



# **DEVELOPMENT OF SUPPLY MANAGEMENT IN PROJECT BUSINESS**

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## ABSTRACT

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Case company is operating in international project business area delivering large scale equipment which includes own manufacturing, direct deliveries from suppliers to work site and purchased erection and site services. Today case company's customers are more focused on cost and delivery time of the equipment. Also competitors from cost competitive countries are penetrating to the markets, which are normally considered as westerners markets. Efficient management of the suppliers is critical from competitiveness, customer satisfaction and profitability point of view.

Study was conducted to case company's supply management department. First objective of the study was to find out, are case company's tools and processes relevant in managing suppliers. Second objective was to find out, how to measure supply management. Research method in this case study was qualitative. Adaptive supply chain management was used as a theoretical framework.

In this study, data was divided to primary and secondary data. Primary data came from the supplier interviews and multinational corporations benchmarks. Secondary data came from case company's internal instructions, process descriptions and literature. Interviews were used to find out what kind of processes case company has and are processes aligned with other similar customers. Benchmarks were used to find out what kind of processes and tools other companies have.

Findings of this study were that the case company has a relevant tools and processes, which are aligned with other companies. Many supplier stated that the case company has better processes than others, but still improvement suggestions were given. Supply management is one of the key processes in the case company, which can be seen that the case company is developing supply management processes and tools vigorously.

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Key words: Procurement, supplier relationship management, project, process development

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**ABBREVIATIONS**

CRM	customer relationship management
DAP	delivered at place
DMS	delivery management system
ECM	enterprise content management
EDMS	enterprise document management system
EPC	engineering, procurement and construction
EPCM	engineering, procurement and construction management
EPS	engineering, procurement and supervision
ERP	enterprise resource planning
ESI	early supplier involvement
FCA	free carrier
HSE	health, safety and environment
IPR	Intellectual property rights
IT	internet technology
KPI	key performance indicator
MNC	multi-national Corporation
NDT	non-destructive testing
PPM	parts per million
SCM	supply chain management
SD	supplier development
SME	small and medium size companies
SQM	supplier quality management
SRM	supplier relationship management
VPN	virtual private network

## 1 INTRODUCTION

“It is not the strongest of the species that survive, nor the most intelligent, but one most responsive to change”

- Charles Darwin

The procurement is very important part of basic functions of companies and in the manufacturing sector the percentage of purchases of sales is average 55%. In other words, every dollar of revenue collected on goods and services sales, more than half goes back to suppliers (Handfield, Monczka, Giunipero & Patterson, 2009). Iloranta and Pajunen-Muhonen (2008) emphasises that in 2006 Finnish companies spend 62% of the cost of goods sold to external suppliers. That 62% includes direct and indirect purchases e.g. services. Therefore it is not difficult to see how important procurement function is among other functions of company. In many companies procurement is only one small function among others and many directors do not see the importance of procurement. More and more the procurement has become to a significant part of the competitiveness of company and effectiveness of organizations.

Companies are networking and they are limiting their production range to core business, in other words they are outsourcing manufacturing according to revised strategies. Few decades ago everybody wanted to manufacture everything, but today key word is networking and deeper collaboration between customer and supplier. Even subcontractors are networking. World is shrinking due to the change of internet culture. Global competition in different business areas is tightening, not only from technology point view, but also from the perspective of supply management. Businesses which are considered as a traditional businesses, where western companies have had a strong foot hold, are suffering competition of the companies from cost competitive countries. These companies are usually considered as a sub suppliers or companies who are providing products which have lower quality requirements and level of technology is lower. Their products are considered not suitable to western markets where quality and technology are playing more significant role. These cost competitive countries are traditionally home of suppliers who are providing less engineered components e.g. where big part of the price is manual labour. More or less these companies have developed their product range so that they are competing in same markets as traditional western companies.

Today the world is struggling with economic challenges, where price and payback time of investment are playing more significant role when companies are investing tens of millions of euros into new equipment. Therefore companies are focusing more on cost and delivery time, than technology and due to that companies from cost competitive countries shall be considered as a threat in global markets, because they can provide almost same equipment, but lower cost.

### **1.1 Case Company review**

This research is done to company, who is global developer and supplier of services and technologies for the pulp, paper and energy industries. Case Company's annual spend to direct purchases is 1.5 B€ and more than 10.000 active suppliers in 53 countries. This study is conducted to Case Company's supply management department.

### **1.2 Research problem**

Many competitor of case company are using same suppliers. Technology itself is more or less identical and therefore there are no big differences between competitive offers. Many times project is awarded to the supplier, who is able to give shortest delivery time and lowest price. Investments can be several tens of millions dollars and shorter the delivery time is, faster the customers are getting revenues and pay-back time is shorter. Case company is focusing also very heavily to cut warranty costs. If case company is able to improve in all of these areas, case company's competitiveness is better in global markets. Supply management has vital role to achieve these performance improvements. Case company's business line has several supply management locations across the world and results of this study can be implemented in those locations as well.

Purpose of the research is to investigate what kind of procurement processes and tools are needed in order to manage the supply chain in project business and compare them to current ways to manage procurement in case company. One part of the thesis is to identify how to measure case company's supply management which include

also supplier performance and how it will affect to project business from quality and project execution point of view and should case company has different procurement strategies with different types of suppliers/categories.

### 1.3 Research objectives and questions

Research plan is to interview the selected suppliers to find out how they see case company as a customer. Also few other companies will be benchmarked, which are working in international project business, to find out what type of organization they have, how they manage supply base and what key performance indicators they are measuring and how. In addition requirements of ERP system to support effective procurement will be investigated. Result of mentioned actions will give guidelines and suggestions how the case company should change the management of the procurement to be more effective.

The questions which are answered in this thesis are:

*What kind of tools and processes are needed in order to manage the supply chain in project business and are the current tools and processes relevant?*

and

*How to measure performance of supply management and how to implement measurement processes to case company?*

To this research, both research models, basic and applied research, are suitable. If we look at the approach of basic research, we are investigating what kind of processes case company should have and this means the development of something new. But also looking for tools or key performance indicators, which will help solve problems. It is difficult to decide, which research model is most suitable, but this research is more as an applied research, because cooperation with practitioners is done to solve problems and facilitate long-term changes.



This research is partly both, explanatory and descriptive. Explanatory, because supplier interviews and benchmarks of MNC's are performed to find out, has the case company different processes or tools than our competitors or other companies which are operating in international project business. This part of the research defines current situation. This research is not looking for the reasons, but understanding how the case company is acting. This is also descriptive, because objective of research is what kind of existing processes and methods there are to manage the supply chain in project business and compare them to current ways to manage procurement in case company. If there are rooms for any improvements, this thesis will give the guidelines to try something different.

The strategy of this research, is case study. Suppliers will be interviewed to collect primary information. Amount of the suppliers is limited, because case company has lot of suppliers, actually several hundreds, but these chosen suppliers, they have to be suppliers which are defined as important and critical suppliers and have an impact to customer satisfaction. They also have to have similar other customers than case company and they have to have acknowledge how we perform compared other customers. Also some other companies operating in project business are benchmarked to find out how they manage their supply base and what kind of key performance indicators they have. That should give the knowledge, what data case company should gather to improve our supplier's performance.

Type of research is more qualitative than quantitative, because interviews are performed with certain limited amount of supplier, instead of sending surveys to the huge amount of suppliers. Research is done to find answers to the processes, not for example trends, which requires high amount of answers. Also the questions which will be asked are rather more subjective, qualitative type questions, than yes or no quantitative type of questions. For example there might be some methods or processes which can be identified only by using open questions. To identify, what are commonly used processes, tools and methods, the secondary material source is used. Data itself is quite mixed, not only interviews or articles, but it is combination of all of it.

#### **1.4 Research challenges**

One of the challenges of research of supply management of project business, is literature and other sources. In many cases articles and literature of supply management is concerning supply management of mass production like mobile phones or serial production of equipment. However there are some sources concerning of construction works, but no combination of the equipment and construction project deliveries. Another challenge might be to get honest answers from the suppliers. For many supplier, the case company is an important customer and suppliers might do not want to be honest and give a straight answers in fright of consequences and impact to relationship. Suppliers are encouraged to be honest and no names are not forwarded. Secondly benchmarking of the MNC's might be a challenge, especially if MNC's are operating in same business area than the case company.

#### **1.5 Limitation of the research**

Firstly the empirical part of the research is limited to certain amount of the suppliers. These suppliers are selected from strategic and importance point of view. Selected suppliers are covering categories which are delivered to the case company's projects, but we limited it to the site deliveries. In other words suppliers who are providing solely services, not related to the site works, are taken away from this research. We did not limited suppliers to only Finnish small and medium size (SME) suppliers, but also multinational corporations (MNC) were chosen. Some of them have dual role in this research, because they are operating in international project business. Secondly the interviews and benchmarks were mainly taken place between February and March 2016.

## **2 THEORETICAL FRAMEWORK**

### **Introduction of literature review**

Goal of this research is to study procurement processes from two perspectives, one is how similar companies, like case company, manage their supply management in project business and other perspective is to study how suppliers see case company processes compared similar customers. This research is based on following theories and key concepts, which provides more information to readers and help understand the research. Literature review is divided to three chapters. First chapter includes theories which are considered as primary theories and research is based on these. Second chapter includes key concepts, which are for supporting readers to understand project business environment, its features and challenges and third is review of IT-programs which are supporting operations of the case company's.

### **2.1 Primary theories**

#### **2.1.1 Adaptive supply chain management framework**

To ensure competitiveness in long term companies shall develop or implement new procurement strategies on collaboration with suppliers. Suppliers are integrated more deeply into their customer processes and product development processes are in many cases started with suppliers or suppliers are involved during development process. This is many cases understood part of the product development process, but supplier involvement can be considered to be happen in example sales phase. Sales project can be done with collaboration with suppliers and supplier know-how can be used in many areas, basically everything what is delivered by suppliers. Johnsen (2005) is calling in his article supplier integration by term "early supplier involvement (ESI)" and according to him, there are real proved potentials to get rewards by ESI. Case company's ESI is shown in appendix 5.

The term “adaptive supply chain management” (A-SCM) was in first use in 2001-2002 in the area of information technologies according to Ivanov and Sokolov (2010).

A-SCM framework has three main inputs, which Ivanov et al. (2010) called strategies. They defined these three strategies (figure 1) as Agility, Supply Chain Management and Sustainable supply chain management. Considering the significance of strategies to A-SCM, the sub-elements of the strategies were added. In agility these elements are: Web-services, Responsiveness and Core competencies. Elements of SCM are: Integration, Cooperation and Coordination. In sustainable supply chain management are: Product life cycle, Policy and Society. There are no value differences between strategies, but those shall be considered as integrated framework.

