented, and loyal to it (Lambert and Schwieterman, 2012; Blau, 1964; Ring and Van de Ven, 1994).

With respect to the theoretical statements above, it can be interpreted that after the integrative negotiation in the third strategic sub-process with the supplier over the PSA, the integrated partners should first draft then write down all the agreed factors. Since both partners had cooperative negotiations while developing the agreement, it can be taken for granted that both are satisfied with the result. Thus they are committed to the agreement and are having long vision for continuing their cooperation.

The empirical results show that Engcon is not very interested in having cooperative negotiations for developing the agreement. In this context, Engcon is setting goals individually and if the settled goals do not get achieved by the supplier, Engcon will carry out a supplier switch. Although, it can be say that this policy of Engcon is
different when it comes to the key suppliers, since they are already working for many years together.

As for the empirical results of Sandvik, the empirical results demonstrate that the relationship has now become strategically collaborative after being only transactional. The manufacturer and the key suppliers collaborate over the product development concepts by developing strategic processes together. From the negotiations that have been carried out in the third strategic sub-process, the interviewee from Sandvik highlights that the sets each year targets, such as reducing the cost by 5% along with the suppliers that are mentioned in the PSA.

As for Volvo CE, the empirical findings stress out that the manufacturer does not carry out negotiations with the suppliers over the PSA since it does not differentiate the key suppliers from the standard ones. As such, the company has standard requirements under the form of an agreement that contains everything that regards the supplier relationship with Volvo CE. Each supplier has to agree with these requirements.

The empirical findings of Scania show that the manufacturer negotiates the PSA with their suppliers for steel and aluminum wheel as well as for rubber tyres. Scania also discusses their agreement with the company assembling the tyres and wheels together which delivers the product sequence to Scania. From these negotiations, Scania and the respective suppliers agreed on an agreement of 13 days lead-time for delivering the supplies. The suppliers have 13 days to receive their required materials, produce the supplies, and deliver them to Scania. This lead-time agreement is divided into two parts. First, 6 days are allowed for the flow between the second tier to the first tier of supplier, and 6 or 7 days are required from the first tier (assembling company) to Scania. The PSA states that the suppliers receive the order, then they produce and send the delivery to Scania. The relationship between the first and second tier of suppliers is let to the responsibility of the suppliers and not of Scania. Furthermore, the PSA outlines the responsibility of the partners in this specific example regarding the logistic transportation. As a matter of fact, Scania handles the transportation from the tyre supplier to the assembly unit (second tier of suppliers) as well as from the assembly unit to Scania (first tier of suppliers). In other cases, Scania is only responsible for the logistic transportation from the first tier of supplier.
Concerning the empirical results of Peab over the outline of the PSA, the interviewee claims that the company develops frame agreements for all supplies, which aim at regulating the carrying out of each ordering, performed according to the JIT model. More so, the PSA shows the fixed yearly price agreement that Peab has with the supplier. This price is based on the expected number of units that Peab intends to receive from the suppliers. However, the PSA also includes an agreement on the costs of repair on which the partners can achieve significant cost improvement. For the PSA, the findings show that the acceptance of the PSA is given by all functions of the supplier. In this regard, the interviewee took the example of their relationship with Volvo AB, for which the agreement has gained highest involvement together from Volvo CE and Volvo trucks. In this relationship, the managements of both companies show significant interest and commitment in this agreement with Peab. The management of both partners is highly committed and the partnership has been decided at the highest management level. On top of it, Peab formalizes in the PSA the existence of a supplier key account management structure that regulates the relationship. The responsibility over the transportation is also stated in the PSA. The interviewee states that both Peab and the supplier are responsible for the transport, but the supplier has the obligation to deliver the machines directly on the operation area.

Based on these empirical findings and with respect to the theoretical results and the analysis of the third strategic sub-process, it can be interpreted that Engcon, Volvo CE and Peab would benefit from integrated cooperative negotiations with their suppliers (as it has been said in the third strategic sub-process). These agreements may include different factors such as objectives and goals. However, the empirical findings highlight that Scania and Sandvik already carry out such negotiations over the PSA with their partners. The findings of Scania and Peab also shed the light upon another fact, which can be included in the draft of the PSA, in the agreement over the responsibility for the logistic transportation.

Moreover, the theoretical results show that the agreement should include all levels of supplier's internal functions. It also should contain communication and continuous improvement plan (Lambert and Schwieterman, 2012). Several dimensions can constitute the agreement; dimensions such as cost savings initiatives, key business reviews, written contingency plans, weekly volume and pricing reports (Lambert,
The buying company should align its goal, communication system, measurement system, and performance with the supplier to reduce the distance between the supplier and the buyer (Prahinski and Benton, 2004).

From the paragraph above, it can be understood that the factors such as communication and measurement procedures should also be emphasized in the agreement to clarify any potential ambiguity that can occur.

In this regard, the empirical results of Engcon show that the organization has a communication set up with its suppliers to enable an easier interaction between the partners. In fact, Engcon’s supplier, Alfta, can reach the data as soon as Engcon enters the customer order into the system. This communication structure leads to a better delivery performance from the supplier’s side. According to the interviewee from Engcon, this set-up occurs only with this supplier for specific products and is notified in the PSA. Moreover, Engcon plans to develop a new ERP system with Alfta to enable better communication between both partners. Such a new communication system will require streamlining the IT systems both internally and with the supplier.

The interviewee from Sandvik explains that the organization uses internally an ERP system and shares an EDI connection with their key suppliers concerning the orders. More so, it can be noted that the targets set by Sandvik are communicated to the suppliers and their implementation is followed up during the meetings, which will be discussed in the sixth and next operational sub-process.

Concerning Volvo CE, the interviewee explains that the company is communicating their needs to the supplier over the development of the parts. The communication between the suppliers and the buyers is required and is therefore specified in the elaboration of the PSA. It can also be noted that a supplier host is implemented by Volvo CE to enable an easier communication between the two parties. However, the integration of the communication between the key supplier and the manufacturer has to overcome internal and external communication obstacles in order to be implemented. The organizational structure of Volvo CE makes the communication internally more difficult, since Volvo CE has three different buyer roles, four material controllers, design engineers and supply developers who need to be kept in touch. Moreover, the interviewee explains that the suppliers prefer personal communication rather than
contacting the single contact in the person of the supplier host. The logistics and Volvo IT departments are responsible for the communication means that Volvo CE uses with the suppliers. As a matter of fact, Volvo CE requires that the supplier has a fully integrated EDI with delivery schedules, deliveries, invoices; that they are able to receive messages from Volvo CE and to send messages into Volvo CE’s system. The suppliers can log in their supplier portal and access the information. The PSA also includes confidentiality clauses.

As for Scania, the empirical findings highlight that the organization possess a classical internal ERP system, whereas it makes use of an EDI connection with the suppliers. They had commercial relationship with this second tier of suppliers. Scania has implemented an integrated information system with the second tier of suppliers in order to prevent confusion over the responsibilities between the actors and to enable a better measurement of the performance (seventh operational sub-process), since the assembling company (first tier of suppliers) had a very confidential information flow with the second tier of suppliers avoiding Scania to access the information. The interviewee also explains that the organization’s completely transformed information flow structure is notified in the PSA.

The empirical results from Peab demonstrate that the organization requires a certain level of communication with their suppliers in order to produce Peab’s products at the best performance. The communication plan is also agreed upon by Peab and the supplier and is formalized in the PSA. The interviewee from Peab, Stenzel (2015) asserts: “our relationship of the company with Volvo CE is as transparent as open books”. More so, the empirical findings show that Peab uses different communication tools depending on the specificities of the product supplied. In this regard, Stenzel (2015) asserts that Peab’s integration with Volvo CE is sufficient and does not require an IT integration, since the machines are followed up hour by hour, whereas in its relationship with Scania, Peab developed integrated IT system to improve the product development further.

These empirical findings show that having an integrated communication system and plan contains detailed complexities that need to be well clarified in the agreement. Through an integration of collaborative negotiations about the PSA that take place in the third strategic sub-process, these detailed complexities can be discussed.
Collaborative negotiations also lead to fully integrative agreements to be written and carried out. However, the potential obstacle for integrative agreements is that the stronger integration that is developed between the partners, the more complicated procedure for stopping the integration and cooperation in the case that one of the integrated partners did not perform according to the agreements. This expression about the potential obstacle is also verified by the interviewee of Engcon who says: “when the suppliers are integrated, and if there is a problem impossible to work through, it’s difficult to overcome the issue”. In order to avoid this obstacle, partners should have correct and comprehensive evaluations about each other's capabilities at the very initial stage, before they start to negotiate about the PSA with the purpose of making sure that opponent partner can fulfill the agreements and satisfy the requirements.

5.2.6 Implement the product and service agreement

According to the theoretical findings, in this operational sub-process, the written PSA will be implemented (Lambert and Schwieterman, 2012). In order to carry out the PSA, the agreement's partners should have fixed meetings in the certain period of time to discuss about the daily matters (Ibid).

The empirical results of Engcon show that after the development of PSA, Engcon and its key suppliers gather 4 times a year together and discuss over the product design in order to make it technically possible to produce, and at the same time to reduce the cost of production by providing suggestions in order to modify the product design if it is necessary.

Regarding the empirical result of Sandvik, it can be noted that that the organization and its suppliers have regular meetings once a week in order to have constantly a look at the contract after the development of PSA. In addition to this, Sandvik organizes meetings with their strategic suppliers once a year to discuss the price whether it is possible to reduce.

As for the empirical findings of Volvo CE, the organization has meetings with its suppliers weekly or biweekly over the new product development with the purpose of developing the design of new products. Moreover, the interviewee explains that after having drafted and defined the PSA regulating the relationship in the previous sub-
process, the communication plan at Volvo CE is carried out under the form of a RFQ for the drawings, to which the suppliers send feedback and a RTS.

The empirical results of Scania show that the implementation of the PSA by the manufacturer is carried out through the sending of the forecasts beforehand so the suppliers can be able to prepare for the production; but they start the actual production after Scania freezes the demand and makes an order to them. Scania provides forecast to the suppliers to prepare themselves for the upcoming weeks or months, but the problem is one of the second tier of suppliers (tyre supplier) does not take Scania’s forecasts as serious as it has to, due to the potential changes in it. This forecast structure leads to production capacity issues. Furthermore, the empirical results display that the employee from Scania at the production unit who coordinates the flows has regular meetings a couple of time a year with both the second and first tier of suppliers and has contacts with them on a weekly basis to follow up the performance and to fix problems, such as production capacity problems.

Regarding Peab, the empirical results show that Peab also has very good relations with SSAB, which is a steel manufacturer. The integration of Peab with this supplier is carried out through constant meetings with them and through an exchange of feedback when it comes to the choice of a specific kind of steel for instance. Otherwise, the interviewee explains that Peab regular meetings are organized with all of their suppliers to secure the supply in the frame agreements and ensure that the suppliers have the desired machine, which meetings actually show the suppliers’ commitment. Moreover, Stenzel (2015) claims that Peab forms a unique integrated purchasing group (non-existent in the construction equipment industry) with SSAB, which is assigned to carry out the PSA. This group meets every month to have a look over the steel market. Within this integrated group, both actors have deep insight into each other’s processes; the supplier also has insight into Peab’s demand and Peab has insight into the supplier’s sourcing. They decide together where to carry out the purchases according to the customers’ demands. A fully integrated IT system is set up for a better execution of the agreement.

The review of the empirical findings demonstrates that all studied companies schedule meetings with their suppliers to follow up the implementation of the PSA defined in the previous sub-process.
The combination of these theoretical and empirical findings enables the authors to say that within these meetings, the integrated partners should provide for each other technical support and exchange knowledge with one another in order to enable process improvements in terms of cost, quality, lead-time etc. Since they are both satisfied by the terms of the agreement in the previous operational sub-process, they will have goal congruence to perform in the best possible way. However, it must be said that the integration in this sub-process should not be limited to only technical support and knowledge exchange. It can also be expanded to the sharing of resources for buying the raw materials, to the exchange of specialized staff or of certain production equipment, to the sharing the warehouse capacities with one another, etc. (Frohlich and Westbrook, 2001; Vanpoucke et al., 2014).

In this context, Engcon also shares its resources with the supplier in order to contribute to them. For instance, Alfta produces the hydraulic blocks whereas another supplier manufactures the valves. Alfta buys the valves from the other supplier of Engcon who has been introduced to Alfta through Engcon.

As for Sandvik the interviewee adds that the company shares common resources and performs a transfer of knowledge in terms of technical issues. Sandvik uses the knowledge from the supplier that they do not have themselves. This transfer of knowledge happens particularly within the smaller teams in which they specific matters are discussed.

Volvo CE and its suppliers also carry out an exchange of knowledge, which occurs through the feedback that the supplier sends back to Volvo CE as RTS. The manufacturer also shares common resources with its supplier. In case the supplier needs a certain material, Volvo CE would be able to help them by allowing them to use of the same agreement that Volvo CE has.

Scania also shares its network and connections with its suppliers to improve cost, quality and delivery performance. The manufacturer also provides its suppliers with technical and knowledge support. In addition to this, the interviewee explains that knowledge exchange occurs more often when it comes to the design of the products.
As explained above, Peab the example of the integrated purchasing group showed the exchange of knowledge and the sharing of common resources that Peab develops with SSAB.

The integration in this sub-process can even expand to the logistic and shipment sector, where both partners share their transportation facilities in order to avoid the cost of extra transportation processes (Frohlich and Westbrook, 2001; Vanpoucke, et al., 2014).

For instance, Engcon seeks to optimize the transportation through improving the filling rate by placing more pieces on a pallet. For this purpose, Engcon needs to ask the supplier to place more pieces on the pallet at the supplier's work site. This requirement can be fulfilled only if the supplier is integrated and interested in reducing the cost of transportation. The supplier who jointly developed the PSA with the Engcon has enough motivation to take such improvement actions. It can also be interpreted that Sandvik and its suppliers should develop a better way to reduce the transportation cost together. For instance, though Sandvik’s key supplier owns the trucks for the transportation of the supply, Sandvik still take care of them since Sandvik has a better logistic and distribution network than the supplier.

By sharing their capabilities with one another, the integrated partners can implement the PSA in the most accurate way in order to reach the goals and the objectives.

However, the integrated performance for implementation of PSA through sharing of resources, exchange of knowledge, and sharing of transportation facilities can face the potential obstacle that in the case of deviation in the joint performance, it becomes difficult to track the exact source of deviation. In other words, it is difficult to track whose fault it is. Therefore the respective punishment and penalty may be imposed on the wrong source. In order to overcome this obstacle, both partners should have strong monitoring and controlling system, which will be discussed in the next sub-process.

5.2.7 Measure performance and generate supplier cost/profitability reports

According to the literature, the seventh and last operational sub-process refers to the measurement of the performance that took place in order to implement the PSA (Lambert and Schwieterman, 2012). The measurement takes place based on the metrics
that have been developed in the previous sub-processes (Ibid). After the performance measurement, the results will be used in order to report the supplier performance (Ibid). The reports are used to assess the value of the relationship with the supplier strategically and operationally with the purpose of evaluating the profitability of this conducted business (Ibid). In the reports, factors such as cost, quality, service and impact on sales are used to make the measurement (Ibid).

On the other hand, the empirical results show that Engcon measures the performance of the supplier and compares the actual results with the settled objectives. The quality and delivery time are major metrics that Engcon uses to measure the performance. Each week, Engcon measures the suppliers' performance. Engcon also provides performance reports at the end of each month and send it to the suppliers. If the supplier's performance has significant deviations from the objectives, then Engcon asks for the explanations of this deviation and further reacts based on those explanations.

Also, the empirical findings of Sandvik show that the manufacturer develops a report of the suppliers' performance and sends it to them. If there was any significant deviation in the suppliers' performance after 3 months of repetition, Sandvik talks and cooperates with suppliers in order to correct the repeated deviation. Sandvik also gives priorities to the deviations that occur with different suppliers. For instance, if three suppliers are below 60% on the on-time delivery, the priority is on them rather than on the one at 90%. Sandvik has a specific “supplier scorecard” through which they follow exactly the performance of the supplier.

Volvo CE also develops a supplier scorecard, which provides the suppliers a score over the product development. The supplier scorecard is used by Volvo CE to measure how the suppliers perform in the new product development, but also in the environment, the quality and the delivery performance (If the supplier achieves the target of 98%, it shall receive 15). Volvo CE gives their suppliers a total score out of 90 points. All suppliers will be notified about their scores every month. SAP sends the reports out and the suppliers can receive them through the supplier portal created by Volvo AB.

Peab bildrift AB, the company within the Peab Group, which is responsible for the purchase of all machines, measures the suppliers’ performance. There is no report
carried out on the measurement. The performance is assessed during the meetings that are taking place with the suppliers, in which everything is documented.

In the example of the supply of the wheels, Scania has a representative who is responsible for the coordination between the first and the second tiers of suppliers. This representative gives reports about the performance of both tiers of suppliers to Scania. This employee also receives reports from the first tier of suppliers if the second one deviates from the agreed performance, and vice versa. This structure is quite normal, since Scania requires the first and second tiers of suppliers to work only together when it comes to Scania's supplies.

From the association of the theoretical and empirical findings, it can be seen that Engcon, Sandvik, and Volvo CE follow a systematic measurement procedure in order to assess the impact and the profitability of the suppliers on their companies. Based on the settled metrics, they compare the actual performance of the supplier with the goals; after what they take corrective actions if they are needed. However, Scania does not follow the systematic ways as Engcon, Sandvik, and Volvo CE do. It is due to the fact that Scania compels the wheel assembler to work with the further upstream tier that Scania chooses. Moreover, Peab also does not follow this systematic way. There is no report to be provided to the suppliers and the measurement takes place with the suppliers of Peab through meetings. In this regard, the manufacturing companies Engcon, Sandvik, Volvo CE, Scania, and Peab can have more comprehensive and accurate measurement system by integrating with the suppliers through jointly performance assessment. Since the supply chain performance is an inter-related process, the performance of each separate actor can influence the performance of other actors. This means that, if for instance the results of actual performance deviate from the objectives, the roots of such a deviation may be in the performance of the second or third upstream tier of suppliers. Therefore, by having a joint measurement system, the manufacturing companies can track the roots of the deviation in a wider range of supply chain actors. If the manufacturer and its suppliers jointly measure the performance, the manufacturer can have access to more accurate information about the performance of further tiers of suppliers so it can track the deviation more accurately, since the first upstream tier of suppliers works much closer to the further tiers of suppliers. To some extent, this integrative system is currently used by Peab, which measures the performance of suppliers through the
meeting that it has with them. This integration can also take place with two upstream tiers of suppliers in special cases. For instance in Scania, by having this integrative system, Scania can track the deviation within the wheel assembler (first tier of suppliers) and tyre & wheel suppliers (second tier of suppliers) much clearer. Through such an integration, Scania can also have access to the information about the performance of even the third upstream tier of suppliers, thus it will have clear picture of wide range of its supply chain.

However, such integration may face the potential obstacle that the supplier intends to cover its own performance deviations by relating them to the further tiers of suppliers. In order to overcome this obstacle, the manufacturing company should maintain its own independent measurement system over the performance of the first upstream tier of suppliers, despite the joint performance measurement that they conduct together. In other words, the manufacturing company should have both independent and joint performance measurement systems.

5.3 Summary of the cross-case analysis

The following tables 8 and 9 summarize the authors’ findings for the cross-case analysis resulting from the empirical and theoretical results in order to answer to the research questions 1 and 2.
<table>
<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Company</th>
<th>SRM sub-process integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Review corporate, marketing, manufacturing and sourcing</td>
<td>Engcon, Sandvik, Scania, Volvo, CE</td>
<td>• Should know in advance the production capability of the potential suppliers through correct production capability, capacity, quality, cost of product, flexibility and speed of production information.</td>
</tr>
<tr>
<td>strategies</td>
<td>Engcon, Sandvik, Scania, Peab</td>
<td>• They should have access to the suppliers’ production capacities, to the suppliers’ technical skills and to the suppliers’ transportation facilities with their respective suppliers to develop a dual sourcing strategy.</td>
</tr>
<tr>
<td>Identify criteria for segmenting suppliers</td>
<td>Engcon, Sandvik, Scania, Volvo, CE</td>
<td>• Information that has been gathered from the suppliers in the first strategic sub-process to identify the criteria for the supplier segment.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Sandvik, Scania, Peab</td>
<td>• Jointly design PSA meeting the demand of both Engcon and its suppliers by attending the cross-functional meetings with the supplier.</td>
</tr>
<tr>
<td>Provide guidelines for the degree of differentiation</td>
<td>Engcon, Sandvik, Scania, Volvo, CE</td>
<td>• Develop a customized PSA with key suppliers and have a comprehensive communication over the requirements of the suppliers.</td>
</tr>
<tr>
<td>service agreement</td>
<td>Engcon, Sandvik, Scania, Peab</td>
<td>• Exchange of information about intra-organizational data in detail with its counterpart with supplier in order to require a good understanding of each partner’s capabilities and demands.</td>
</tr>
<tr>
<td>Develop framework of metrics</td>
<td>Engcon, Sandvik, Scania, Volvo, CE</td>
<td>• Plan to share the profits that result from the supplier’s process improvements (e.g. Lead-time).</td>
</tr>
<tr>
<td>Develop guidelines for sharing process improvement benefits with suppliers</td>
<td>Engcon, Sandvik, Scania, Volvo, CE</td>
<td>• Should exchange information with the suppliers that have been discussed in the first and second strategic sub-process.</td>
</tr>
<tr>
<td>Differentiate suppliers</td>
<td>Engcon, Sandvik, Scania, Peab</td>
<td>• Have joint independent inter-organizational meetings with each of the five key suppliers.</td>
</tr>
<tr>
<td>Prepare the supplier/Segment management team</td>
<td>Engcon, Peab, Scania, Volvo, CE</td>
<td>• Share each other’s technical knowledge and resources in the meetings.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Peab, Scania, Volvo, CE</td>
<td>• Integrate with both its standard and key suppliers, by trying to involve them in the team.</td>
</tr>
<tr>
<td>Internally review the supplier/Supplier segment</td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Have a key SAM structure and a cross-functional team to help integrate and later being able to carry out the PSA together with each key supplier.</td>
</tr>
<tr>
<td>Identify opportunities with the supplier/Supplier segment</td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Performing the task of the inter-organizational team (Cf. Second operational sub-process) which is to cooperate to achieve performance on the cost, quality, environmental affect and delivery performance improvement.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Jointly look for opportunities together with the suppliers in order to improve through the implementation of the inter-organizational team.</td>
</tr>
<tr>
<td>Develop the product and service agreement and communication plan</td>
<td>Engcon, Peab, Volvo, CE</td>
<td>• Should have integrated cooperative negotiations with their suppliers (explained in the third strategic sub-process) to discuss objectives and goals.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Having an integrated communication system set up and plan with suppliers in the agreement.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Carry out and write integrative agreements about collaborative negotiations.</td>
</tr>
<tr>
<td>Implement the product and service agreement</td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• The integrated partners should provide for each other technical support, resources sharing, an exchange of knowledge and of transportation facilities.</td>
</tr>
<tr>
<td></td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Have fixed meetings with the suppliers.</td>
</tr>
<tr>
<td>Measure performance and generate supplier cost/ profitability reports</td>
<td>Engcon, Sandvik, Scania, Peab, Volvo, CE</td>
<td>• Have a joint measurement system with the supplier to help the manufacturing companies track the roots of deviation in wider range of supply chain actors.</td>
</tr>
</tbody>
</table>