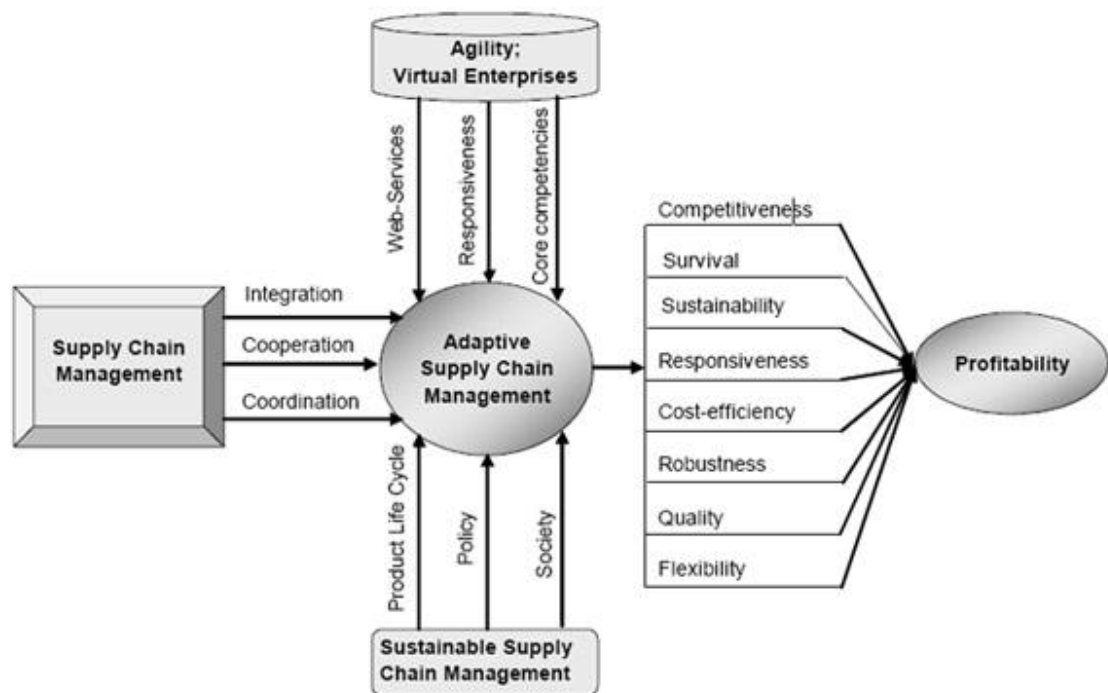


FIGURE 1, Framework of A-SCM (Ivanov & Sokolov, 2010, 27)

**Agility:** According to Collin and Lorenzin (2006) “an agile supply chain is a basic competitive requirement in the industry and building agility into operations requires a continuous planning process together with customers”. Today agile organizations have implemented an extensive range of Web based services emphasizes Van Donk and Van Der Vaart (2007). According to Van Donk et al. (2007) the agility includes

an information sharing system, which can be internet based system or company's ERP system, where suppliers have an access to retrieve information concerning company, product, quality or order. Ismail and Sharifi (2006) defined the agility of SCM "to be the ability of the supply chain as a whole and its members to rapidly align the network and its operations to the dynamic and turbulent requirements of the demand network". Their theoretical ground of agility of SCM is based on concept of agile manufacturing and systems. Some of the companies have direct web-based portal to their ERP system, where all information can be down loaded for supplier use. Important features of this kind of portal is e.g. quick access to order documentation, production planning and forecast can be down loaded and adjusted to suppliers own material management processes and information sharing. Many ERP systems providers offers this kind of feature which can be established via middle man services or direct access to ERP system.

**Sustainability** is no longer optional, nice to have, business imperative, but one of the important programs in global supply chain management. According to Hanifan, Sharma and Mehta (2012) Accenture surveyed more than 700 companies in 2010 who are members of United Nations Global Compact and result of that, 96 percent of surveyed CEO's told sustainability shall be integrated into company's strategy and operations. Many MNC's are defined sustainability as one of the core values in SCM, because investors are recognizing the importance of sustainability for corporations. Dow Jones Sustainability Indices is based on RobecoSAM's Corporate Sustainability Assessment (CSA) methodology and annually over 3.000 public companies are invited to participate in RobecoSAM's assessment (<http://www.sustainability-indices.com/>, 19.03.2016).

According to Asefeso (2015) the sustainability in supply chain is "a holistic perspective of supply chain processes and technologies that go beyond the focus of delivery, inventory and traditional views of cost". This philosophy is based on basic rules of socially responsible services and products which are "not only good for the environment, but are important for long-term profitability".

Sustainable supply chain is transparent, traceable and have a good awareness of risks and agreement on mitigation actions. The case company has six elements in sustainability policy: Business ethics, Compliance, Human rights and labour rights, Occupa-

tional Health and Safety (HSE), Environmental management and Products and services. The case company is participating the Dow Jones Indices and suppliers are audited and followed-up to monitor the sustainability in practise.

**Supply Chain Management** is explained in following chapters, but basically according to Ivanov et al. (2010) supply chain management consists three functions, integration, co-operation and coordination. Suppliers are integrated to the processes and as Johnsen (2005) stated, suppliers shall be involved as early as possible. Second function is co-operation, which is part of mentioned integration and third is coordination. Without coordination, results are rarely achieved. According to Johnsen's (2005) article about supplier integration projects, it is important to have right skilled people with right competencies to successfully embark supplier integration projects.

According Ivanov et al. (2010), figure 2 describes an example of A-SCM from special machinery industry. The goal tree shows the main drivers of A-SCM, which are listed here below:

- Integration
- Coordination
- Agility
- Sustainability

Ivanov et al. (2010) emphasizes that as it is shown in figure 2, flexibility, effectiveness, cost-efficiency, stability and quality-effectiveness are areas to focus on to ensure long-term competitiveness, sustainability and survival of the company.

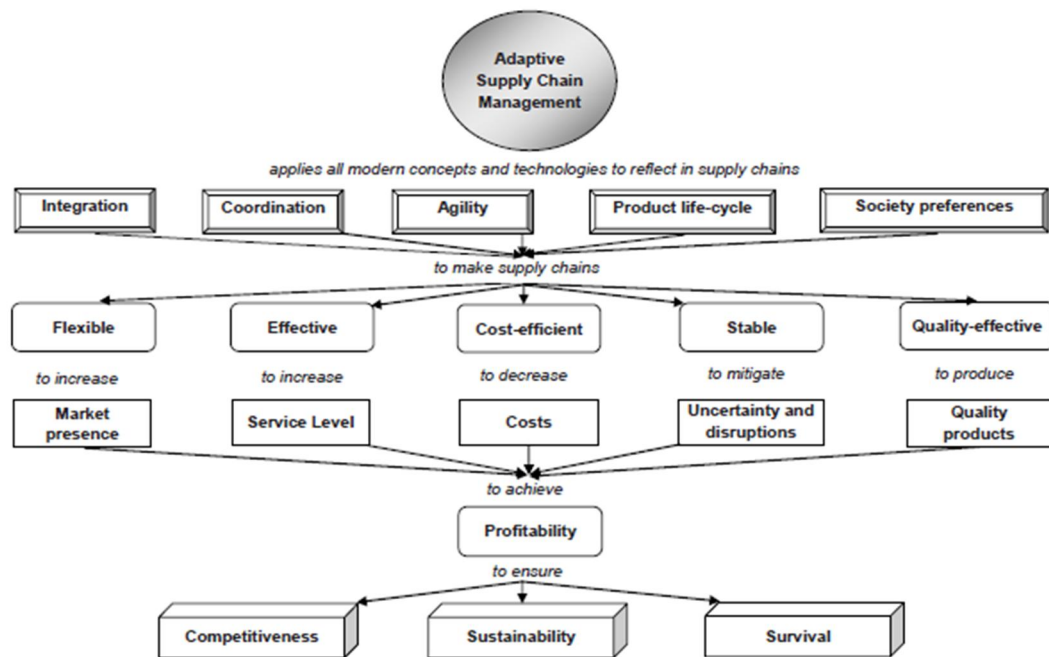


FIGURE 2, Goal Tree of the A-SCM, (Ivanov et al, 2010, 30)

### 2.1.2 Supply management

In the literature, the definition of the supply management, is wide and diverse and it has been described in many publications. As it can be seen in this chapter words buying, purchasing and procurement have different meanings in different literature. Same words cannot be used when interpreting procurement literature from different authors, first step is to understand what certain author is meaning by words supply management, supplier management, procurement, etc.

Supply management is not only the procurement work itself, but incorporates all processes between buyer and seller. Supply management organizations are consistently being challenge to build more effective and more value adding supply chains to increase the company's profitability and competitive advantage. According to Handfield (2006) supply management shall move from the tactical to strategic approach. Van Weele (2010) defined tactical same as strategic, but Hanfield means instead tactical as operative purchasing. Handfield writes that "in the future, there will be a greater need for integrating data systems, standardizing parts, and creating joint ventures in the procurement area". Strategic approach will help companies to achieve

these goals, because developing the long-term relationships with suppliers will bring consistency and continuous to the relationship between customer and supplier, which increases openness and reduces uncertainties.

The concept supply management can be understood as Supply Chain Management (SCM). In many literature the term supply chain management is used more often and for example Melnyk and Swinks (2002) defined that the SCM is the whole network between organizations. They described as follows:

1. Converting raw materials and information into products and services.
2. Consuming the products and services.
3. Disposing of the products and services.

Dyckhoff, Lackes and Reese (2004) writes that concept SCM is widely discussed in in literature and most often SCM includes mainly production, procurement and sales. Sales is actually not that often included in SCM's. Basu and Wright (2007) extended this concept even further, they called this as Total Supply Chain Management. According to them, the focusing only on traditional supply management practises such as "forecasting capacity planning, inventory management, scheduling, and distribution management will offer only partial solution to optimizing customer services". Basu and Wright (2007) developed a model for Total Supply Chain Management which contains six items:

1. Customer focus and demand
2. Resources and capacity management
3. Procurement and supplier focus
4. Inventory management
5. Operations management
6. Distribution management



And these items are integrated by functional processes as follows:

1. Sales and operations planning
2. Systems and procedures
3. Performance management

Supply management must be considered as a concept around the delivered goods or services and this concept is combining all parties, not only the buyer's and the seller's organizations, but whole supply chain from low tier suppliers to the end user.

### **2.1.3 Supplier management**

Supplier management is one part of the supply management and focusing on managing the supplier base. Office of Government Commerce (2006) defines that supplier management is “an approach which builds on the outputs and approach for contract and frame work agreement. It is focused on overall relationship with the supplier rather than specific relationship around a contract”. In general traditional supplier management focuses on e.g. cost reduction, shorter lead-times, continuous improvement and better quality. Supplier management can be extended to advanced relationship to build more trust, increase business opportunities from both parties, add more value to supplier relationship and reduce of uncertainty. Supplier management is called also in some literature vendor management. According to Hanfield (2006) “vendor management is multi-faceted”. He describes that “effective vendor management has four distinct elements that needs attention”. These elements are “evaluation and selection, contract development, relationship management and delivery management”.

### **2.1.4 Procurement**

The meaning of term “procurement” is much larger than term buying. In buying you basically order something from the supplier's standard product range or specifications are clearly defined by other department. Even more meaningful word is purchasing. According to some literature in purchasing includes more responsible for

specifications and supplier selection. The word procurement has the widest meaning and it has been more common today than the past. Procurement means all activities what are required to the get a goods from the supplier to its final destination. Today the popularity of the word procurement can be seen in different titles e.g. chief procurement officer (CPO), project procurement manager and director of procurement.

Procurement is a one of the main functions in company's processes. Basically, the procurement process includes "determining purchasing needs, selecting suppliers, arriving at a proper price, specifying terms and conditions, issuing the contract or order, and following up to ensure proper delivery and payment" (Van Weele 2010, 8).