Table 8: Summary of the cross-case analysis regarding the first research question
<table>
<thead>
<tr>
<th>Name of SRM sub-process</th>
<th>Company</th>
<th>Potential obstacles to sub-process integration</th>
<th>Solutions for overcoming the obstacles</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic sub-processes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Review corporate, marketing, manufacturing and sourcing strategies</td>
<td>Engcon Sandvik Scania Volvo CE</td>
<td>● Embellish capabilities information by suppliers.</td>
<td>● Add a particular clause into the contract agreement to prevent any deviation.</td>
</tr>
<tr>
<td></td>
<td>Engcon Sandvik Scania Volvo CE</td>
<td>● After having signed an agreement with two different suppliers for one supply or part, a recurring deviation from one supplier can occur in the on-time delivery leading to the part being delivered late.</td>
<td>● The possible increase or decrease of the suppliers’ production compared to the forecast should be included in the agreement.</td>
</tr>
<tr>
<td>Identify criteria for segmenting suppliers</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Cf. First strategic sub-process. Supplier may be reluctant to offer maximum capability for producing the best product and deliver the best service.</td>
<td>● Cf. First strategic sub-process. Share the profits with the supplier when the supplier achieves a cost reduction and/or higher quality and/or faster lead-time.</td>
</tr>
<tr>
<td>Provide guidelines for the degree of differentiation in the product and service agreement</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Supplier is not willing to reduce its expectations in order to come up with a common agreement.</td>
<td>● Provide purchasing department internally with higher opportunities to increase the bargaining power with supplier.</td>
</tr>
<tr>
<td></td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Settlement of unrealistic metrics for the supplier. The supplier is willing to lower the metrics standards in order to ease its performance by giving underrated information about their production and delivery capacities.</td>
<td>● Have face to face meetings to agree upon the common realistic metrics (mainly upon quality and delivery time) to assess the performance. Establish stronger ties and more trust with supplier by sharing intra-organizational information and increasing the supplier sense of belonging.</td>
</tr>
<tr>
<td>Develop framework of metrics</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● The improvement of the lead-time by the supplier is difficult to relate to the improvement of the number of sales and to the profit earned.</td>
<td>● Add a clause in the agreement for agreeing on a certain percentage for supplier’s improvement of the lead-time.</td>
</tr>
<tr>
<td>Develop guidelines for sharing process improvement benefits with suppliers</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Supplier is reluctant to share the respective information due to confidentiality concerns.</td>
<td>● Share and exchange information and knowledge such as competences and technologies to establish strong ties and trust with supplier.</td>
</tr>
<tr>
<td><strong>Operational sub-processes</strong></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Differentiate suppliers</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Suppliers might be competitors to each other. Suppliers can integrate together; step forward and take over Engcon’s role in the supply chain. It is difficult to handle all the suppliers since they have only three employees in the purchasing department.</td>
<td>● Only in the case that the design of the final product that Engcon produces with the purpose of decreasing the cost of the production is discussed.</td>
</tr>
<tr>
<td>Prepare the supplier/Segment management team</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● No integration.</td>
<td>● No integration.</td>
</tr>
<tr>
<td>Internally review the supplier/Supplier segment</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● The supplier is reluctant to share resources, knowledge, transportation facilities due to a lack of commitment and trust.</td>
<td>● Establish strong ties and trust with suppliers in order to encourage the suppliers to be fully committed in the performance improvement process.</td>
</tr>
<tr>
<td>Identify opportunities with the supplier/Supplier segment</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● Complicated procedure to implement the system. Complexities for stopping the integration and the cooperation in the case that one of the integrated partners did not perform according to the agreements.</td>
<td>● Complexities for the implementation of a communication system should be clarified in the PSA. Have correct and comprehensive evaluations about each other's capabilities at initial stage before negotiating PSA.</td>
</tr>
<tr>
<td>Develop the product and service agreement and communication plan</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● It is difficult to track the exact source of the deviation in the joint performance, if it occurs.</td>
<td>● Both integrated partners should have a strong monitoring and controlling system.</td>
</tr>
<tr>
<td>Implement the product and service agreement</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td>● The supplier intends to cover own performance deviations by relating them to the further tiers of suppliers.</td>
<td>● Have both independent and joint performance measurement systems with the first upstream tier of suppliers.</td>
</tr>
<tr>
<td>Measure performance and generate supplier cost/ profitability reports</td>
<td>Engcon Sandvik Scania Volvo CE Peab</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9: Summary of the cross-case analysis regarding the second research question
5.4 Representation of the thesis development

The following figure 10 shows the development of the thesis after the cross-case analysis. The gathering of the empirical data in addition to the elaboration of the theoretical chapter enabled the authors to perform the analysis. Moreover, from the analysis, the authors will give their conclusions and make their recommendations in the next chapter.

Figure 10: Representation of the thesis development after the cross-case analysis
6. Conclusions and recommendations

6.1 Provides the conclusion for the research and the answer to the first research question.

6.2 Provides the conclusion for the research and the answer to the second research question.

6.3 Provides the recommendations from the authors for the companies and for further research.

6.4 Shows the reflections of the authors on the validity and reliability of the research.

6.5 Explains the practical and theoretical contributions of this thesis.

From the results of the analysis and findings, the authors of this paper can provide their conclusions and answer the research questions.

6.1 Conclusions for the first research question

*RQ 1: How the supplier relationship management process is integrated between the manufacturer and its first upstream tier within the Swedish construction equipment industry?*

For what regards the way that the SRM process can be integrated between the Swedish construction equipment manufacturer and its first tier of suppliers, it can be concluded that the SRM process integration takes place through the integration of the SRM sub-processes. It means that each sub-process contains certain characteristics and tasks that need to be carried out, and this performance of tasks can be conducted jointly between the manufacturing company and its first upstream tier with the purpose of getting those tasks done in the best possible way and at the lowest possible cost.

In this regard, twelve sub-processes have been pointed out from the literature that categorizes the SRM process into the steps (Croxton, et al., 2001; Lambert and Schwieterman, 2012). These twelve sub-processes include five strategic sub-processes, which refer to the identification and the categorization of the suppliers as well as to the
preparation of the PSA, and seven operational sub-processes, which reflect the proceedings that take place in order to perform the PSA and measure the performance.

During the strategic sub-processes, the PSA will be included with clauses regarding the performance metrics and the proportion of benefits that each partner receives as the result of performance improvement. The tasks within these five strategic sub-processes require an exchange of knowledge and of information. These information exchanges will be performed better by having an integrated system for the flow of information. The type of integration of these five strategic sub-processes is rather informational. In this context, Forslund and Jonsson (2007) define informational integration as an exchange of knowledge, information, technology, resources, risks, planning, control, and process management within the integrated actors.

Moreover, during the operational sub-processes, suppliers will be assessed and categorized into key and strategic ones. Teams will be assigned to deal with each supplier. Each team identifies opportunities with each supplier and based on this identification, the PSA will be written and further implemented. Ultimately, the implementation will be measured. The integration of the tasks, with the purpose of enabling a better performance within these operational sub-processes, not only entails an exchange of information, but also an exchange of trust and ideas, as well as a jointly measurement of the performance. This means that, despite the informational integration, an organizational integration also takes place for six out of the seven operational sub-processes (one operational sub-process is internal and does not need to be integrated with the suppliers). The organizational integration is also defined by Forslund and Jonsson (2007) who say that organizational integration consists of an exchange of ideas, trust, and organizational cultures, as well as the development of the joint performance measure, the problem solving and the decision making progress.

However, both the informational and the organizational integration of these twelve sub-processes can face potential obstacles, which should be addressed by the partners and tackled in order to be overcome.
6.2 Conclusions for the second research question

*RQ2: How can the potential obstacles to an integration of the supplier relationship management process between the manufacturer and its first upstream tier within the Swedish construction equipment industry be overcome?*

From the findings of the cross-case analysis, it can be seen that most of the potential obstacles that have been pointed out (table 3) are the results of the lack of trust, commitment, and goal congruence between the manufacturing company and its supplier; for instance, the supplier reluctance for sharing certain information with the manufacturer or its reluctance for offering maximum capability to produce the best product and to deliver the best service.

From these statements above, it can be concluded that many of the obstacles can be tackled by establishing a mechanism that makes the supplier feel part of the manufacturing organization with the purpose of deploying the supplier goals aligned with the ones of the manufacturer and of creating goal congruence. This also increases the trust and commitment of the supplier towards the manufacturer. The supplier feels itself as a trusted member of a bigger family so it works hard towards the success of this family. In order to establish such a mechanism, the manufacturing company should demonstrate that it values its suppliers. To do so, the manufacturer should provide incentives for the suppliers that will contribute to earn their trust and commitment. This incentives could be financial or/and the transferring of certain technical knowledge, information or/and the sharing of the resources etc. depending on the characteristics of the actors of the supply chain and of the specificities of the industry.

However, besides establishing commitment, trust, and goal congruence, the manufacturing company should also have an optimized internal structure in order to avoid deviations and misperformance. Selecting the right suppliers, the correct categorization and assessment for them, as well as a solid independent performance measurement system are major internal tasks that should be carried out well, in order to prevent obstacles and issues with the suppliers.
6.3 Recommendations from the authors

Moreover, the authors of this thesis wish to recommend to the manufacturers to keep an integrative perspective towards the suppliers, because integration allows better performance, lower costs, and longer and deeper relationships. Large enterprises such as Scania and Volvo should not have the vision that they are big and attractive, so the suppliers do as they command, since the suppliers may fulfill their agreements, but they will not have motivation to achieve better performance and process improvement; for the reason that they are not feeling themselves as a member of the family. This matter is especially significant when it comes to the key suppliers. It is recommended to the manufacturers to have integrative policies with their suppliers, despite the strong internal mechanism for planning, performing, and controlling.

It is also recommended to the other academicians to provide studies about the integration of other the seven key business processes of Croxton, et al. (2001) that constitute the core concept of SCM. It is also suggested to academicians to provide studies about the integration of SRM process between the manufacturer and first upstream tier of suppliers but in industries other than the construction equipment. However, the same industry can be studied but another country than Sweden should be favored for the research. The studies in this area can even be expanded to the integration of the other actors of the construction equipment supply chain such as the suppliers or the customers.

6.4 Reflections on the reliability and validity of the research

The research over the SRM process integration by the supply chain actors is a wide concept; therefore certain limitations have been set by the authors of this thesis. One of the limitations was the number of the construction equipment manufacturers available for interview. In fact, only a limited number of construction equipment companies are located in Sweden. Out of this limited number, only 5 companies agreed to have interview, despite the fact that the authors of the thesis contacted the companies for the interview 2 months in prior. The second obstacle was the different allocated time by the companies for the interview. In this regard, a shorter time has been given to the interviewers to carry out the interview with Peab (64 minutes). This limited time
prevented both parties to elaborate each topic, as they wanted. The third limitation refers to the mean of interviews. Face-to-face interviews for all the case companies would have been preferable in order to have common basis for comparing the results. In this thesis, only 3 interviews out of 5 were face-to-face, whereas 2 interviews out 5 were carried out through phone conversations, as it was the only possibility for the interviewees. The fourth limitation is that the thesis authors would have liked to interview more than one responsible person for each one of the interviewed companies. This could have raised the value of the empirical data obtained in this thesis. However, this could not happen since the managers of contacted companies were very busy.

6.5 Theoretical and practical contribution of this thesis

This thesis has been developed with the purpose of contributing and filling the existing research gap on the broad concept of SCM integration (cf. detailed information in chapter 1.2). The contribution takes place by adding new knowledge to the methods that can be used in order to integrate the business processes and particularly the SRM process.

The practical contribution of this research is given through the combination of the empirical information gathered through the interviewed companies with the theoretical findings. By this, it became possible to apply the theoretical data into the actual business world. It became possible to see how far the literature matches the reality of the practical world.
References

Books


**E-books**


**Journals**


Zubova, K., and Arikainen, O. (2012). Procurement Process Integration (PPI) in Swedish and Ukrainian Companies Producing Machinery and Equipment: Comparison in terms of the level of integration, the tools of integration and the barriers to integration from buyers’ perspective.

**Verbal sources**


**Websites**


Appendix

Interview guidelines

Background explanations

In order to have pre-understanding about the topic that we intend to discuss with you, the three main concepts are explained: Supplier relationship management (SRM) process, integration, Supplier relationship management integration.

- **Supplier relationship management (SRM) process**
  - Supplier relationship management (SRM) process is used to organize the relationship with the suppliers and to maintain it.
  - SRM is the process of activities that are necessary to acquire a service or/and a good which is matching the customer requirements.
  - SRM is used to understand how the buyer (manufacturer) should interact with the suppliers that are crucial for the manufacturing company (Ibid).
  - SRM is the process that involves setting up, stabilizing, dissolving, and developing connections with in-suppliers and out-suppliers with the purpose to improve relationships values.

- **Integration**
  - Integration is a process in which two or more firms intend to jointly develop and agree upon their processes and activities within the supply chain.
  - The integration between a manufacturer and a supplier help both actors to decrease their costs and improve their efficiency in order to be competitive.
  - Integration can lead to better performance in terms of quality, time, environmental aspects, innovation, and work environment.

- **SRM integration**
  - Supplier relationship management integration includes the jointly performance of activities (e.g. material acquisition, movement, and storage) with the purpose of decreasing the cost.
  - The supplier relationship management integration is an integrated process exploiting the suppliers' capabilities and qualified inputs by the manufacturer to produce/manufacture high quality products. It is also the effective utilization of
the suppliers' reputation for the durability and reliability of the supplies, which can have a positive impact on the perception of the manufacturer's customers.

- The supplier relationship management integration is a cooperative relationship over the long-run that is aimed at increasing the performance of both the supplier and the buyer.

**Interview questions**

- Some background about the company

  - **Supplier Relationship Management process integration**

    1. Do you have a Supplier Relationship Management process (or similar) – How is it called in your company?
    2. Can you explain in detail the steps followed internally in this process?
    3. Does your process divide into sub-processes – How are the sub-processes called? How are the activities carried out in each sub-process?
    4. How do you integrate this process with your supplier? Do you integrate the sub-processes with your supplier?
    5. Can you explain in detail the steps followed for the integration of the process (sub-processes) with your supplier?
    6. What do you think can still be improved in the integration of the process (sub-processes) with your supplier?