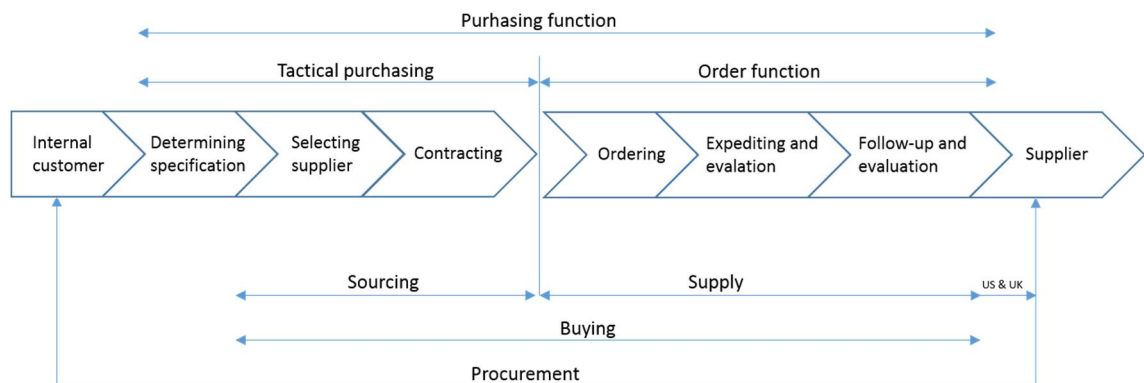


FIGURE 3, Purchasing process (Van Weele, 2010, 9)

As figure above shows, Van Weele (2010) divided purchasing function in two sections, tactical purchasing and order function. Tactical purchasing is also known as "strategic purchasing" and in case company tactical purchasing is taken care by category management team. In Van Weele's model (2010), tactical purchasing ends after contracting, but in project business it may end before contracting, because frame agreements or annual agreements are relatively rare in project business. In most of the cases in project business, contracts are done per project and tactical purchasing is support function to find new suppliers or if needed, manage the long term co-operation contracts or frame agreements.

According to Iloranta et al. (2008) procurement processes are many cases considered only from reactive procurement point of view and it covers only part of the processes which are considered procurement processes. If company's want to exploit all benefits of supply markets, they shall consider wider and more strategic perspective of procurement. If reactive procurement is expanded to cover strategic portion, next three points shall be fulfilled (Iloranta & Pajunen-Muhonen, 2008, 64):

1. Supply management knows supply markets and competitive aspects.
2. Supply management exploits knowledge of supply markets and is in collaboration with other functions to defining the need.
3. Suppliers are managed after contracting.

When these mentioned three points are fulfilled, procurement processes are focused on strategic parts of process. Iloranta et al. (2008) illustrates procurement processes from wider and strategic point of view in figure 4.

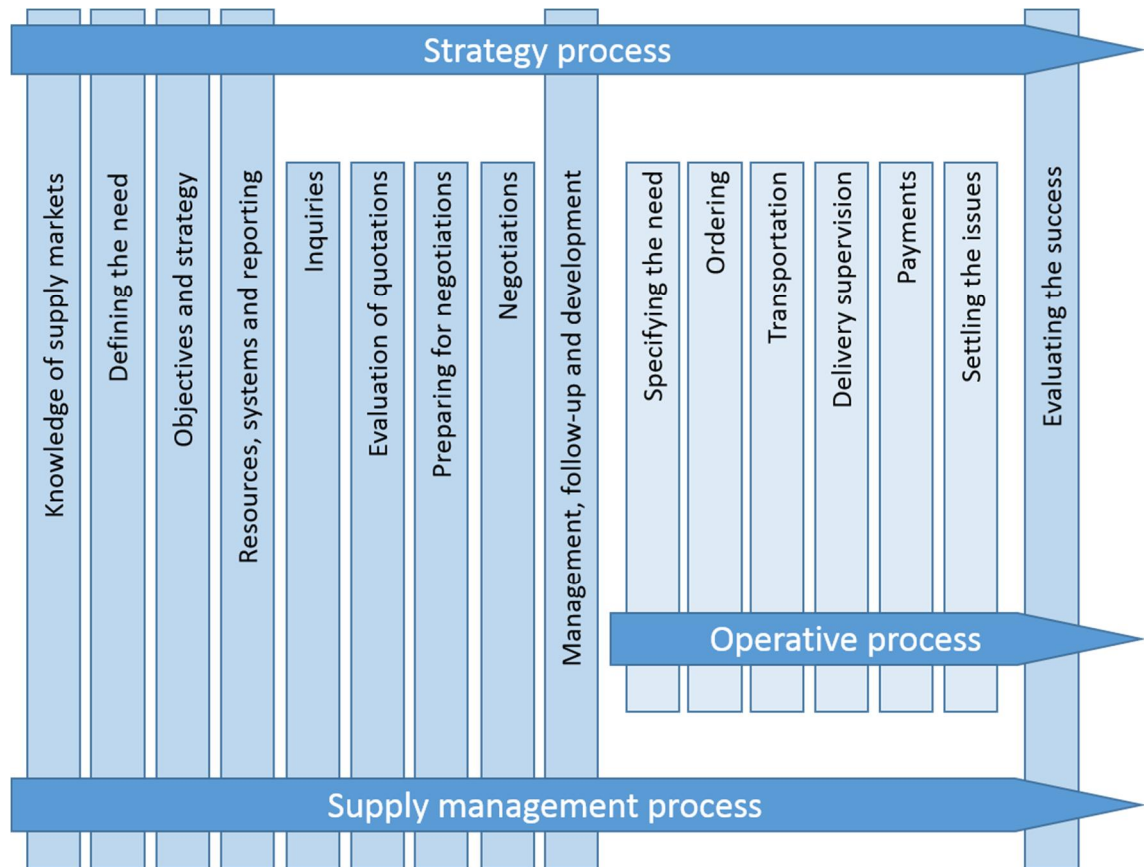


FIGURE 4, New wider and strategic perspective of procurement processes (Iloranta & Pajunen-Muhonen 2008, 65)

### 2.1.5 Supplier relationship management

Supplier relationship management is a process where company's supplier relationships are established, developed and maintained. Supplier relationship is hereinafter called "SRM". According to Lambert and Schwieterman (2012) "supplier relationship has become a critical business process". The competitive pressure, sustainability and cost efficiency is driving companies to develop their SRM's. According to Office of Government Commerce (2006), "SRM is an approach between two parties to work towards the integration of their organizations". This integration will bring more value to the customer and improves margin of delivered goods or services to the supplier. This is one way how both parties can meet their strategic objectives. Hanfield (2006) has listed ten reasons why companies needs a dedicated SRM function:

1. A single system never works
2. People need to communicate better
3. Better be nice to people on the way up; you are going to see them again on the way down (Bob Dylan)
4. Strong-arm negotiation tactics will hurt you in the end
5. The demise of the reverse auction
6. Data means different thing to different people
7. China: Do you have a strategy?
8. Channel/Supply chain design: ten hats are better than one
9. People are strange when you are a stranger: Geographic differences
10. Information becomes distorted

The SRM cannot be only one strategy. More companies have different type of suppliers, more versatile the single SRM strategy need to be. Therefore companies should develop different SRM strategies for different suppliers and even for different purchase categories. Reasons why SRM is important is that company and it's different functions have their own goals e.g. cost reduction, quality, delivery and product/process improvements, decreasing of the "to the customer" cycle time, communication improvements and other requirements. These goals can be incorporated to SRM and can be communicated with suppliers through one channel.

Handfield (2006) quoted Thomas S. Monson:

"When performance is measured, performance improves. When performance is measured and reported back, the rate of improvement accelerates".

As Thomas S. Monson described importance of measuring of performance, SRM should be two-way communication method. John Deere Corp. is using Achieving Excellence supplier evaluation program ([www.jdsn.deere.com](http://www.jdsn.deere.com)) as one part of their SRM. This is basically two-way communication method, where goals are set up beginning of the year and mid-year and end-year evaluation results are shared and discussed with suppliers. Suppliers are able to give improvement suggestions and comments via Achieving Excellence online system. Suppliers are rated annually and program is in use globally and results are comparable around the world. John Deere

Corp. has achieved outstanding results what comes to supplier performance and product development by using this program.

How to identify important suppliers, which can be incorporated to SRM? There are several different methods and few of them are described in this paragraph. One and most used model is the Kraljic portfolio matrix, which was published by Peter Kraljic (1983) in the article in Harvard Business Review. In this four-area portfolio model, impact of certain importance items are added on X- and Y- axes. This is very simple model and easy to use. It is also very indicative and importance's can be seen easily. Important thing is to remember that in Kraljic matrix you review purchased products and service commodities, not suppliers itself, even though product commodities and suppliers might have clear connection between them (Iloranta & Pajunen-Muhonen, 2008).

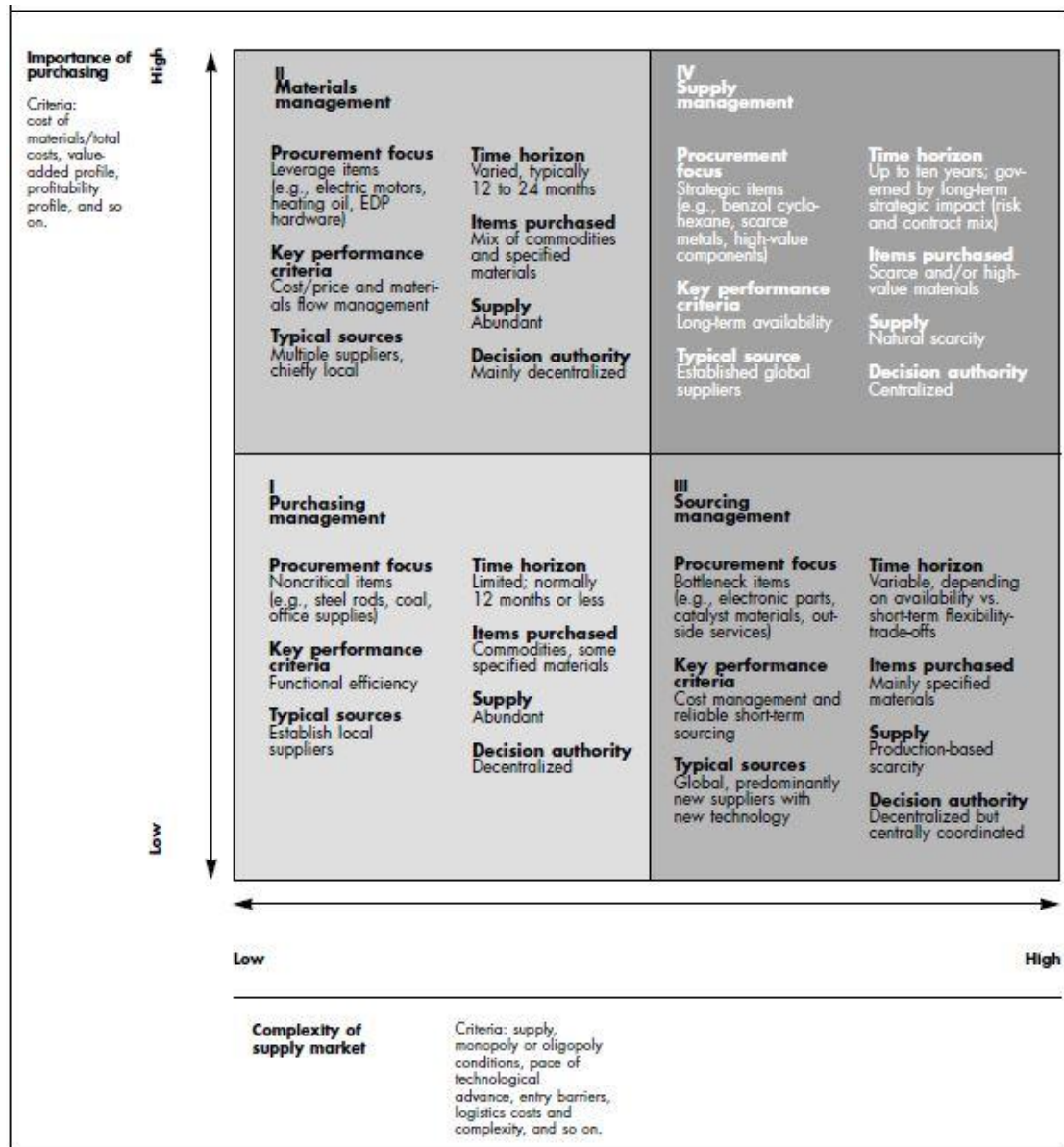


FIGURE 5, Complexity of supply market (Kraljic 1983, 111)

Kraljic portfolio matrix is widely used and modified in different context. E.g. Van Weele (2010) redefined the Kraljic matrix (see figure 5) by adding two variables; the purchasing impact and the supply risk. This is probably most used modification of Kraljic portfolio matrix. In this model each segment has individual procurement strategy, which are defined after figure 6.

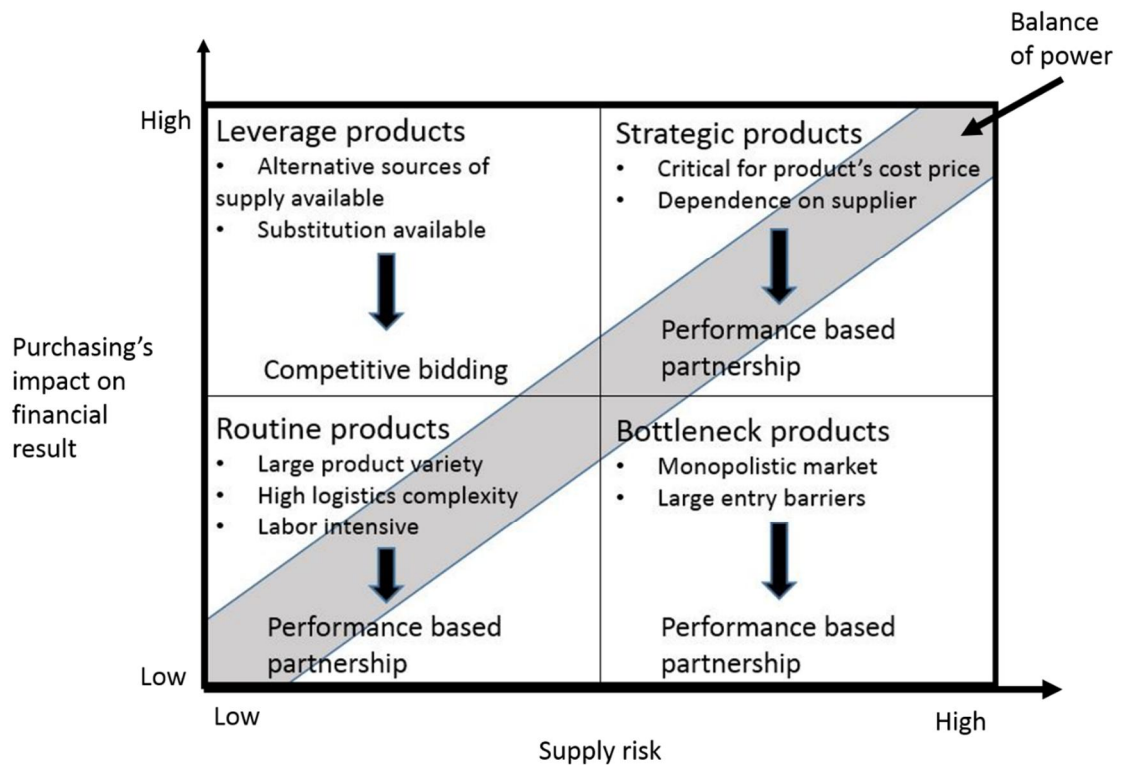


FIGURE 6, Purchasing portfolio (Van Weele 2010, 197)

**Strategic products** are mostly supplied according to customer specifications. These are high tech or high volume supplies. Sometimes these products have only one supplier, which cannot be changed in short period of time. Suppliers in this segment are important and many cases long-term agreements or development agreements exists between parties.

**Leverage products** are supplies, which have several suppliers and base on standards. Probably these products cost is high and represents major part of the cost of final product. These are mainly bulk material such as raw materials, semi-manufactured or packaging.

**Bottleneck products** have mainly small cost, but are difficult to source. These supplies have one or couple suppliers and therefore are hard to purchase from another place.



**Routine products** are supplies which have several suppliers and cost is relatively low. These can be bought from several sources and are mainly inventory parts. In this category are products like bolt and nuts or other cheap bulk products.

Although this purchasing portfolio is used widely, there are some limitations to use it. Van Weele (2010) observed that there might be a significant shortcoming. According to him, strategically important product “does not necessarily imply that this product is also of strategic relevance to the supplier involved”. If company would like to develop effective co-operation with supplier, there have to be good fit between the positions of the product in buyer’s purchasing portfolio and supplier’s customer portfolio. This is the reason why companies have developed and introduces the “Dutch Windmill” (see figure 7). This is an extension to their purchasing portfolio.

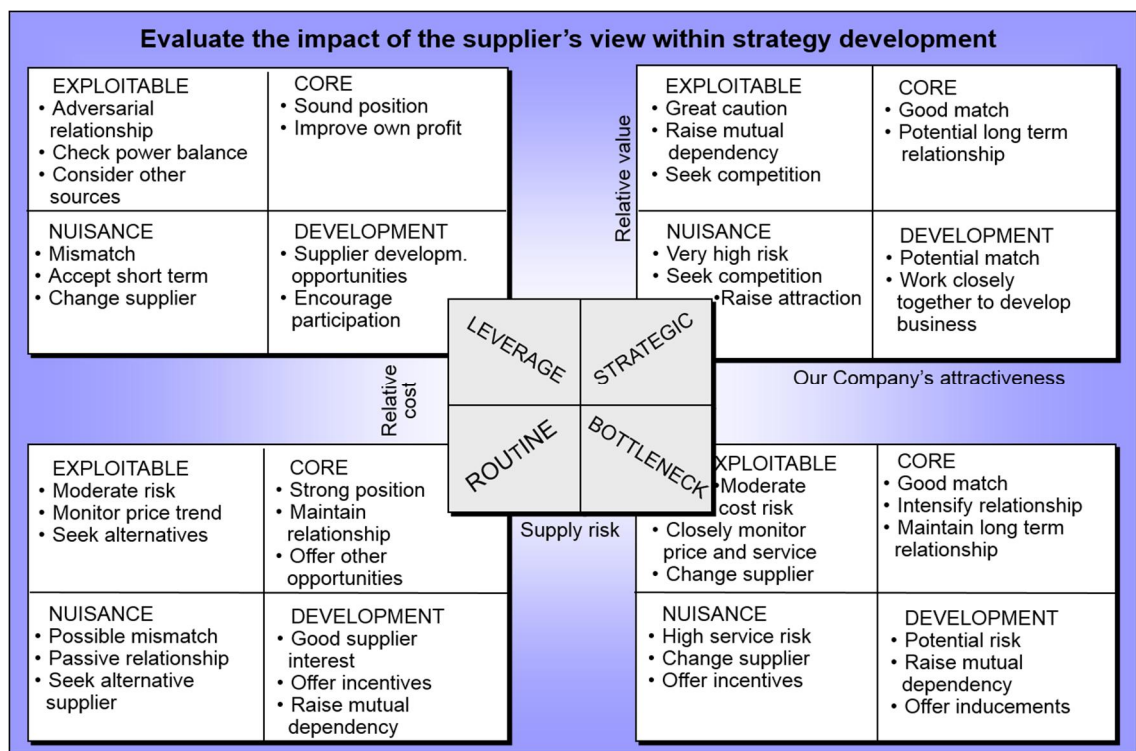


FIGURE 7, Dutch Windmill (Van Weele 2010, 202)

Another way to identify critical suppliers is The Pareto Principle, which was published by Italian economist Wilfred Pareto. This principle is also known as the 20/80 rule. According to Parmenter (2007), Vilfredo Pareto observed that “80% of the land

of Italy was owned by 20% of population”. Later he discovered that the Pareto principle was valid in other parts of life, such as gardening: “80% of his garden peas were produced by 20% of the pea pods”. According to this principle 20% of the suppliers represents 80% of the purchase spend and therefore it is logical to concentrate only to the top 20% of the suppliers. The Pareto principle generates the Pareto Curve (figure 8).

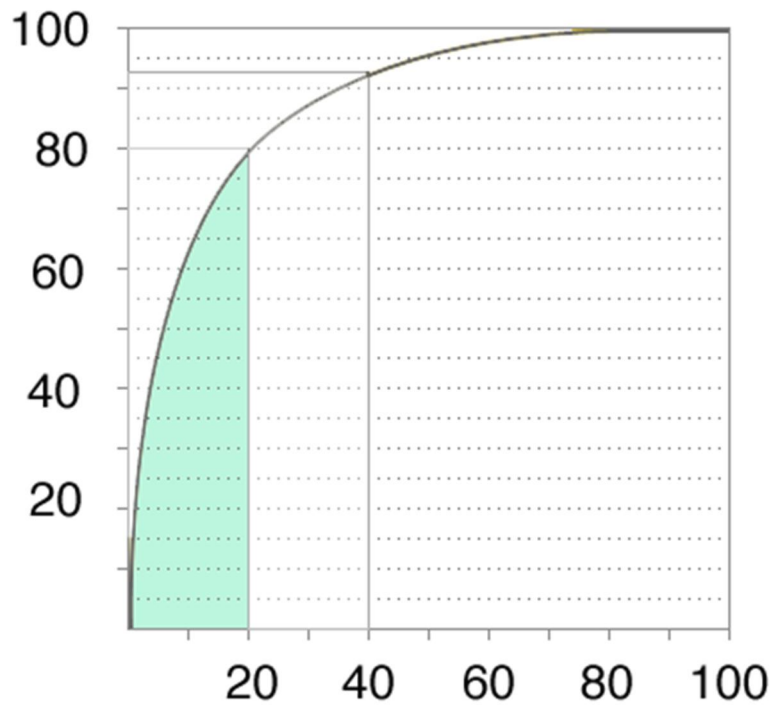


FIGURE 8, Pareto Curve (Rusty 2013)

Sometimes 20/80 rule might be false, because Vepsäläinen, Koskinen, Lankinen, Sakki and Kivistö (1995) claims that most of the cases 10% of the supplier represents even 80 to 90% of the turnover of the company purchases. Today that might be even more false, because companies are optimizing supplier base to reduce number of active suppliers. This is one strategy of supply base management, because less suppliers companies have, more spend is dedicated to few active suppliers. One way to reduce suppliers in routine products is so called “full service method”. This method is widely used when supplier is delivering e.g. fasteners. It does not matter how much companies have these in stock, most important thing is availability of fasteners, which inventory value is only couple of percent or less.

The Pareto principle can be used to make ABC analysis, where most important percentage can be defined as category A, second important as B and least important as category C. The 20/80 rule or ABC analysis proves that companies should focus on A and B category suppliers, because their impact is most significant to result of the company.

### **2.1.6 Procurement in project business**

If the projects are challenging, so is the procurement in the projects. The procurement as a process is not that different in project business than in serial production. Same features and aspects are valid in project procurement than in any other, but in project business multiplicative effect can be bigger. Challenges in project procurement are the similar as in projects. If the project is one of a kind, you might purchase something only once. Also tight delivery time or delayed time schedule of project may cause difficulties to manage project planned way. Iloranta et al. (2008) emphasises that if the execution time of the project is short, focusing on procurement function is lacking and decisions are done without long-term considerations. If supplier understand the tight schedule of project and procurement should be done as soon as possible, supplier may tempt buyer to do precipitate decisions which are from cost or technological point of view poor. According to Basu and Wright (2007, 261) a project supply chain becomes more complex when size of the project grows. They mentioned Airbus 380 and London Olympic 2012 projects, where the projects lasts many years, with several stakeholders and project had several tiers of suppliers and subcontractors. They showed a conceptual model of supply chain in major constructional project in figure 9.