  - **Supplier Relationship Management process integration barriers**

    7. Do you have barriers to implement internally a Supplier Relationship Management process?
    8. Can you explain in detail the barriers you have to implement this process?
    9. Do you have barriers to integrate a Supplier Relationship Management process with your supplier?
    10. Can you explain in detail the barriers you have to integrate this process with your supplier?
    11. How do you think can the barriers be overcome to achieve a higher level of integration?
Additional information from the literature

Sub-processes listed in the literature

- **Strategic sub-processes**
  - Review corporate, marketing, manufacturing and sourcing strategies
  - Identify criteria for segmenting suppliers
  - Provide guidelines for the degree of differentiation in the product and service agreement
  - Develop framework of metrics
  - Develop guidelines for sharing process improvement benefits with suppliers

- **Operational sub-processes**
  - Segment suppliers
  - Prepare the supplier/segment management teams
  - Internally review the supplier/supplier segment
  - Identify opportunities with the supplier/supplier segment
  - Develop the product and service agreement and communication plan
  - Implement the product and service agreement
  - Measure performance and generate supplier cost/ profitability reports

List of existing barriers to integrate the process (stated in the literature)

- Lack of trust
- Lack of goal congruence
- Lack of communication – information sharing
- Anxiety about a possible information system breakdown
- Disagreement on the implementation and on the specificities of the system
- Security issues
- Lack of fund - high costs
- Discrepancy in partners’ trading capability
- Lack of commitment
- Higher coordination costs and to a lack of flexibility
- Corporate inflexibility, slowness to changes and less reactivity to uncertainties
- Willingness of managers to share essential information
- Lack of available tools to assess joint performance
- Poor IT infrastructure
- Differences in the organization of the supply chain
- Internal resistance
- Lack of consistent information technology
- Demand alteration
- Discordancy between information systems
- Lack of understanding
- Formality
Empirical findings

Engcon Nordic AB

Strategic sub-processes

Review corporate, marketing, manufacturing and sourcing strategies

Engcon receives a lot of purchasing orders. The strategy of the company is to have few suppliers with as much integrated processes and long-term relationships as possible. Engcon does not look too closely at the prices, which means that they do not switch suppliers when the prices increase; but they prefer to develop their products together with the suppliers through dialogues: if the price is too high, they have a discussion to know how to achieve the required target.

Engcon has made a change from welding the products to casting them. Previously, they bought the pieces and welded them together. Nowadays, they mould them by pouring material to form it. However, the mould is not made by them.

The corporate strategy for Engcon is growth with fair quality and cheap prices. The owner of the company is entrepreneur. This entrepreneurial mind tends to define very short deadlines that have to be met, which is sometimes difficult to keep up with. This strategy is also not to prioritize the price and quality above other factors; but rather, the first priority is given to have the product move from a point A to a point B. However, this strategy is according to Sjölund (2015) not profitable, they need to look at the purchasing prices. This strategy also allows fast end results but they are not optimized.

The supplier is buying the parts and keeps stock of the products on its own. Engcon is buying only the finished products: They do not produce anything by themselves; they only assemble the pieces together. They buy the components from the suppliers, which should be as finished as possible.

Engcon has selected the foundry, from which they buy the casting parts in big batches (100 pieces at once). They store the semi-finished goods, and they start machining. As a result, they have a half-finished product.
The delivery occurs after Engcon places the purchasing order, and they assemble the product. They do not use a JIT procedure, but they rather use a re-order point system. The supplier afterwards sends an order acknowledgement back to Engcon. Engcon does not have JIT, because the inventory term indicator which is used as a metric could be quite high. Inventory term indicator refers to the number of inventory replenishment that takes place within a year. Also, the demand fluctuations in high and low seasons can cause delivery errors if the JIT process is followed by Engcon.

Engcon notifies the supplier of the required lead-time. Engcon’s goal is to minimize the lead time: in fact, the re-order point system is based on the lead-time. In case the supplier asks for a longer lead-time, Engcon will need to bear more stock. In case Engcon wants less lead time, the supplier would need more information from Engcon on how much they are going to order. Engcon does not use forecasts, due to the difficulty to forecast their own sales. Basically they are able to see 2 weeks into the future. Everything that Engcon assembles is sold.

The suppliers know that Engcon has a long-term strategy. There is no market price for most of Engcon’s products; they own the production and the drawings. Therefore, to have the product, go to the supplier (batch size, lead time) and the suppliers come back with the price.

They do not only choose the cheapest supplier but also a big organization, on which Engcon can rely on if support is needed in some ways.

**Identify criteria for segmenting suppliers**

Engcon has a supplier base that has not changed much since the beginning. The suppliers have to be able to produce the products matching Engcon’s needs. Therefore, heavy machinery is necessary since Engcon has big products, they cannot use small equipment. This requirement is a criteria part of Engcon’s categorization of the suppliers.

In fact, Engcon needs to have suppliers that can meet their production needs. Engcon categorizes its suppliers based on the critical needs of the components. In other words, the supplier that provides the components which are necessary for production and without them the production stops, are considered to be the key ones.
They do not only choose the cheapest supplier but also a big organization, on which Engcon can rely on if support is needed in some ways. They should be able to trust the competence of the supplier. Their construction department does not have to be an expert in the domain.

Provide guidelines for the degree of differentiation in the product and service agreement

The purchasing department has close relationships with the production department. The production is the customer of the purchasing department. The production department is responsible for notifying the sales person that the delivery of the product will have delay. In case the supplier is somewhat late, the end customer will not be affected, due to the stocks on finished products. If the delivery is late, Engcon can assemble with the stock the company maintains, since Engcon keeps stocks and so have the suppliers.

Develop framework of metrics

As for indicators, Engcon uses the quality, delivery time, gross margin, number of products produced, start and stop of the production (for example, the production cycle time can be 2.5 h), delayed deliveries, purchased orders, inventory terms (it refers to the number of times that the company uses the whole stock per year; it can be understood as ITO, for instance 10 times a year). Sjölund (2015) adds that the quality and delivery time are indicators that are integrated with the supplier.

Develop guidelines for sharing process improvement benefits with suppliers

Engcon and the supplier do not agree upon the profits. Even if they benefit from integration, the suppliers do not have any incentives for the collaboration: they do not earn any percentage of the profits earned by the sale. All the benefits from the finished product are kept by Engcon.

Engcon has a preferred transportation supplier (fourth party), and the suppliers use their agreement in order to have a good deal.
Operational sub-processes

Differentiate suppliers

At Engcon, regular meetings are organized with their suppliers. They have 5 key suppliers that are important in terms of the critical need for the supply. All these suppliers provide different products to Engcon.

Alfta has larger series machines going 24h a day, whereas other suppliers are rather handmade or in small series.

Prepare the supplier/segment management teams

Engcon is a rather small company. Engcon’s purchasing department includes 2 managerial employees and one assistant who are consistently involved with suppliers. Sjölund is the responsible for the strategic purchasing, the other buyer is responsible for the operational part and there is one administrative assistant.

Engcon provides coaching through the help of a consultant 4 times a year, during the meetings. The purchasing manager meets the supplier more often and can talk about the problems in person. During these meetings, the suppliers also meet with one another, and can discuss business related issues.

Internally review the supplier/supplier segment

Engcon reviews the supplier’s ability to deliver on time, which determines when Engcon is able to sell the product.

When Engcon sends the purchase order, they agree upon 21 days lead-time. Within 2 days, Engcon receives an order acknowledgement with the date at which the supplier is able to deliver the product; in other words, the date at which Engcon has the product in their inventory.

Engcon has set a time-window. If 5 more days are counted more than what was expected, Engcon will require a discussion with the supplier.
Identify opportunities with the supplier/supplier segment

Engcon includes a construction department. Therefore, if the customers place an order for a product that Engcon has not produced before, their teams will draw a new plan.

The internal goals, targets and strategies of Engcon are communicated to the supplier. If the supplier reaches the goal set at 90% for the lead-time, Engcon will try to achieve a further goal of 92%. If a problem persists, representatives of the organization will talk to the supplier and eventually, Engcon will decide to change the supplier.

The suppliers know that they cannot keep raising prices all the time. They need to come up with other ways to satisfy the customers, and through this, they benefit from it. The most important incentive that Engcon believes they can give to their suppliers is stability. They can agree with a supplier that they will be customers for 3 more years, which gives the supplier stability, and investment possibilities (hiring plan). Engcon uses this strategy with all their suppliers. They also give a promise for a volume at the beginning of the year, to allow the suppliers to buy raw materials for example (this promise might decrease during the year).

Also, it must be noted that, the suppliers are rather small companies; the contact persons are therefore the same no matter the functions and their needs. However, Engcon finds itself in a growth period; as a result, they look at bigger companies to supply them: they will have better production capabilities.

Develop the product and service agreement and communication plan

To reduce the delivery performance for special products in the tiltrotator, the supplier has access to Engcon’s system. They see in their plan when Engcon enters an order. However, this is only for this supplier Alfta and specific products else than stomme.

Engcon is looking to develop a new integrated ERP system, with fewer hands on, since the EDI function in their system is old. However, Engcon is facing internally some barriers. To choose the new system, they are looking at 5 different ERP suppliers. Sjölund (2015) adds that they are not ready to implement a new system yet. The integration of the processes internally remains difficult since the different entities at Engcon are not working the same way (Finland /Sweden). The processes remain difficult to standardize. Sjölund (2015) asserts that Engcon would need 3 to 4 years to
streamline the processes; afterwards, they will have an IT system enabling the organization to communicate easily with their suppliers.

Sjölund (2015) asserts that Engcon sees the integration with the supplier mostly as a benefit. As a matter of fact, the organization can rely on the supplier if a problem occurs. They can trust the competence of the supplier; their construction department does not have to be an expert in the domain.

To reduce the lead-time for special products in the tiltrotator, the supplier has access to Engcon’s system. They see in their plan when Engcon enters an order. However, this is only for this supplier Alfta and specific products else than stomme.

Engcon is setting goals. For instance, they try to achieve the 60% in two months, and then 70% in 4 months, etc. If the setting of goals does not work, Engcon will change the supplier. The supplier cannot continue to feel safe because they are located close to them. It can be noted that the internal goals, targets and strategies of Engcon are communicated to the supplier.

**Implement the product and service agreement**

Both partners accommodate each other: if the supplier recognizes that the welding is difficult to do, then Engcon can change the drawings and therefore help to reduce the lead time. The supplier has the production knowledge but accommodating each other is key, to prevent problems. For example if they put a hole somewhere but remains impossible to reach. In other words, Engcon and suppliers gather together and discuss over the product design in order to make it technically possible to produce, at the same time, reduce the cost of production by providing suggestions in order to modify the product design if it is necessary. Engcon sets meetings 4 times a year with all of their 5 key suppliers. There is also a knowledge exchange group occurring through the meetings. All the meetings have a theme, for example the risk management that leads to knowledge exchange through a discussion between the participants. Engcon tries to make their suppliers grow together. In this regard, the entities carry out an exchange of resources. For instance, Alfta produces the hydraulic blocks, another supplier manufactures the valves. Alfta buys the valves from the other supplier of Engcon.
Measure performance and generate supplier cost/ profitability reports

Engcon displays the indicators as curves. On the chart, one curve represents the trend, and another one represents the actual results. The quality and delivery time are indicators that are integrated with the supplier. It is possible to notice the discrepancy between both curves. For these assessment measures, Engcon also has a window upon which all suppliers agree. In addition to these measures, the key suppliers have their own internal indicators.

Each week, Engcon assesses the supplier performance (Nordic supply). For instance, they see that the indicator is 87. The reporting is carried out weekly. Monthly, the suppliers get an email with the report. It is automatic but can also be done manually. The reports are sent to them and following the reports, Engcon asks for explanation to explain the worst problems during the week even though they may know the problem already. This goes for all the suppliers.

Engcon also has a web-based database that they send to the supplier, and that the suppliers need to answer within 10 days, when something does not happen according to plan. Engcon also assesses the answer and judges if the answer from the supplier is sufficient.

Obstacles / integration

The stomme is a strategic product, therefore they need to push the integration further, unlike for other products.

According to Sjölund (2015), the costs to integrate are not high for Engcon but it requires a lot of time and energy to work together. The interviewee adds that the suppliers can face internal problems that need to be dealt by themselves. They have sometimes issues with their production capacity that derives from a problematic planning process. According to the interviewee, the supplier might not use their IT system correctly.

Engcon and the supplier do not agree upon the profits. Even if they benefit from integration, the suppliers do not have any incentives for the collaboration: they do not earn any percentage of the profits earned by the sale. All the benefits from the finished product are kept by Engcon.
Sjölund (2015) asserts that Engcon sees the integration mostly as a benefit. However, Sjölund (2015) also recognizes that when the key suppliers are integrated, and if there is a problem impossible to work through, it’s difficult to overcome the issue.

Engcon is just starting to work with the environment by optimizing the transportation and the shipping of material. They tend to improve the filling rate by placing more pieces on a pallet.

The supplier integration can have an impact on the work environment when the pallets have to be moved, through an improvement of the cooperation and of the storage. However, Engcon does not train the supplier for safety.

Of course, the lack of trust is a big obstacle for implementing an integration with the key supplier, Sjölund (2015) explains that if there is no trust between both actors, there is no willingness to integrate either. Engcon trusts their key suppliers by remaining open with their financial records and drawings.