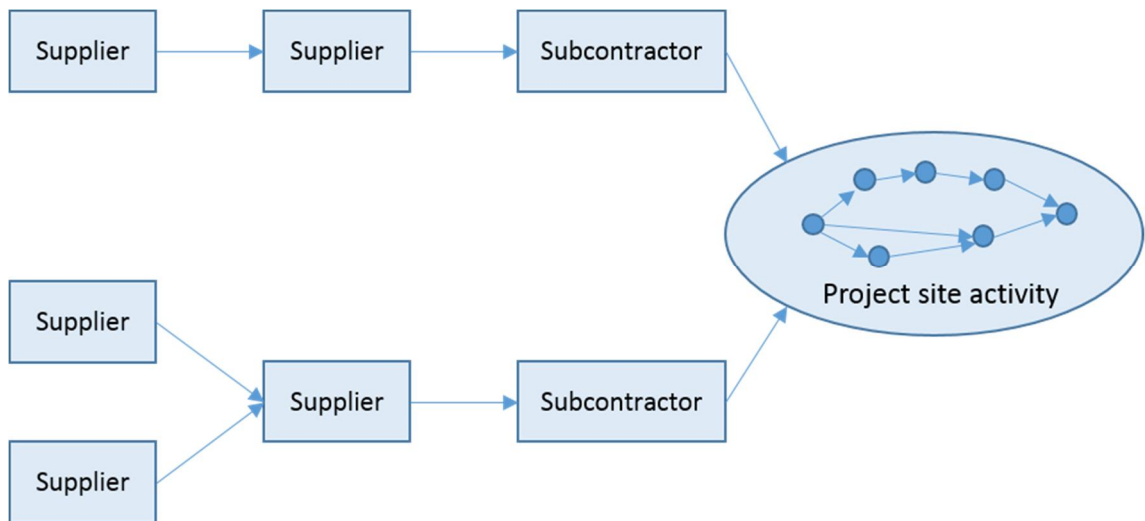


FIGURE 9, A conceptual representation of a project supply chain (Basu & Wright 2007, 261)

Companies which are operating in project business lives from the results of the projects. Importance of the procurement in any business is very high from return of investment point of view. Using the so called DuPont analysis, as Lorenz H. (2013) did in the following figure 10, 2% cost decrease will increase margin to 5,9% (23% total increase) and RONA (return of net assets) will be increased to 12,4% (24% total increase). 200.000 € savings in procurement in this analysis means more than 1.000.000 € sales increase.

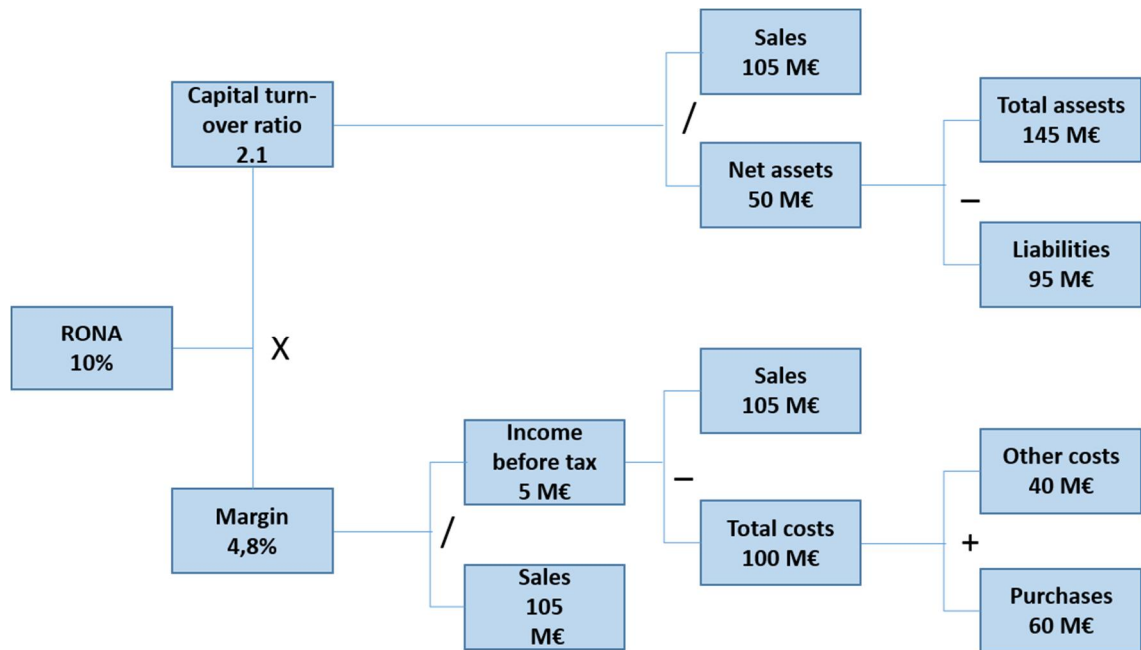


FIGURE 10, DuPont analysis, (Lorentz 2013, 5)

The PMBOK (2013, 355-389) defines that project procurement management process contains four processes (figure 11). In procurement plan phase buyer shall get specifications and other procurement material, make procurement decisions, investigate supplier markets and define the strategy of the procurement. In conduction phase buyer shall choose suppliers, send inquiries, evaluate offers, negotiate with seller and conduct agreements and orders. In third phase buyer shall monitor deliveries and work with performance information. In this phase changes or modifications of orders are done. Last phase is in many case forgotten, if delivery has performed as it was planned. If there are any issues, these issues shall be settled in last phase and close the procurement process. In this phase experiences and results shall be collected and this knowledge should be transferred to next projects. Result of this phase gives procurement function foothold in next projects when similar procurement decision are done.

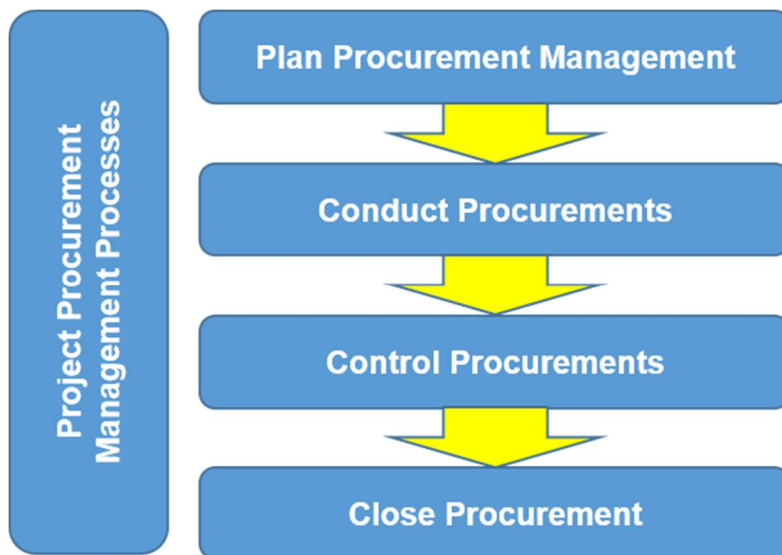


FIGURE 11, Project Procurement Management Processes

Procurement in projects has similar features as project itself. There is a start and end. Starting point of the procurement is when needed documentation or specifications are released for procurement. Documentation or specifications are defined by another department or function of project team. Procurement material can be only specifications or comprises several documents and data sheets. Most complex procurement materials are for erection works. In erection works, you shall pay attention to e.g. technical and quality document, site responsibilities and HSE documents. Case company has a certain list of contract enclosure. That list can be found from chapter 4.2.2. Procurement in project contains same risks as project itself, because procurement in projects have same features as main project. In other words purchases are sub-projects within main project. Procurement risks can be mitigated via proper contract management and therefore is it important focus on contract policies.

### 2.1.7 Procurement strategies in project business

Procurement strategies shall be defined according to result of analysis. One previously mentioned analysis model is Krajlic portfolio matrix (1983) which was redefined by Van Weele (2010). Strategy is depending of impact of the purchased product. Van Weele (2010, 198-200) listed four different strategies according to purchasing product portfolio model. These are *performance-based partnership*, *competitive bidding*,

*securing continuity of supply and category management and e-procurement solutions*. Procurement strategy is heavily depending on the criticality of the purchases.

*Performance based partnership* is mainly used in strategic and leverage products which might cover up to 80% of the purchased spend. Minor changes in price will cause immediate impact on final products price and therefore it is critical to monitor price level and development. Purpose of partnership base collaboration with suppliers is to reduce risk of supply and keep costs visible. Also partnership type collaboration is used when products are developed together with supplier, but risk is that suppliers are in dominant position and sourcing cannot be done in short term without high costs.

Strategy for leverage products is in many cases *competitive bidding*. In leverage product category products and suppliers are interchangeable and therefore long-term agreements are not needed. In this category spend is high and possible savings are plausible when contracts are competed.

Bottleneck products are extremely important and therefore *securing continuity the supply* is important, if necessary at additional costs. If there are products in this category, aim shall be reducing dependence of product or supplier. Alternative products shall be developed to secure the independence of supply markets and to find out alternative suppliers for products. In many cases risk analysis are needed to identify possible risk of supply.

In routine products shall not been paid lot of attention. These purchases are many case products like office supplies, production support equipment and parts, standard products like bolts and nuts. These commodities shall be taken care via most convenience way as possible and reduce administrative cost and time. There are many solutions e.g. *e-commerce* or full-service model, where suppliers is taking care of filling boxes. So basically order trigger can be automated as well as delivery to place of need.

## **2.2 Key concepts**

In this chapter key concepts are explained. These concepts help readers to understand of supplier behaviour towards customer and features and challenges of project business environment.

### **2.2.1 Small and medium sized enterprises**

The Statistics of Finland (2015) defines that enterprises which have fewer than 250 paid employees and whose annual turnover is not exceeding than EUR 50 million or balance sheet total is not more than EUR 43 million are defined as Small and Medium Sized Enterprises, which is called hereinafter “SME’s”.

Small Sized Enterprises are with fewer than 50 paid employees and annual turnover is less than EUR 10 million or balance sheet total does not exceed EUR 10 million (Statistics Finland).

### **2.2.2 Multinational Corporations**

There are different definitions for Multinational Corporations, which is hereinafter called MNC’s. Website [www.investopedia.com](http://www.investopedia.com) defines MNC’s as “A corporation that has its facilities and other assets in at least one country other than its home country. Such companies have offices and/or factories in different countries and usually have a centralized head office where they co-ordinate global management”. Sometimes MNC’s are called as transnational corporations.

### **2.2.3 Customer relationship management**

Customer relationship management (CRM) was introduced in the early 1990’s and it’s a seller’s process, where seller is establishing, developing and maintaining relationship towards to the buyer. Knox, Maklan, Payne, Peppard and Ryals (2003) de-



defined the CRM as a “far reaching management process” and they demonstrated that most of the large companies are investing significantly to implement CRM process.

CRM has been developed in four waves and Saarijärvi, Karjaluoto and Kuusela (2013) researched it from customer data point of view. According to Saarijärvi et al. in the *first* wave, early 1990’s, companies faced with lot of customer data, which was focused on developing technological solutions to manage better the company-customer interface. In the *second* wave, mid 1990’s, customer data was organized to serve better company purposes, such as mass customization and one-to-one marketing was established. Third wave of CRM took place 2000 - 2010 and customer data was seen as an asset and loyalty programs was used better manage of customer relationship. In the *fourth* wave 2010, the customer data was refined and given back to customers (Saarijärvi, Karjaluoto & Kuusela, 2013). These waves can be seen in figure 12 where CRM’s waves, focus and goal is also shown.

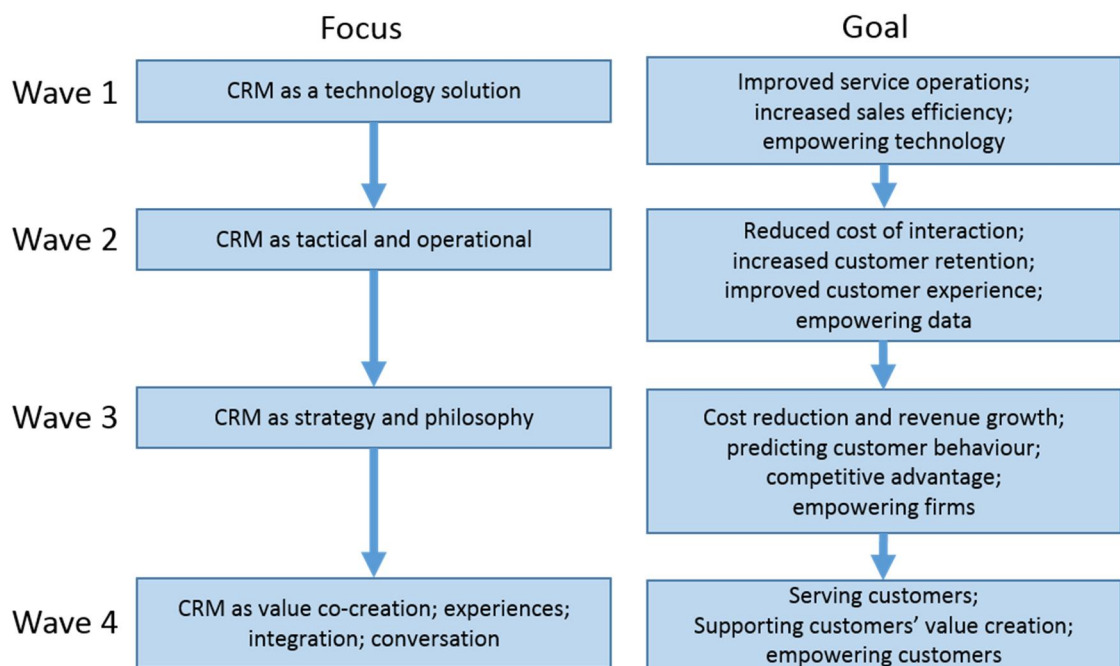


FIGURE 12, CRM waves (Saarijärvi et al. 2013)

### 2.2.4 Project

Project is a sequence of tasks and has beginning and end. Basic four steps of the project are shown in figure 13. Each project is different and executing project team is not always the same. Customers might change and even if the customer is familiar, but objectives of project are different. Project Management Institute (2013) defines that project is “a temporary endeavour undertaken to create a unique product, service, or result”. The temporary means the project has a definite beginning and the end. In most of the cases project ends when all goals and objectives are achieved, project is handed over to customer and all financial obligations are fulfilled. Project ends also in case when project is terminated and all parties are released from their obligations. After termination project does not exist anymore.

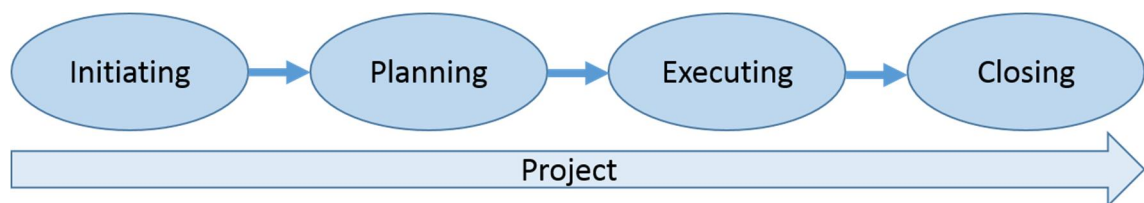


FIGURE 13, Project sequences

Forsberg, Mooz and Cotterman (2004) described that “each project has a life cycle, which in many cases is not documented or understood”. This life cycle contains several different sequential phases toward completion and level of the activity ascents until it has been reach the highest peak until it starts descent. In figure 14 project life cycle is illustrated.

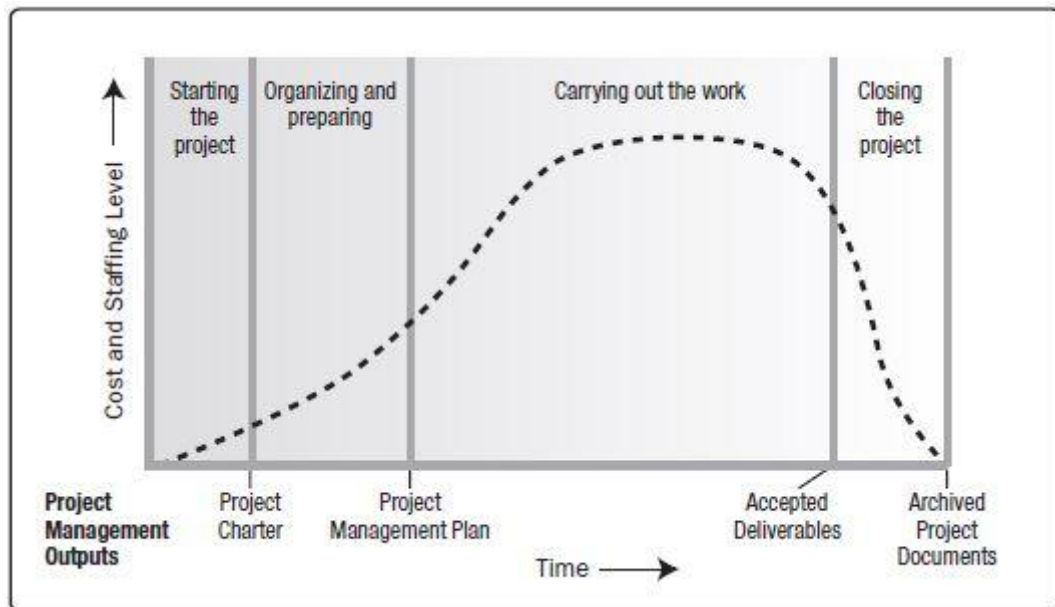


FIGURE 14, Project Life Cycle Structure, (PMBOK Guide 2013, 39)

### 2.2.5 Project business

The business can be based on manufacturing for serial products, solving customer's problems or fulfilling customer's needs. In case where company is providing solution or one single equipment for customer need, this can be defined as project business. Artto, Martinsuo and Kujala (2011) defined that "project business is the part of business that relates directly or indirectly to projects, with the purpose of achieving the objectives of a firm or several firms".

### 2.2.6 Project management

Project management has many different descriptions and many authors have defined it in different ways, but main message is the same. Project management is an application where you manage the whole life cycle of the project (figure 14). Project management has been described in Project Managements Institutes publication PMBOK Guide (2013) as "project management is the application of knowledge, skills, tools, and techniques to project activities to meet project requirements". The project management was also defined by Artto, Martinsuo and Kujala (2011) "project manage-

ment is the application of management practises aimed at achieving the project goal and objectives”.

### **2.2.7 Processes in project business environment**

In this chapter we go through features and challenges of project business environment. As earlier was stated, each project is unique from scope, environment or geographical point of view.

#### **Project environment**

Projects, why those are so challenging? At this point I would like to quote a slogan from movie and TV-series Star Trek: “To boldly go where no man has gone before”. This slogan is very useful describing projects, because each project is unique. According to Horine (2005) following key reasons shall be managed during project phase: “Uncharted territory, multiple expectations, communication obstacles, balancing the competing demands, cutting edge, organizational impacts, collaboration and estimating the work”.

#### **Project types**

Projects are classified according to responsibilities of contractor and end customer. Project type EPC stands for **E**ngineering, **P**rocurement and **C**onstruction. In this model contractor is responsible for design, procurement, construction and commissioning of the project. This is typical turnkey project when contractor is providing an operational facility e.g. power plants and contract includes performance guarantees. Other type of projects is EPCM, this comes from the words **E**ngineering, **P**rocurement and **C**onstruction **M**anagement and is mainly a professional services type of project. (Dawson & Higgins, 2011, 1-2). In EPCM model constructor is not providing complete project on time and on budget, nor take any responsibility of quality or performance of project. Main differences can be found from table 1.

TABLE 1, A Comparison of EPC and EPCM, (Sarcich &amp; Moore 2014, 6)

	EPC	EPCM
Accountability	Contractor fully accountable	Owner has multiple points of accountable
Risk	Contractor holds risk	Owner holds risk
Time	Fixed rate for completion	No fixed completion schedule
Price	Fixed price contract	Schedule of Rates / Cost plus
Procurement	Contractor responsible for procurement	Procurement has agent for the owner only
Quality/Performance Guarantee	Contractor guarantees performance of completed facility	Contractor does not provide performance guarantees
Owner's involvement	Contractor is control	Owner in control
Defective works/services	Contractor to rectify any defects	Assists owner to manage rectification of defects

Another project type is only material delivery or materials with engineering services. These are called EPS project. EPS stands for **E**ngineering, **P**rocurement and **S**upervision. In this model contractor's responsibility is deliver material on time to named place and supervision of the erection works. Sometimes commissioning is included to project. This type of project very common in far-east and Asia, where end customer is responsible for erection works.

### **Project risk management**

"There's no such thing as a risk-free projects", says Kippenberger (2000). Each project includes risks and therefore it is very seldom that projects will be realized according to the original plan. Both parties, buyer and seller, have their own expectation and vision of the scope of the project. Typically seller is not included something to the scope, but buyer may believe that same thing is included. This is the reason why it is significant to both parties to understand the scope of the project and it is clearly written down in the contract. PMBOK Guide (2013) defines that "project risk is an uncertain event or condition that if it occurs, it has a positive or negative effect on one or more project objectives such as scope, schedule, cost and quality". According to Arto, Martinsuo and Kujala (2011), risks can be divided into four different risk types: "pure risks, business risks, financial risks and area-specific risks". **Pure risks** can be considered as accidents or losses and can be affected directly or indi-

rectly through management or project management. For example any kind of unpredictable accident or fire is classified to this category and main feature of the risk in this category is unpredictable. Company may protect themselves against such risks with insurances and risk planning. **Business risks** instead are something what affects the project, project's objectives or its benefits. Artto et al. (2011) divided also business risks into three categories: "financial, pure and area-specific". Companies cannot protect themselves against business risks because it can be related to functionality, technological quality, feasibility or technical solutions. These are subjective risks, without clear objectives. **Financial risks** are related to the finance of the project and these risks can be managed with effective financial planning. Positive net working capital flow will protect against possible project risks, procurement losses can be avoided with bank guarantees and currency fluctuations can be avoided by hedging. **Area-specific risks** are political, geographical or administrative area. Geographical risks are many cases related to earthquakes, flooding, bush fires, etc. and political risks are e.g. war or terrorism. Also local legislation and culture may cause risks which are categorized to area-specific risks.

As PMBOK Guide (2013) defines that project has a negative impact, but also a positive effect. According to Rolf Olsson (2008) the positive effect can be called as an opportunity. He has been highlighted, the importance of the management of the opportunities shall not be forgotten in any risk management process. Opportunities should be calculated with negative risks, when total risk of the project or part of the project is calculated.

Some of the risks are known in sales phase and these contingencies can be easily added to sales price. Of course possibility of the realization of the risk is unknown and many indirect forces may affect to the risks. Impact of the risks to the project can be reduced by good risk management. Almost all project management literature defines risks and risk managements. Project risks can be considered to relate to economic performance, delivery time, quality, environmental performance, work environmental and innovation.

One feature of the case company projects is that project does not have much value to final customer until the project is completed.

## **2.3 IT review**

In this chapter ERP systems and data management systems are explained. These are basic IT-systems, which are used in almost every company. These are important systems to manage procurement function and in many cases, processes are aligned or integrated with these systems.