For the future with the development of the integrated ERP system, Sjölund (2015) thinks that the supplier should not have access to everything; nevertheless, Engcon will not keep any secret from their key suppliers. The interviewee says that a complete information integration might not be relevant, profitable nor effective. However, information integration is beneficial if this is the right piece of information that is exchanged.

A further concern Engcon has, concerning the integration with a key supplier, is that if there is only a single source that can provide a specific product to Engcon, a problem for the delivery would become a major issue for the organization.

For further improvement, Sjölund (2015) thinks that a better communication would improve the lead-time on time delivery, if the information communicated is correct. Therefore having a better communication remains an internal problem first. A better communication can also come through an estimated consumption of what has been sold. At the high season, there is a need to produce more. As a result, sales people should give an estimated forecast. This is currently based on history.
Sandvik AB

Strategic Sub-processes

Review corporate, marketing, manufacturing and sourcing strategies

The supplier’s production is located close to them, which is convenient for Sandvik. It makes the supplier even more reliable in case something happens, Sandvik will be able to react more quickly.

First, Sandvik noticed through a benchmarking that the supplier was not competitive anymore and that they had to do something differently. They found out that the cost base was too high. As a result, Sandvik led discussions internally to determine where the pricing should be. It can be added that it is very difficult to make Swedish companies compete only on costs against eastern companies. It has been decided to sort things out on other areas.

The organization is also looking for new sourcing opportunities coming from other countries in order to have more negotiation power with the supplier.

With their supplier, Sandvik works particularly closely on the R&D section. Sandvik is especially expecting the suppliers to help them on the technical side. Sandvik totally relies on their steel manufacturer’s capabilities and skills.

Identify criteria for segmenting suppliers

In order to select among the suppliers, the purchasing department at Sandvik takes several criteria into account. First, the organization considers the production capacity of the supplier in order to assess whether the supplier will be able to produce the volume needed by Sandvik, Sandvik then regards the closeness of the facilities which is for the company a factor of reliability. The competitiveness of the supplier is also assessed according to their pricing and their attractiveness against other suppliers, as well as their technical knowledge.
Provide guidelines for the degree of differentiation in the product and service agreement

The company includes four different business areas, such as technology, machining tools, construction and mining. They might use the same supplier for several business areas. For instance, Sandvik can source steel from the same key supplier for the construction area as well as for the mining area.

More so, Sandvik is separated internally into product lines, which leads the different internal departments to work closely with each other. To produce this specific kind of steel, the manufacturer needs about 8 weeks. Therefore, Sandvik needs to keep stocks for this product.

Sandvik gives a lot of freedom to their key suppliers concerning their technical and production skills.

Develop framework of metrics

Sandvik develops a framework of metrics that are bound by the contract they have with the supplier. The most important ones are the On-time delivery that should be at 95%, the Product rejection of 9% and the lead-time of 5 days.

Develop guidelines for sharing process improvement benefits with suppliers

Duffaut (2015) explains that Sandvik does not develop any formal agreement concerning the payment and the sharing of the benefits.

Operational sub-processes

Differentiate suppliers

Sandvik segments its suppliers according to the criteria developed at the strategic stage and categorize the suppliers regarding the strategic importance of the supply and its complexity to produce.
**Prepare the supplier/segment management teams**

Sandvik has implemented a SAM structure in order to regulate the relationship. It results in a single person, key account manager who is responsible for the communication and the coordination. Before implementing such a structure, no one had the complete picture of the relationship. Sandvik’s higher management set targets to the key account manager. If the cost targets cannot be achieved directly throughout the product development activities, the key account manager has the task to look upon the supplier’s processes to see what can be improved, copied and implemented.

The task of the key account manager also is to get the right people in the room to discuss the respective issues and to discuss where the issues are. They implement a cross-functional team that aims to improve the product, through product development activities, and the cost. In some cases, the only goal of the cross functional team is only to reduce the costs.

The cross-functional teams are formed of 2 or 3 employees from the R&D as well as an R&D manager from both sides, a product line manager, an employee for the quality, an employee for the production, and an employee for the sourcing. In total, they are about 16 persons to attend to these meetings.

Besides these group meetings, the bigger team is divided into smaller teams to work in a more efficient way.

**Internally review the supplier/supplier segment**

In the past, the supplier had an experience of not reaching the targets set by Sandvik. To remediate to this problem, Sandvik used other suppliers to recover from the issue. Since the supplier managed to correct the inefficiency, from now on, Sandvik makes sure that the supplier has a back-up solution in case of issues. On top of this, Sandvik has its own internal back-up.

To establish the section of the supplier, Sandvik analyzes internally the criticality and the technicality of the supply and the supplier.
Identify opportunities with the supplier/supplier segment

Knowing that Sandvik disposes since a couple of years of dual sourcing for every product that they buy from the suppliers, the suppliers have lost a lot of volume, and they want to keep Sandvik as a customer to get rid of their remaining volumes, this is an incentive for the supplier to integrate more with Sandvik.

For the performance measurement, Sandvik uses Excel spreadsheets instead of an ERP system. However, they are currently working on implementing an integrated ERP system that will encompass the performance measurement.

In the future, Sandvik wishes to develop more areas to work closely together with the supplier on, such as different processes, logistic solutions and also on identifying the potential risks and assets.

Develop the product and service agreement and communication plan

Duffaut (2015) highlights that Sandvik sets each year targets, such as reducing the cost by 5% along with the suppliers. This goal is communicated to the suppliers and its implementation is followed up during the meetings.

Implement the product and service agreement

The key account manager plans regular meetings with the supplier, about once a week, and is the one that constantly has a look at the contract. Sandvik organizes meetings with their strategic suppliers once a year to discuss the price and whether it’s possible to reduce it.

Sandvik and its supplier have together a full insight into each other’s operational processes. In this regard, technical employees come to their facilities to look at their processes.

Measure performance and generate supplier cost/profitability reports

Once a month, Sandvik carries out a reporting and transfers it to the supplier. In case the reporting shows necessary correction, Sandvik reacts after a quarter (3 months) and talks to the supplier to fix the problem. For the reaction to deviations, Duffaut (2015) explains that there is a need for prioritizing the corrections. In fact, in case 3 suppliers
are below 60% on the on-time delivery, the priority is on them rather than on the one at 90%.

For the last couple of years, Sandvik integrates their metrics with their supplier. They dispose of a certain “supplier scorecard” through which they know exactly the performance of the supplier. Internally, the supplier might have also other metrics.

**Obstacles / integration**

To enhance the integration, further development of the relationship remains possible concerning the planning and product development process.

For this purpose, they use common resources and carry out a transfer of knowledge in terms of technical issues. Sandvik uses the knowledge from the supplier that they do not have themselves. This transfer of knowledge happens particularly within the smaller teams that are working together on a daily basis. Duffaut (2015) notes that Sandvik is improving over time regarding the transfer of knowledge.

Concerning the purchasing, Sandvik has established an integrated EDI solution that makes the ERP solutions connected to each other.

Regarding the risk management, Sandvik makes sure that the supplier has a backup solution, so the production and the delivery run without problems. However, Duffaut (2015) adds that problems came many times from their side, especially from the purchasing department over the forecasts. Whenever there is a mismatching of the orders or of the forecasts, the supplier tries to help fix the problems.

For Sandvik, a close integration with the key suppliers improves the quality performance and cost performance. It also prevents any interruption of the supply, which can be very expensive.

Regarding a potential enhancement of the integration with the key supplier, questions have been posed internally to know whether they should integrate further together. There is internally a lack of understanding over how a Supplier relationship should be working and managed.
Another issue that they had is that too much information is given away. From a negotiation point of view, they need to choose the right information to share in order to remain in a favorable position.

Duffaut (2015) explains that the integration of common resources can be essentially measured in human terms. In this regard, the integration can be considered as expensive.

**Volvo Construction Equipment AB**

**Strategic Sub-processes**

**Review corporate, marketing, manufacturing and sourcing strategies**

They cannot show that supplier management process looks that, because they do not have a so-called process. They have different tools, strategies. Volvo CE has different ways of working with the suppliers depending on the parts they are sourcing. For example, they will not spend too much time talking about strategies with Nuts and Bolts that offer low value products. It can be noted that the strategy of Volvo is not to switch the supplier after 2 months. They aim to develop close relations with the suppliers that offer the highest value products. The longest lead time is probably new engines, transmissions; new tyres are very long to develop (1 year).

When they pick a supplier, Volvo CE evaluates the supplier through a tool called SEM. This model comes from Global Trucks Operations (GTO), a Volvo AB tool. They evaluate the supplier during 2 or 3 days, and go through production, organization, safety, finances, statistics, etc. and give them a rating. In this evaluation, there are different stop parameters described in their ethical chart such as forbidden chemicals, child labor. The supplier is then integrated into their supplier base, and can be seen by all Volvo companies throughout the world.

In most cases, they are producing the drawings, developing the parts that Volvo CE is going to source from their suppliers.

The complete value of the complete product is from 70% to 80% of the total value bought purchased material, whereas the rest is assembly, paint and internal production. They buy from suppliers and internal companies.
They have divided all parts into different commodities and divided the purchasing of the commodities into different purchasing offices. Normally, the purchaser has the responsibility of the strategic purchasing, sourcing the products to the ongoing projects and to the production. In 2009, they divided the responsibilities into 3 different roles: Strategy, Project and Production.

They have 1 buyer in each area, for the same commodity (for example: structures) they could be heavy components, like a part that can be fitted on the frame. The buyer in the production area is responsible for everything with the ongoing production. If there is a negotiation with the supplier or changes on parts, he makes the updates in the system. For projects, the person is responsible for all new parts to be bought into the projects, new machines, next generation machines, updates of smaller component projects. He is also responsible for the parts until it has been running flawless 3 months in the production. The strategy or commodity buyer is responsible for the strategy. He is responsible for the suppliers in a dedicated commodity. He looks whether it fulfills the requirements (support for the engineering, dedication, etc.). They select 5 suppliers, and when a new project comes up, the person presents the list. This person also takes care of the big negotiations concerning the suppliers. They select the suppliers to the supplier base; the project buyer is responsible to select one supplier for the project. They might source 1000 project parts of a machine (for example 200 from this commodity. The purchase parts are divided into the commodities appointed by the commodity buyer).

Normally, they have single sources. They have cases with dual sourcing, when they know that it takes time to have/ move the parts. There is the knowledge at the supplier to manufacture the part. If they want to source hundreds of parts within 5 suppliers, they have to divide the job between the suppliers. For heavy components, there is seldom a scarcity of the supply, which differs from electronics, in which some companies might have bought a patent that prevents any other company to manufacture it. There is only one supplier for engine and transmission parts, because no one else can make them.

In Braås, they have all roles. 5 commodity buyers, 5 project buyers and 3 production buyers.
When they start a new machine development, they identify the material. Then the SD is responsible to identify key parts, components where they need to secure the quality, the measurement in a more detailed way. This is not the case for standard parts.

They are looking to increase their gross margin. Therefore, they cannot reduce their final prices to be cheaper than the competitors. Volvo CE is a price leading company in the market, and as such, they need to set a standard price for the market. As a result, they need to reduce costs in the purchasing and in the production.

They have a stock of finished machines. When they build a machine here, it’s produced for a customer, but the dealers also order machines to be able to take short time orders and to have machines available.

The production occurs according to forecast and also to customer orders. However, after 2008, they are producing more on customer orders.

**Identify criteria for segmenting suppliers**

Volvo CE tries not to implement suppliers that do not have a process in place already. They have bought a lot of companies between 1997 and 2007 which later merged into Volvo CE. They increased their supplier base tremendously. The merges happened so fast, that they did not really manage to keep the supplier base on a manageable basis. They had about 2800 suppliers. Since 2009, they want to reduce the supplier base. To narrow it down, they have basic requirements on the suppliers. They should have standards (ISO 9000, 14000, etc.). Some years ago, the delivery performance should be at a certain rate; but today it has become more a standard: the delivery performance should be at 98% and the quality 280 PPM. They are also looking at how many suppliers are supplying one part number as they look to segment their suppliers. They do not want many suppliers to supply one part number.

Moreover, Volvo CE needs to be seen as the first priority for the suppliers. In case there is capacity issue, they want to be the priority.
Provide guidelines for the degree of differentiation in the product and service agreement

They have a framework agreement with Volvo’s general purchasing conditions which is signed with the key and standard suppliers. However, Volvo CE also has very long term suppliers, with which it’s difficult to force such an agreement into the relation since they have been working for a very long time together.

They have a QDC contract through which they formalize the quality demands, deliveries and the cost. They work on a 2 or 3 years basis with them. They are aware about what they expect from them.

Regarding the fluctuation in the demand, they have an agreement regarding how quick Volvo CE can change their delivery schedules. They have to be able within 3 months to increase 30% of the volume. They do not promise to buy volumes from their suppliers. They explain to the supplier that they are going into the business together and that the market demand is controlling their orders. During Q1 and Q2, they have quite high production Q3 decreasing and Q4 quite slow.