### **2.3.1 ERP system**

Samaddar, Narkundgar and Daley (2006) as well as Rai, Patnayakuni and Seth (2006) have emphasized that good and efficient information sharing through the supply chain can create much better performance than poor information sharing. In supply chain model, where information systems are shared between suppliers and customer, can create actual value to the business. Areas which values are improved are e.g. cost reduction of production and reduced lead times, decrease of inventory value, lower procurement cost and improvement of service and cooperation level (Bumann, Von Ahsen, Diaz & Wolf, 2004).

Modern ERP system is using database technology to control and integrate information to inter-company usage e.g. employees, finance, procurement, production technologies as well as to related suppliers and customers. Typical modules in ERP system are for inter-company use are e.g. logistics, manufacturing, finance and marketing (Forslund 2010, 353). In ERP-system, several programs runs information into one single database, which means that every function has a history, actions are visible and barriers between different function of company are decreasing. Example of different modules or programs is presented in figure 15 (Parthasarthy, 2004, 1-6)

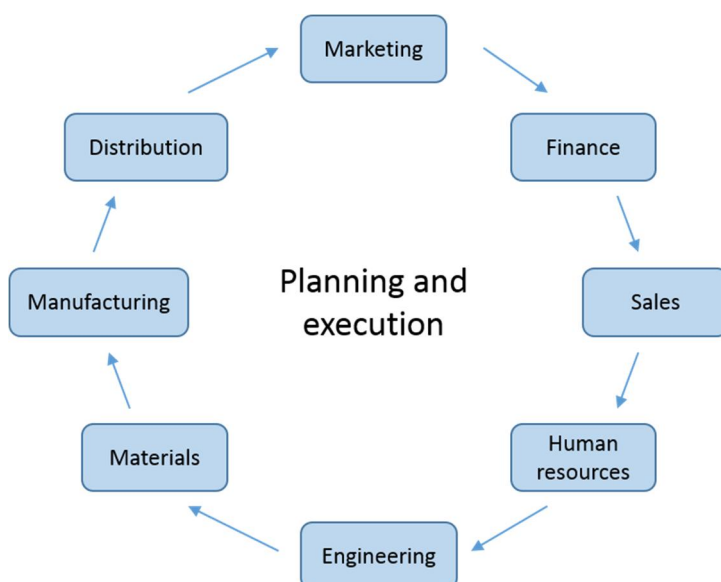


FIGURE 15, ERP-systems functions (Parthasarty 2004, 6)

Forslund (2010, 365) emphasises that ERP systems have a brighter future, because in the future more companies are upgrading their ERP systems to measure performance of supply management. One reason for this is faster development of ERP systems and newly developed features for supply management purposes, which are not presented for internal usage only, but external modules to suppliers and customers as well.

### 2.3.2 Document management systems

Document management systems are many literature called DMS. But in this study, the document management system is called Enterprise Document Management System (EDMS), because in case company DMS is a Delivery Management System. EDMS is used to manage the creation, storage, distribute and control company's documents in electrical form. Kelemen and Mekovec (2007) defines that the EDMS systems are for indexing, storing and retrieving, communicating, modelling and automating the flow of documents. It can be a part of company's Enterprise Content Management (ECM) which is developed to enclose the technologies used to capture, manage, store, preserve, and deliver content and documents related processes (Kelemen & Mekovec, 2007, 41). Document storage and distribution systems can be the



same as company's ERP system. Problem of ERP systems is accessibility of external partners and therefore documentation distribution software like Document Hotel is used for document distribution purposes. Another way to distribute is e-mails, but email do have size limitations and it cannot be used to store documents in one place. Anttila (2001) defines that internet based email system is not suitable for document managing and passive document sharing.

### 3 METHODOLOGY

This research aims to give the answers to two research questions: *What kind of tools and processes are needed in order to manage the supply chain in project business and are the current tools and processes relevant* (RQ 1) and *How to measure performance of supply management and how to implement measurement processes to case company?* (RQ 2)

#### 3.1 Research method

There are two different methods to research; Qualitative and Quantitative. Qualitative research is guided by concepts from the interpretive paradigm and quantitative research by assumptions inherent in the positive paradigm (Hennink, Hutter & Bailey, 2011, 16).

Because of the differences of these two research methods, the approach characteristics are different as well. Hennink et al. (2011) listed main differences of these two methods as follows:

TABLE 2, Key differences of qualitative and quantitative methods, (Hennink et al. 2011, 16)

	Qualitative research	Quantitative research
Objective	To gain a detailed understanding of underlying reasons, beliefs, motivations	To quantify data and extrapolate results to a broader population
Purpose	To understand why? How? What is the process? What are the influences or contexts?	To measure, count, quantify a problem. How much? How often? What proportion? Relationships in data.
Data	Data are words (called textual data)	Data are numbers or numerical data
Study population	Small number of participants or interviewees, selected purposively (non-randomly)	Large sample size of representative cases
	Referred to as participants or interviewees	Referred to as respondents or subjects
Data collection methods	In-depth interviews, observation, group discussions	Population surveys, opinion polls, exit interviews
Analysis	Analysis is interpretive	Analysis is statistical
Outcome	To develop an initial understanding, to identify and explain behaviour, beliefs or actions	To identify prevalence, averages and patterns in data. To generalize to a broader population

If we study the differences of qualitative and quantitative research methods we easily notice the suitable method for this thesis. Firstly, let's look at the data and data collection method. Primary data is coming from interviews and therefore data is in word form, not in numerical form. Secondly we try to understand processes, which are the influences and how can we improve processes. This analysis of research methods indicates very clearly that research method of this study is qualitative.

### **3.2 Research model**

Maxwell J. (2013) created a model for qualitative research design which is called "interactive" model (figure 16). According to him, it is impossible to develop or even borrow a logical strategy in advance and implement it successfully for qualitative study. Researcher shall construct and reconstruct the research design, which was a main rationale for Maxwell's design model. This interactive research design has a flexible and interconnection structure. (Maxwell 2013, 2, 3, 6)

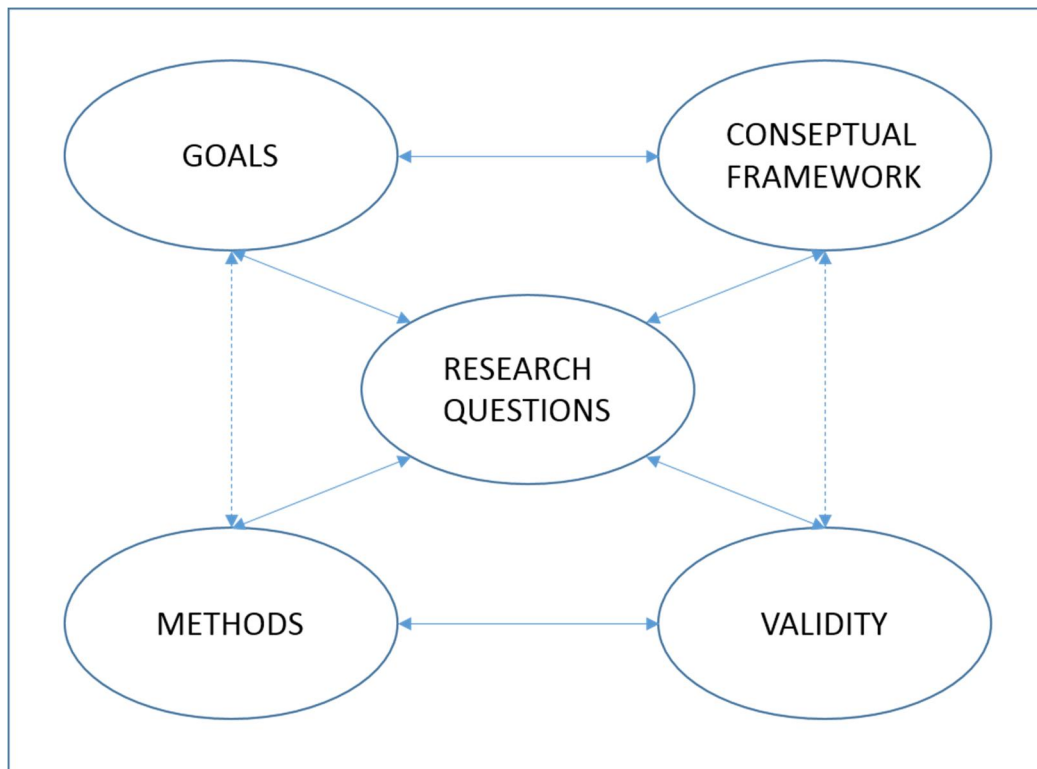


FIGURE 16, an Interactive Model of Research Design (Maxwell 2013, 5)

The figure above presents the key components of interactive research model and how these components are connected to each other and creates a workable relationship between them.

In this model the research question is in centre and all other components are in connections with it or with each other's. Key components are listed in this chapter and following questions will present the connection between the key components and objectives of this study. (Maxwell 2013, 4)

1. **Research questions:** First of all, which are your research questions? Do you want to understand better something what you study? What do you *not* know about it and is there something you would like to know more?
2. **Goals:** Why is your study worth doing? What are the issues you want to clarify or would you like to improve something existing? Why the results are important?

3. **Conceptual framework:** What is going on with the issue you plan to study? Which theories will guide you through your study? Is there literature or other material to get you to understand better the issues you are studying?
4. **Methods:** What you will actually do in conducting this study? How do you approach this study? What kind of tools or techniques you will use to collect the data and analyse it?
5. **Validity:** Can your conclusions and results be invalid? Is you collected data valid and plausible? Why should the reader of the study believe your results?

Answers to the question 1-3, 5 can be found from the chapters 1-2 and answer to questions 4 in this chapter.

### 3.3 Case study

This study was conducted to find out the process improvements and how to measure the case company's supply management in project business. This study was limited to collecting the data from the suppliers and analyse it to find out improvements. Secondly similar companies, operating in project business, was interviewed to find out their processes and tools and comparing those results to case company's processes. The study, which give answers to questions how and why, is a case study according to Yin (2009, 8, 9). He emphasized that especially the case study gives answers to questions why and how, which are explanatory questions than how many or how much, which are clearly results of yes or no surveys or numerical analysis. All features of case study are filled if three conditions are fulfilled. These conditions are:

1. What is form of research questions? How
2. Does it require control over behavioural events? No
3. Does it focus on contemporary events? Yes

Yin (2009, 46) introduced case study design model, which is divided into four basic units, which are single or multiple-case designs and holistic (single-unit of analysis) or embedded (multiple units of analysis) analysis (figure 17).