Develop framework of metrics

Volvo CE has a supplier scorecard (performance measurement tool) for all their suppliers. They evaluate the suppliers through this tool monthly, and the suppliers get a measurement. The metrics used are the delivery performance, ITO, the price reduction and the non-conforming inspection reports.

It must be noted that Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them.

Develop guidelines for sharing process improvement benefits with suppliers

The suppliers can suggest improvement on the parts they develop rather than on the production plant as Volvo CE is doing with their hydraulic supplier.

Volvo CE uses also penalties as incentives if the suppliers do not perform as agreed. When they have workshops together on certain occasions, they share the cost improvements together. Sometimes they have an agreement, and sometimes they need it
to remain a supplier of Volvo CE. It profits to the suppliers if they make 3% cost reduction, Volvo CE allows them to keep it.

**Operational sub-processes**

**Differentiate suppliers**

Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them. When they pick a supplier, Volvo CE evaluates the supplier through a tool called SEM.

**Prepare the supplier/segment management teams**

The cooperation for the new product development is carried out through cross-functional teams. Both partners have meetings together, with the buyers, design engineers, supply developers together with the sales persons. These meetings happen weekly or biweekly.

**Internally review the supplier/supplier segment**

Volvo CE has a supplier base and they once had about 2800 suppliers. Since 2009, they want to reduce the supplier base. Moreover, Volvo CE makes no differentiation between the key suppliers and standard suppliers on how they measure them, but on how they work with them.

**Identify opportunities with the supplier/supplier segment**

In very few cases, Volvo CE implements an ESI, which leads to a deeper relationship with supplier.

Volvo is helping the suppliers with the system called VPS. The VPS process is used at the supplier’s location. The SD is part of the purchasing organization.

It is interesting for Volvo CE to use the VPS system as Volvo CE employees can come at the supplier’s site to develop the production in order to be more cost efficient.

If they send a RFQ to the supplier and say this is how they designed it. Volvo CE expects the supplier to send back a RTS where they agree upon the design, and that they
give feedback with suggestions (square bottom instead of round for instance) on how it would be easier for the supplier to produce it more cost efficiently. This refers to integration through an exchange of knowledge. Nilsson (2015) calls it cooperation.

Volvo CE also helps other suppliers to buy steel on the same agreement that they have. AB Volvo makes agreements on high tonnage of steel.

**Develop the product and service agreement and communication plan**

Volvo CE has a framework agreement with Volvo’s general purchasing conditions which is signed with the key and standard suppliers.

The lack of communication is always there. One of the hardest parts in the day to day work is to carry out efficient and enough communication. The buyers in 3 different roles have to communicate with each other. The communication between the buyers is crucial to make things work. There are already internal issues for communication. This is a drawback or a backside of the organizational structure. The employees also have a dialogue with the suppliers that they are responsible for. Many times, they think that someone else informs or that the person is already informed. There are internal and external issues for communication. In fact, the suppliers do not tell everything to Volvo CE (they do not always know who to communicate to). They have a supplier host aside the roles; therefore, there is one single contact since 2009. However, this does not work very well since the suppliers prefer personal communication: it is easier to communicate with a person that they have a good relationship with.

They have 4 material controllers for the Volvo CE plants in Sweden, for the same commodities, design engineers, supply developers. It makes lots of people to communicate with. They need to keep the headcount down so it is not possible that an additional employee come to help the communication. Moreover, Volvo CE prefers to use the telephone rather than a common database. They have too many information channels; databases, intranet, mails, Lync, telephone, SMS, etc. They do not have time to look for information; if urgent, have to make sure that the person receives the information he needs. They need to know who needs to be informed: this can be difficult for big organizations.
How they communicate with the supplier is handled by logistics and Volvo IT. They should have a fully integrated EDI with delivery schedules, deliveries, and invoices. They should be able to receive messages from Volvo CE and be able to send messages into their system. They use automotive industry standards. If they do not have that, they should be able to use the web EDI, when they are not integrated. They can log in in their portal and get the information into another form.

**Implement the product and service agreement**

Volvo CE is not taking the full process to implement it at the supplier’s location. Instead, they try to use parts of it when it’s necessary and transform it into a kind of VPS.

There is a frozen period of time of ten days, in which Volvo CE freeze the orders, with the volume and time. They have 60 days when they take the responsibility, they say that they need the material in the next 60 days, but they cannot say exactly when (it can differ from 1 day earlier or a couple of days later). Volvo CE has a 10 to 12 months forecast in which they predict and plan. The forecast is transparent for the suppliers; they get a delivery schedule showing at least 12 months ahead (which is not for sure).

They have news about the market, in order to know if the market is stable or still uncertain. In this regard, if the forecast changes, the suppliers are prepared.

Volvo CE does not have big stocks since 2008. However, the suppliers have the same agreement.

Some suppliers say that it’s not fitting their strategy. So if Volvo wants them to be cost efficient, you need to move parts away from them. It is easy for Volvo to say that the supplier and Volvo CE have an agreement. But Volvo CE needs to understand what the supplier aims at. Then Volvo CE might find cost savings by moving the parts away. This is a unique situation because usually people want more to produce.

**Measure performance and generate supplier cost/ profitability reports**

Volvo CE implements the metrics of the supplier scorecard and give the suppliers a score over the product development, through which they assess how well the suppliers perform in new product development; over the environment and quality and over the
delivery performance (If the supplier achieves the target of 98%, it shall receive 15). Thus, Volvo CE gives their suppliers a total score out of 90 points. All suppliers receive this evaluation automatically every month; nothing needs to be executed manually. SAP sends the report out and the suppliers can receive it through the supplier portal made by Volvo AB.

**Obstacles / integration**

Volvo CE is not very developed in this area. It’s hard for the engineering platform to integrate the engineers into their product development process. They are developing the product for 2 or 3 years. This means that the suppliers have to be integrated into the development also for 2 or 3 years. Volvo CE is trying to improve this area for the hydraulic components. However, an internal resistance among design engineers to integrate the supplier in a project that they have been developing for a long time and in which the supplier can give better ideas can be noticed. Volvo CE is not very good at integrating the suppliers at the developing phase. Volvo CE cooperates with the partner in the design phase.

Volvo CE benefits from its complex organization; because a production stop does not impact the project ongoing.

The production buyer needs to notify the project buyer that there are issues in the production with the supplier (Volvo CE will be careful for choosing the supplier for the next project). Depending how far they have come with the supplier, they can switch it but if it’s a long-term cooperation with the supplier, they would rather correct the error. If there are long term issues, the supplier would probably not be chosen for the next project.

Volvo CE works more closely with the supplier where they have heavy tooling, because there are longer lead-times to develop the parts.

Nilsson (2015) takes the example of exterior plastic parts. The time to develop a tool for them is between 6 and 12 months. For heavy casted parts like the hitch, it takes longer, so Volvo CE and the supplier are working more closely together. As they have to start the cooperation earlier in the project; they need to know that the suppliers are stable. The parts and the tooling are also very costly. It is interesting for Volvo CE to use the
VPS system as Volvo CE employees can come at the supplier’s site to develop the production in order to be more cost efficient. They also use Intraco Penta Prima Servis (IPPS), which is a similar system to VPS for the value analysis for the supplier.

When Volvo CE needs key parts, the company has also key suppliers. Therefore, they need to be entirely sure of the suppliers. But not by integrating their processes together: They rather cooperate on the development of the parts. Normally, for non-key components, they can send drawings and a RFQ to the supplier. Volvo CE is expecting that they understand the drawing and expect that they give feedback. They have a negotiation and they later place an order.

For the plastic parts, the suppliers need to be involved in order to know their functions, how they are going to be fitted on the carrying structure underneath. If the design of the product/machine in done this way, it will affect the cost and the performance of the part. For this purpose, they need to integrate them early in the project to be able to design the machine to fit their technologies for producing the parts.

They are communicating their needs to the supplier, rather than integrating their processes together.

A difference between Volvo CE’s goals and suppliers’ goals happens quite often: if Volvo CE’s goal is to reduce the cost, and the supplier’s goal is to reserve the investment for other customers, there might be issues. If they want the supplier to invest, sometimes they take part of that investment as well. They pay the tooling needed for these parts.

Volvo CE has set a limit, which is that the organization should not represent more than 30% of their supplier’s business. More than that, there is a risk for the supplier if Volvo CE has to leave them somehow.

Nilsson (2015) explains that the cost of integration amounts to around 150 000 SEK to get the part of the system implemented. The investment may be expensive.

When Volvo CE increases the production volume the whole industry increases at the same time. The suppliers start investing (power stations etc.). However, it happens that they hit the roof of their supplier capacity. When it happens, they need solutions: they
can find for example another supplier and they move volumes of some parts to the new one. They cannot manufacture more than they can. But it is not an obstacle generally.

They invest to increase the capacity for collaboration. If the suppliers do not have enough capacity, they fail to pass the selection into Volvo CE’s supplier base.

Working with Volvo is important for many (due to their brand image), the suppliers can get their volumes up and they can reduce their purchasing costs for materials. Moreover, working with them helps the suppliers to develop their knowledge by developing their production.

Nilsson (2015) reckons that Volvo CE should not share every kind of information but only exchange the information that is really needed. The suppliers sometimes share with them information that Volvo CE does not need to know on Volvo CE’s competitors. They need to make sure that the supplier understands what is okay to share or not.

The IT infrastructure is not an obstacle any more. The supplier uses just a web EDI. It’s important just for the sending of the drawings, but it’s not a real problem any more.

They are starting in the system solutions (hydraulics) since it’s hard to focus on every commodity at the same time. It can be added that logistically speaking, Volvo CE is responsible for all the transportation of the product.

They also use common resources, if the supplier needs a certain material, Volvo CE would be able to help them. For instance, they buy steel plates as raw components. The only raw material they buy here in Braås. They help other suppliers to buy steel on the same agreement that they have. Volvo AB makes agreements on high tonnage of steel. Nevertheless, this exchange is just one way. The suppliers do not really help Volvo CE.

They have knowledge exchange at the supplier’s production rather than at their own production. They have mainly assembly in Braås. They have quite lean production thanks to VPS. They are quite far beyond the suppliers. But they listen. They have also a welding shop where they make these parts. They are cost efficient; therefore it’s hard for the supplier to tell them how to do it.

No joint risk management is integrated; they evaluate their risk management in their SEM. They help them with it, Volvo CE provides them some tools, and they can make their own self-assessment when it comes to risks (capacity issues is a major risk since
2008). Afterwards, they reshaped into financial discussions, after back to capacity, logistics is also involved.

They have a joint project office; they have a project plant that they develop together. Moreover, Volvo CE has demands on the suppliers about the sustainability. They have standards to respect (Toxic fluids, safety, work environment). In Sweden, the suppliers have the same regulations to fulfill. It’s different in China, where they are fulfilling the legal requirements in the country. Volvo CE make demands to improve their production facilities. For long lead-time suppliers, bulk transports from 6 to 8 weeks are used. Volvo CE has a hub close to their plant where the suppliers store their goods, where they call off the parts from (from which they are supplied from). It can be an issue if they increase their production. This issue is regarded during their meetings.

Regarding the fluctuation in the demand, they have an agreement regarding how quick Volvo CE can change their delivery schedules. The suppliers have to be able within 3 months to increase 30% of their volume. Nevertheless, Volvo CE does not promise to buy any volume. They explain to the supplier that they are going into the business together and that the market demand is controlling their orders. During Q1 and Q2, they have quite high production Q3 decreasing and Q4 quite slow.

They have a frozen period of time of ten days, where they freeze the orders, with the volume and the time. There are 60 days when Volvo CE takes the responsibility, they say that they need the material in the next 60 days, but they cannot say exactly when (it can differ from 1 day earlier or a couple of days later). Volvo CE has 10 to 12 months forecast in which they predict, plan. The forecast is transparent for the suppliers; they get a delivery schedule showing at least 12 months ahead (which is not for sure).

They have news about the market, in order to know if the market is stable or still uncertain. In this regard, if the forecast changes, the suppliers are prepared.

Through the crisis in 2008, the suppliers also stopped. They had to lay out people. They looked at Volvo as a bank (they have to secure material from them etc…) they cannot support the suppliers. If they themselves did not have Volvo AB to support them, they would have gone through hard times. In 2008, due to the crisis, a demand deviation occurred due to market fluctuation. In 2007, Volvo CE produced 2 700 machines, whereas they only produced 267 machines in 2008. During this difficult period, Volvo
CE tried to keep the knowledge up. There was a stock of machines that they had to reduce that they wanted to reduce by 90%.

Nilsson (2015) reckons that one further obstacle is the inflexibility of Volvo CE due to its size.

**Scania CV AB**

**Strategic Sub-processes**

**Review corporate, marketing, manufacturing and sourcing strategies**

It is quite seldom that a supplier needs to be replaced in the short term. Scania has dual sourcing for some supplies. It is then possible to take one part from two different suppliers. More common is that they have dual sourcing within segments (similar type of production). So it is possible within weeks or months to move from one supplier to another and to get the production running within the specific lead-time, but that is something that the logistic function at Scania cannot manage in the short term. This is a commercial issue that has to be handled by the purchasing department, or they can cope with it together between the purchasing and logistics department.

For the production plant, the vision is made toward a short-term planning (e.g. within the next week), so it does not matter that much if they can switch to another supplier in a couple of months. It is important for them to prevent the stoppage of the production. For Scania it is important that the stoppage of receiving certain supplies does not stop the production.

Scania is always trying to solve the situation rather than to switch the supplier. They have also deep relationship with the supplier that they have already long term relationship with. If Scania is taken as a whole then how long their strategic relation with the supplier becomes vital, and that is of course by building a stronger relationship. But if only the logistic department is regarded, Råvik (2015) explains that it is more deviation based.

Four or five years ago, Scania decided to make a strategic change about the sourcing strategy which has led to quite long discussions internally. The discussion was regarding a very important and quite expensive component. They had one supplier that
they were heavily depending on. The supply refers to wheels through a wheel assembly. They have contract with several suppliers for steel and aluminum wheel as well as for rubber tyres. One company is assembling these tyres and wheels together and delivers the product sequence to them.

Scania wanted to improve in two aspects. First, they wanted to decrease the dependency on this supplier because they were too dependent on them so they wanted to have a dual sourcing set up. Second, they wanted to have closer relationship with the second tier of suppliers, suppliers of tyres and wheels, because they are very strategic suppliers with high turnovers. So they needed to enclose the relation, but there was this assembly company in between. This meant that there was too much distance between Scania and the second tier of suppliers. Thus Scania wanted to have a different set up where this assembling company would not have such a strong role in the supply chain. Physically, it would basically be the same structure, producing, assembling and delivering. Also, the assembling company was doing what they had to do. They were checking to see if the suppliers of the second tier are working on the right track, if they have right condition, if they could meet the demand, etc. So Scania decided to have a dual source. They decided to implement a new supplier to the supply flow. They should deliver to one of the final assembly unit, and the older supplier should continue to deliver to two other final assembly units. Scania has three major final assembly units.

As soon as Scania informed the older supplier that they will lose 25% of their business with Scania, they were about to stop the relationship. Obviously Scania has made a miscalculation regarding how the supplier would react to this offer. The older supplier believed that they had high bargaining power because they were owned by a big company. As a result, Scania decided to come to an agreement with them. Scania had half a year to switch to the new supplier. The new one had to prepare for a much higher supplying capacity than initially expected and they bought from them. So they had to take a new look at these agreements and then Scania started the transition process which resulted in more complexity than they expected in terms of moving this big business and structure the new integrated business set ups with this new supplier, due to different internal processes and different IT structures. The second tier of suppliers had the complexity mostly in terms of information flow that is why Scania wanted to change.
The old set up was the following: the old assembling company was receiving the component from the second tire of suppliers, assembly it, and send it to Scania. They had commercial relationship with this second tier of suppliers. But the assembling company had a very confidential information flow with the second tier of suppliers that was preventing Scania to have information transparency. So if there was deviation Scania struggled to understand whose mistake or misperformance it is. They tried to receive the wheels from the assembling company but at the same time, they received products from them (second tier of suppliers) as well, and their relationship should be only a physical flow. They thought that if they have an integrated information system with the second tier of suppliers, this will take away the confusion over the responsibilities between them when it comes to logistic problems related to these companies, since they had commercial power to pressure them for better performance but they did not have transparency in their daily basis information flow. They had to listen to the assembling company to know if the second tier of suppliers works correctly or not. Also they were experiencing lot of problems in capacity and delivery, so they needed to know truly where the roots of these problems were. Therefore, while changing this assembling company in a short time span (which by itself was a big change), they also completely transformed the information flow structure, the IT and the organizational set up.

The older supplier had problem in their internal flows, they did not have control over the material that came in and went out. After a while, when Scania started to dig deep into this problem, they understood that there was a deviation in the information flow that they have created, the information that was sent at one place was not exactly corresponding to information they sent at another place. They had either shortage of stocks or overstocks. The lack of control over the input and output made it difficult to track the deviations. Scania had a good strategy and good intentions from the beginning of this new plan, but the old supplier surprised them by stepping out completely.

They had misled the IT structure. It took around one year and a half to make it right. It is still not perfect but better in many ways than before.
Identify criteria for segmenting suppliers

The size of the supplier (how many deliveries) is also important for the supplier relationship of the production plant. The turnover can be also interesting but more for purchasing rather than for the logistic department because the logistic group at Scania does not have commercial responsibility. For the logistics, it is still the product that is important, Scania has the product or they do not, they produce or they cannot produce, that is most important for them. The level of complexity of the supplier relation is important, which can be translated in the worst case as the number of deviations. For the supplier that has more deviation in the flow, there is the need to establish a good relation. For the suppliers with the fewer deviations, Scania has a supply chain set up that makes it go forward so they do not need any closer relation. Scania does not change the supplier because it is a big issue, but of course that is in the end an option. Scania may have the problem that the supplier does not fulfill their demand but from the commercial point of view they think it is good, so that’s the struggle.

Both the old and the new supplier have different processes in supplying this product. Before agreeing upon the cost, quality, and lead-time, Scania should understand how they work based on the agreement upon cost, quality, and lead-time.

Provide guidelines for the degree of differentiation in the product and service agreement

It is not like that Scania can impose their objectives and goals to the suppliers. Both sides should be satisfied when the agreement is made. Scania cannot state anything to the suppliers except a few things such as the quality level, the logistic set up, and specifications. Also if Scania has a lot of requirements, the price of the supply will be higher so they cannot have too much of them.

Develop framework of metrics

The delivery performance is the most important metric for Scania. They measure it when it comes to the performance of suppliers. The lead-time is fixed and is agreed with the supplier only at the implementation phase. First they want to understand each other’s processes, then they agree upon the lead-time. They do not measure the lead-
time because if they fail to deliver in the agreed lead-time, it means that they did not fulfill the contract.

Scania has with relative suppliers an agreement of 13 days lead-time for delivering the supplies. So they know exactly what and when they should produce the supply. It means they have 13 days to receive their required material, make the supply, and deliver them to Scania. 6 days from the second tier to the first tier of supplier, and 6 or 7 days from first tier (assembling company) to Scania.

**Develop guidelines for sharing process improvement benefits with suppliers**

On top of the technical and knowledge support that Scania provides for the assembling company, they also connected them to the second tier of suppliers so it means that they shared their resources with them in terms of connections and networks. As a matter of fact, Scania told that the assembling company should only work with the second tier of suppliers when it comes to their supplying product.

**Operational sub-processes**

**Differentiate suppliers**

The relation runs from time to time more or less by itself. Scania addresses deviations and solve problems. But there is no room to have a deep relation with these standard suppliers. With some suppliers it is important to have deep relations based on the strategic importance of the suppliers for the production, the suppliers that have strategic components are of course more critical; especially those whose performance deviation is more directly influential for production.

Whether the supplier is unique or not might not affect the logistics department that much.

For the purchasing department, the relation becomes more crucial if the supplier is unique: it makes a big difference. On the strategic level, the suppliers are very important for Scania.
**Prepare the supplier/segment management teams**

Scania has succeeded in carrying out the supplier changes. They made most changes in the information flow. In the new structure, one material planning for each production flow handles the flows. One person who is employed at Scania coordinates the second tier of suppliers (both tyres and wheels) with the assembling company, so he has an overview of everything and can work both reactively and proactively. Each deviation that happens in the suppliers’ performance will be reported to him and he reports to Scania. In other words, there is one person for each production unit who takes care of the coordination of the first and second tier of suppliers.

With this supplier, Scania does not have any cross-functional team in the design phase, because the product is standard, so they just mention their demand and the supplier fulfills it. Both the first and the second suppliers are key suppliers for Scania.

There is one area that they improved a lot, which is the level of coordination that has been enhanced after they used a Scania employee for coordination process.

The coordinator and the supplier meet physically couple of time a year and have contacts on a weekly basis.

**Internally review the supplier/supplier segment**

Scania had one supplier that they were heavily depending on. The supply refers to wheels through a wheel assembly. They have contract with several suppliers for steel and aluminum wheel as well as for rubber tyres. One company is assembling these tyres and wheels together and delivers the product sequence to them.

The old set up was the following: the old assembling company was receiving the component from the second tire of suppliers, assemble it, and send it to Scania. They had commercial relationship with these second tier of suppliers. But the assembling company had a very confidential information flow with the second tier of suppliers that was preventing Scania to have information transparency. So if there was deviation Scania struggled to understand whose mistake or misperformance it is. They tried to receive the wheels from the assembling company but at the same time, they received products from them (second tier of supplier) as well, and their relationship should be only a physical flow. They thought that if they have an integrated information system
with the second tier of suppliers, this will take away the confusion over the responsibilities between them when it comes to logistic problems related to these companies, since they had commercial power to pressure them for better performance but they did not have transparency in their daily basis information flow. They had to listen to the assembling company to know if the second tier of suppliers works correctly or not.

**Identify opportunities with the supplier/supplier segment**

The second tier of suppliers is still there because Scania connected them to the older supplier from the beginning so they do not get replaced. Commercially Scania had relationship with the second tier of supplier but they also wanted informational relationship since they did not have it since beginning.

**Develop the product and service agreement and communication plan**

Scania has contract with several suppliers for steel and aluminum wheel as well as for rubber tyres. One company is assembling these tyres and wheels together and delivers the product sequence to them.

Scania has with relative suppliers an agreement of 13 days lead-time for delivering the supplies. So they know exactly what and when they should produce the supply. It means they have 13 days to receive their required material, make the supply, and deliver them to Scania. 6 days from the second tier to the first tier of supplier, and 6 or 7 days from first tier (assembling company) to Scania.

In principle, Scania starts the supply delivery process and production, based on the customer demand. Scania is responsible for the logistic transportation from the second tier of suppliers (tyre supplier to assembly unit) to the first and from the first to Scania, but it is only in this case. In other cases, they are only responsible for logistic transportation from first tier of supplier to them. Because they would like to have more control over the second tier of suppliers in this case and Scania want to treat them as first tier of supplier.

They thought that if they have an integrated information system with the second tier of suppliers, this will take away the confusion over the responsibilities between them when
it comes to logistic problems related to these companies, since they had commercial power to pressure them for better performance but they did not have transparency in their daily basis information flow. They had to listen to the assembling company to know if the second tier of suppliers works correctly or not.

Scania has a classical internal ERP system. With the suppliers, the IT communication is carried out through EDI.

**Implement the product and service agreement**

Scania is very well integrated with these suppliers. With this new set up they developed a very strong logistic integration. The employee from Scania who coordinates the flows has regular meetings with both the second and first tier of suppliers to follow up the performance and to fix problems.

**Measure performance and generate supplier cost/ profitability reports**

One person who is employed at Scania coordinates the second tier of suppliers (both tyres and wheels) with the assembling company, so he has an overview of everything and can work both reactively and proactively. Each deviation that happens in the suppliers’ performance will be reported to him and he reports to Scania. In other words, there is one person for each production unit who takes care of the coordination of the first and second tier of suppliers.

The suppliers do not have storage facility, they receive the order, then they produce and send to Scania. When it comes to the relationship between the first and second tier of suppliers, they are responsible for their own coordination, not Scania. Scania sends them the forecast beforehand so they have initial preparation for the production, but they start the actual production after Scania makes an order to them. If any of them has deviation in performance, the other supplier reports to the (Scania) coordinator.

**Obstacles/Integration**

Scania puts a lot of support to these first and second tiers of suppliers and they have a SD department at Scania who takes care of improvement of suppliers. Scania supports them when it comes to quality level and volume output: they can go there for weeks or months to assist them. It also depends, for instance one supplier of the second tier of
suppliers Michelin is even bigger than Scania. This company is very big and global. They are the biggest tyre producers in the world so Scania cannot send them employees to determine what they should do. In other cases, when the supplier company is smaller and has less competence, Scania provides them with assistance in different aspects (e.g. technical).

The assembling company is smaller and they are owned by one company of the second tier of suppliers but they work quite independently and they have very specific processes that differ from the second tier of suppliers. Therefore, for the assembling company, Scania does provide help if the supplier needs it. The assembling company was positive towards establishing an integration with Scania. This assembling company does not provide any technical support for Scania, because Scania does not need it. In general, when it comes to the design, many suppliers provide very good contribution to Scania and they use their knowledge, but this is a standard product.

A big company such as Michelin considers the integration with Scania as an incentive and beneficial because the communication gives them better understanding about Scania’s needs and demands, because the information flow in an integrated partnership is faster and more reliable. Also, this supplier knows that the closer operation with the customer (Scania) makes it even harder for Scania to give them away.

Having different IT setup is an obstacle toward the integration. The major obstacle is with the first tier of supplier, due to the large focus that Scania had there and there was where they saw the problems. At the end, it was more problematic to have a functional set up with the second tier of suppliers.

One of the other issue is that they provide forecast to the suppliers to prepare themselves for the upcoming weeks or months, but the problem is one of the second tier of suppliers (tyre supplier) does not take Scania’s forecast as serious as it has to, because they thought that the forecast is anyway wrong. They think that they have to see the frozen demand then act upon it. Because of this way of acting, they sometimes may face problems in their capacity of production.

Scania also thought to ask them to share their transportation facility through integration with Scania but then they realized that it is not wise in practice, because Scania also has transport network all over Europe and they have quite big volumes to negotiate with our
transport network. When it comes to filling rate Scania has every day 100% filling rate with this assembling company.

They have agreement and contracts with the transportation companies around Europe and they take care of Scania’s transportations. They also have a logistic company as a fourth party that coordinates the transportation company with them and the supplier.

They decided to take care of the transportation internally by the upcoming year since Scania is itself a producer of trucks. This gives Scania a better knowledge about the status of the volumes that will be transported on every transport. Because even though they have very strong integration with this fourth logistic party that is mentioned, they do not have access to everything in Scania’s ERP system. By internalizing the transportation, Scania can have clearer information, and therefore, they can optimize their transportation in a better way. Scania also thinks that by internalizing the transportation, they can increase the filling rate in the overall transport network from 70-80% to 90-95%, which represents huge savings in costs and has a positive impact on the environment. Also, they think that by internalizing this process, it will give them the knowledge to understand their customers better, because Scania’s customers do what Scania does but in the other side of the supply chain. Therefore, Scania can provide their customers better services in future.

Scania can improve the integration in this explained case with the first tier of supplier in the way that they could be better connected to their internal sequence: they do not produce in Scania’s sequence; they produce in batch based on what they get from the second tier of suppliers. Råvik (2015) thinks that there is a potential for a better integration to their production which could reduce the lead time, cost, and quality.

The information sharing could be more sophisticated with the first tier of suppliers, if they could integrate the information they get from EDI from Scania, it could be better. They still work a lot with excel spreadsheets in their internal process. This could also be more integrated.

Scania does not have a joint risk management with their suppliers. They do it internally. But when it comes to the risk management about the fire for example (safety), Scania demands them to take all precautions into account. It is part of our relationship to try to understand if they took those safety measures.
It always happens that they have fluctuation in the demand. Scania always tried to take corrective action with the old supplier, because they always had problem with their tyres supply. Scania understood that they need more negotiation power, which is why they oriented themselves towards a dual sourcing strategy. The suppliers understand that the fluctuations are natural in this business, but they are inflexible in this tied business. They come and say that they cannot produce this volume in for example three months. On the other hand, Scania says that they need this volume and this is their demand. Scania also recommended that the supplier changes its production a little bit to be able to reach the demand, but they say no, the production plans are prepared and cannot be changed.

They tried to force the suppliers to act more on the forecasts and they made them warn Scania earlier if they have problems in their production capacity, so Scania can react before freezing the orders.

Depending on the market situation, the bargaining power rises and falls for both the supplier and Scania. If the situation is in their favor, then they can bargain better and impose their demands and vice-versa.

Scania does not have any joint project office with these suppliers.

Råvik (2015) explains that some obstacles are occurring. A lack of trust with the second tier of suppliers exists from both sides. Scania had a low level of communication on operational processes with the second tier of suppliers. They had no direct communication, which made the information flow not accurate. But now it is a direct communication.

The lack of goal congruence and lack of commitment also have been sometimes the case with these suppliers, especially with the second tier of suppliers. Scania knows that they may not be the important customer for them, because they feel that the automotive aftermarket is more profitable than the original equipment manufacturer (OEM). The suppliers prioritize the aftermarket rather than Scania. Thus they might feel that they do not have full commitment to Scania.

The corporate inflexibility and slowness to changes is also an obstacle as well as the willingness of sharing the information from both sides. The IT infrastructure is a big obstacle. The internal resistance exists at Scania for integration. A lack of understanding
sometimes occurs. Scania does not understand why the suppliers are so inflexible in tied business.

**Peab Bildrift AB**

**Strategic Sub-processes**

**Review corporate, marketing, manufacturing and sourcing strategies**

The first step for their selection of the supplier is to look at the demand that the organization has. The process starts well ahead of the equipment being delivered. It starts in autumn for April the year after. From this process, Peab gets a number of suppliers.

**Identify criteria for segmenting suppliers**

Following this, they look for specific information or criteria to base their selection on. The criteria used for the selection and categorization of the suppliers are the credit line, the financial requirements (the reports must look respectable), machinery requirements from the supplier to produce the goods, the suppliers have to be registered, whether they can achieve the total running time they need, whether the machinery is approved on the market, the service net should fulfill Peab’s requirements, whether the cost of production of the supplier matches Peab’s requirements. These are the criteria for the first selection. During the second selection, the selection is narrowed down.

For the spare parts, the cost of the product, the lead-time to have the delivery of the spare part done and the lead time for the service (crucial for them) are evaluated.

Having these pieces of information, they can compare the suppliers between each other. They need to decompose the evaluation of the supplier into pieces, to have the best assessment.

It can be noted that the cost of the machinery and also the cost for running the machinery (repairs, guarantee) are important.
Provide guidelines for the degree of differentiation in the product and service agreement

For example, if there is an order for a machine from the civil engineering business unit, this is known from the start of the project. Therefore, the good is order JIT. The ordering is regulated by the frame agreement. On the other hand, the ordering of the spare parts is regulated through the producer of the machines.

They have a yearly price agreement based on the expected number of units that they intend to take out. So the price is fixed. However, they are constantly looking at the agreement on the costs of repair to allow costs improvements.

Develop framework of metrics

The metrics that are used for the assessment of the suppliers by Peab are the following ones. The lead-time is a crucial indicator: if the good is not in time, the supplier provides Peab with spare machinery to run the operations. The cost is also important: the cost of all spare parts (the price is indicated as soon as they follow the supplier), the cost of repairs and other unexpected repairs.

Develop guidelines for sharing process improvement benefits with suppliers

Stenzel (2015) says that the achievement of integration is a matter of facts, personal relations and commitment from both sides. For Peab, integration in bound by contract and is carried out through frequent meetings.

Operational sub-processes

Differentiate suppliers

To establish the categorization between key supplier and standards suppliers, the following criteria are used: cost of the machinery, expertise of the supplier, previous conducting on the market, supplier’s service net (this is a big obstacle for new suppliers), lead-time for service and repairs, R&D, fuel consumption and total cost of ownership.
**Prepare the supplier/segment management teams**

The meetings involve around 5 to 6 persons, from which at least one person is from the operations. These meetings are happening every second months (sometimes every third month).

**Internally review the supplier/supplier segment**

Volvo construction equipment is a key supplier for Peab. They provide Peab with full machinery but there are lots of extras to add (lubricants, hydraulic components, cameras, etc.).

As one of the key suppliers, Volvo CE maintains a close relation with them. An example of that is that they can call them on a Saturday evening: they have a close open relationship. The relationship that Peab has with Volvo CE is a very long time relationship that exists through commitment/openness from both parties. It is not a static relationship. The commitment of the actors can be shown through regular/frequent meetings. It can be added that their relationship is as transparent as open books. Even though they do not look over each other processes very closely with Volvo CE, if certain issues occur, the partners reserve themselves the possibility of suggesting potential improvement solutions.

Peab’s agreement with Volvo involves together Volvo CE and Volvo trucks. There is a high interest from the management of both companies to have the agreement with Peab. Stenzel (2015) cannot see any barriers for any potential further integration together with them. The management of both partners is highly committed and the partnership has been decided at the highest management level.

**Identify opportunities with the supplier/supplier segment**

Peab and its key supplier can make use of common resources. As a matter of fact, Peab maintains a close connection with the steel manufacturer SSAB that they connect with their supplier to gain in costs (steel supplier with the producer of the machinery).
Develop the product and service agreement and communication plan

It can be added that Peab also has very good relations with SSAB (steel manufacturer). Even though Peab is not as far into their production process as with different suppliers, their integration is carried out through constant meetings with them, an exchange of feedback: when it comes to new material for example, Peab can say that a specific kind of steel is be better. There is in this situation only little transfer of knowledge, because this supplier has a deep knowledge of their production. Peab only requires that the supplier is able to produce the products together with them and that they listen to their input carefully.

Peab organizes meetings on a regular basis with all of their suppliers.

Implement the product and service agreement

They have a supplier key account management, which is formalized in the frame agreement that is carried out through the meetings. Peab has frame agreements for all supplies but such an agreement is crucial for the supplies that are necessary for the organization. Peab needs to secure the supply in these cases and ensure that they have the desired machine.

Measure performance and generate supplier cost/ profitability reports

During these meetings, the assessment of the performance is followed up. The follow up of the assessment is carried out by Peab bildrift AB, which is the company responsible for the purchase of all machines and also for the suppliers.

Regarding the performance assessment, Peab does not use any standard form to send out to the supplier. They have no report for the performance. Nevertheless, the performance is a topic discussed during the meetings, and everything is documented during these meetings.

Obstacles / integration

Peab has dual sourcing for everything.

Peab discusses the different parts with the supplier at the design phase. Prior the selection, the supplier has to give a list of the basic machines they have, as simple a
manner as possible with the extra components specified so you know how the machine is built up.

The operators (drivers) of the machine are a key part of the operation success. They provide information/feedback on how quick the repair actually is, if you get the spare parts, they check the invoices, if the cost remains how it was agreed. The one that has the best information is not only the operator of the machine but the responsible for the machine in the organization.

For Peab, the integration with their suppliers is as important as the integration with their customers. To achieve a desirable level of integration, there should be trust, good will and also transparency.

Peab grants them with a high trust, since they have a deep technical knowledge. The supplier is highly committed and would open up their processes if asked to do so (no reluctance). In their relationship with Scania, Peab went deep into the development of the product through the implementation of an integrated IT system that followed all the costs involved.

The deviation of the performance is a topic that is discussed in the regular meetings they have with the suppliers.

For Peab, the integration that they have with the supplier is sufficient because the machines are followed up hour by hour. Therefore, there is no need to get into their IT system nor to have an integrated IT system to extract that knowledge. An integrated IT system does not improve the lead-time in this case because everything is agreed in the agreement framework.

Both parties (Peab and the supplier) are responsible for the transport. However, the supplier has the obligation to deliver where Peab wants the machine, usually directly out on the operation area. Peab also has transportation facilities.

To achieve integration, there is a need for an open relationship between all involved actors. Both sides have to answer all questions, in order to demonstrate high commitment and good will. When there is mutual interest, the integration is carried out in a beneficial way for both parties.
From time to time, Peab goes into their production facilities. They also discuss together over their planning and their R&D.

The supplier needs to know Peab’s requirements to invest in machinery. The supplier also usually sees a potential in their collaboration with Peab. For the supplier, the better they perform, the more good will or commitment they have towards their collaboration with Peab, and the lowest total cost of running the machines they have, the more trust will Peab have in the future to continue business together. This is an important incentive for the supplier to integrate with Peab further.

Trust comes over time and can be achieved by more formalization through meetings, in addition to explanations for new suppliers). It is very difficult to let the customers see into every process of the organization if there is no trust; the company does not know what the other party can do with the information they received. This step is however past regarding the relationship between Volvo CE and Peab.

Peab does not have a lack of goal congruence: they “speak the same language”, which is the total and having a machine that works. For Stenzel (2015), the lack of communication with the supplier comes together with the lack of trust.

Achieving integration is expensive especially in manpower. They can also receive support from the IT department. When an integration of the IT system is desired and the system (at one of the actors) is obsolete, the input is higher and becomes more expensive.

With some suppliers, the orders can go directly into the same IT system (Scania), however not with Volvo CE.

The improvement areas in which the integration can still be improved may be on the product development phase (for example on the asphalt machines where Volvo CE needs Peab’s input); Peab can test Volvo CE’s machines (prototypes) to improve the products; the service and repairs can be improvement areas as well as the guarantee commitment.

An integrated system would need to follow the machines, the repairing and the fuel consumption. On the new machines, there is currently and integrated system that
follows the repairing of the machines. Peab also provides support to the supplier if something happens.

Peab forms with SSAB an integrated purchasing group. They meet every month and have a look over the steel market. Through this group, both actors have deep insight into each other’s processes. They decide where to carry out the purchases. These decisions are taken together with them. The supplier has insight into Peab’s demand, and they make the purchases according to them. Peab also has insight into the supplier’s sourcing. Within that group, they also have a fully integrated IT system in which they can pass drawings along. In the industry, such kind of integrating purchasing group is unique; however, it exists in other industries (Ica, Ikea). For example, Ica has been criticized to look too deep into the supplier’s processes.

Regarding an IT integration, it is necessary to decide how crucial it is to integrate with a specific supplier depending on the type of product and the type of supplier.