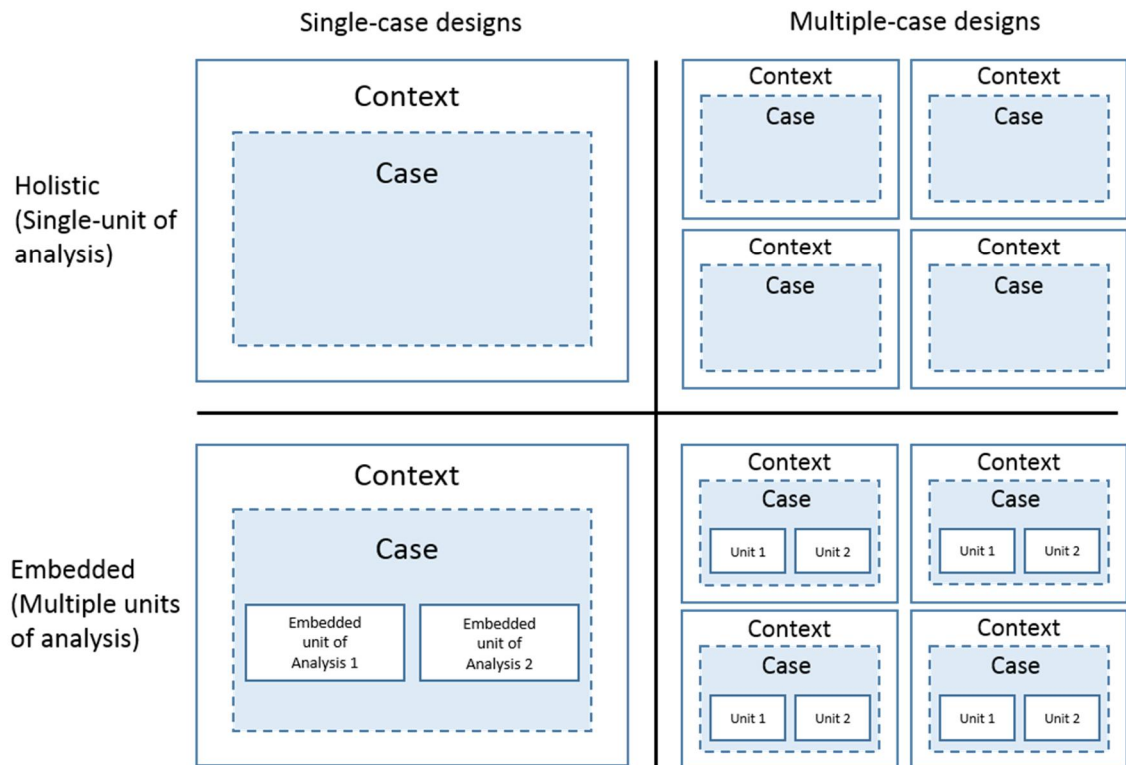


FIGURE 17, Basic types of design for Case Studies (Yin, 2009, 46)

The chosen research method is multiple-case design, because study contains more than a single case. Study is searching answers to two independent research questions which are considered as own cases (Yin, 2009, 53). Second choice is either holistic or embedded analysis. According to Yin (2009, 59) “each individual case may still be holistic or embedded”. The difference between of these two designs is phenomenon around the study and research questions. The embedded design is used when results of the interviews would not been pooled across the suppliers. In this study, results of the interviews, are combined as one data and therefore holistic design is valid in this case study. If study contains single research question this would have been holistic single case study, but individual research questions leads to holistic multiple-case study.

Yin (2009) created a case study flowchart (figure 18) which is adapted to this study. This case study method includes steps which are taken consider conducting this study. Process flow of research can be seen in appendix 7.

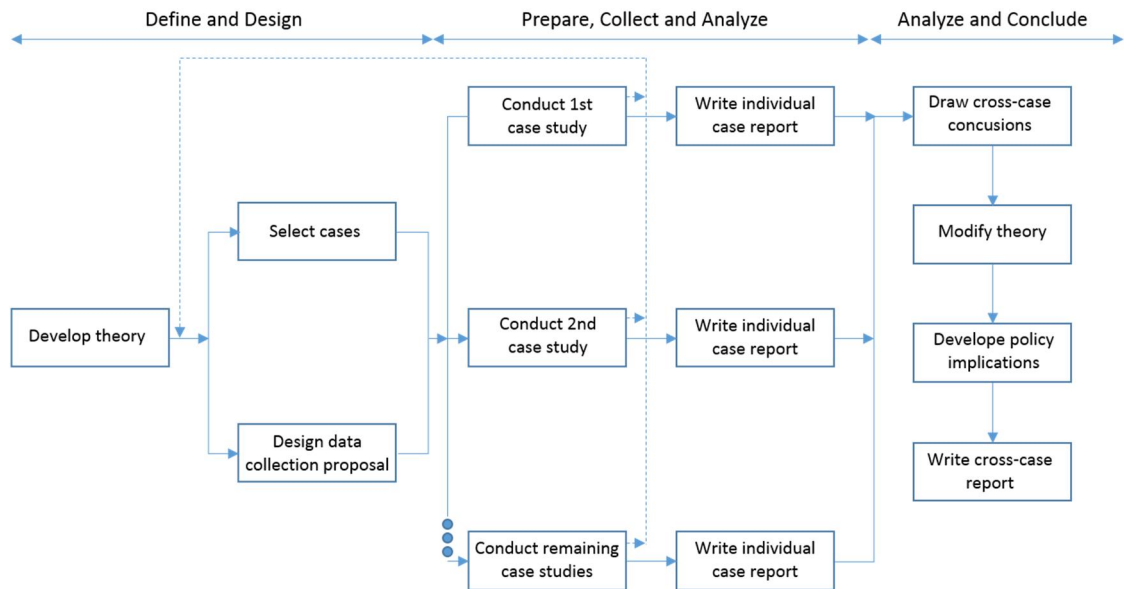


FIGURE 18, Case study method (Yin 2009, 57)

### 3.4 Data sources

Data for the research can be collected in many different ways and from different sources. According to Saunders, Lewis and Thornhill (2009) the data can be divided into two different sources; primary data and secondary data. The main difference between these data's is that what purposes data is collected for. Primary data is collected for this research and secondary data is collected to for other purposes. Saunders et al. (2006) are emphasizing that such "secondary data can provide a useful source from which to answer, or partially to answer, your research questions". Secondary data includes data for both research models, qualitative and quantitative and are used also in both descriptive and explanatory researches.

#### 3.4.1 Primary data collection method

Primary data, which is used in this research, is collected from three sources:

1. **Observations and experiences.** Author has several year experience of supply management on different business areas and nationalities. The Author worked, before project business, in serial production of heavy machines and

spare parts business and has been in collaboration and development projects of different suppliers, from raw materials to highly sophisticated automation systems as well as project business type of manufacturing and site services. This experience has helped the author to observe the project business also from serial production point of view and how SCM is managed from that perspective. This data can be considered as qualitative.

2. **Supplier interviews.** Suppliers were chosen to this research from 80/20-analysis and according to importance and strategy of the suppliers for case company. Suppliers, who have lot of purchase orders and are involved all in case company's projects were chosen. Some suppliers have high spend, but those suppliers are mainly awarded by competitive bidding and their existence is not in every project. These kind of suppliers are typically mechanical erection suppliers or suppliers who are providing site services. Suppliers were interviewed face to face, because information what is needed is qualitative data and it is much easier to penetrate deeper toward problems than filling in questionnaires. Author also interviewed additional suppliers during normal daily cooperation, which observations are used in this part of data. Questions to suppliers can be seen in appendix 3. This is clearly qualitative data.
3. **MNC benchmarking.** Purpose of the benchmarking was to find out what kind of processes and tools similar type of companies as case company have and how they use them. These MNC's were not direct competitors, but are working either same kind of business area or in project business. Questions can be seen in appendix 4. This data is qualitative.

### 3.4.2 Secondary data

1. **Case company's process manuals, training material and internal website.** The case company has wide repertoire of internal training materials, reports and documents. These were used to familiarize the case company policies and processes. This data is qualitative.



2. **Internal data.** Internal data was down loaded from case company's ERP system. This data is quantitative.
3. **Literature.** Literature part of the research includes material from academic researches, international publications e.g. books and articles, study material and websites. This is qualitative data.

### 3.5 Data analysis

Data was analysed by using the method which Vuori and Huy (2015) used in their qualitative study "How Nokia Lost the Smartphone Battle". This method was originally described by Gioia, Corley and Hamilton (2013) and this method was modified for this study by using same kind of code aggregation diagram. In this study, interviews were read and codes were marked. These codes were identified as 1<sup>st</sup> order codes like "absolutely too much irrelevant documents" or "some contract clauses cannot be accepted". These 1<sup>st</sup> order codes were added to the diagram. These codes are essential to identify possible 2<sup>nd</sup> order themes. 2<sup>nd</sup> order themes are collected from the conclusions from the 1<sup>st</sup> order codes. For example several different comments about technical problems are identified as one 2<sup>nd</sup> order theme like "technical problems". This method was used to analyse data and 2<sup>nd</sup> order themes are opened to written form. This data is a base for discussions and implications. However MNC benchmarks are not analysed to 2<sup>nd</sup> order themes, instead of that, most significant observations (1<sup>st</sup> order code) are identified and included discussion chapter.

## **4 CURRENT SITUATION AND FINDINGS**

This part of the study emphasizes how the procurement department in the Case Company is organized and what are the current processes. Also data from the MNC's benchmarks and supplier interviews are summed-up.

### **4.1 Current situation and processes**

Case company is investing lot of time and money to develop supply management processes and therefore several new processes are implemented and old processes are developed. This will also cause organizational changes, e.g. responsibility changes and new job descriptions. This is clear indication that case company has seen the procurement function as one of the critical core functions what comes to competitiveness on global markets and improvement of profitability. Case company's several must-win goals are related to supply management.

Case company's supply management department has four main functions, which are operative purchasing, category management, delivery supervision and logistics. All these functions are independent functions in matrix type of organization. Organization has been enhanced from category purchaser model, which includes both strategic and operational procurement, to the separate procurement model. In new organization model category management and operational purchasing is divided in separate functions which have own directors. At the same time global category purchasers are nominated to purchase own category items for all locations within of business areas. For example one category purchasing manager purchases all electric motors for all business units inside EMEA area.

#### **4.1.1 Case company's SRM**

Case company has created SRM and defined it as a systematic and segmented management of supplier relations. SRM has three main themes: Project Management, Category Management and Design-to-cost. Purpose of the SRM is to create transparent relationship with trust, commitment, time and continuity.



FIGURE 19, Case Company's SRM circle (case company's supplier day presentation)

Purpose of the case company's SRM is as follows:

- Systematic and segmented management of supplier relations
  - Optimize both case company and supplier value through proactive interacting, two-way performance monitoring and risk minimizing
  - Develop two-way, mutually beneficial, long-term relationship with selected suppliers
  - Deliver greater levels of innovation, proactive actions and competitive advantage than could be achieved by operating independently or through a traditional purchasing arrangement

#### 4.1.2 Document hotel and delivery management system

**Delivery Management system (DMS)** is IT-system for logistic and delivery supervision purposes. It is an IT based tool for maintaining projects logistical data, transportations, deliver supervision and erection site activities. External parties have an access through intranet/internet by standard web-browser.

Functions that can be found in DMS:

- Monitoring: from supplier agreement to customer, inbound/outbound
- Shipping: documentation, Transport from point of origin to customer

- Warehousing: material management, Erection site warehousing
- Measuring: time, material and quality

DMS system is mainly used people who are responsible of shipping and deliver supervision.

**Document Hotel** is a case company's EDMS system for document management purposes. It is an IT based tool for organizing, delivering and publishing documents during a project between case company and supplier. The documents are searchable by using the stored keywords that describes the contents of each document. Document revisions are maintained and easily referenced within the tool. While the application is a document repository it is not an archive. All original documentation is archived by the companies or parties that have produced the documents.

## 4.2 Supplier findings

After the literature review and defining of the current situation, in this chapter supplier interviews are summed-up. Interviewees were CEO's, sales manager or directors, basically who are the owners of customer relationship. This data was collected from interviews of seven suppliers and interviews took place 2015 and 2016.

### 4.2.1 Processes

As it was shown in figure 4 where Iloranta et al. (2008) defined wider and strategic perspective of procurement process, the case company has similar procurement process which starts from the defining of the need (figure 4). This need creates inquiries, quotations, evaluation of the quotations, negotiations, supplier selection, etc. until procurement is ending up to approval of the delivery and handing over to customer. In the simplest process this will end when goods are delivered to the destination according to incoterms, but also it may consists erection, supervision, commissioning and test runs, depending of the complexity of the delivery. Procurement process will start by defining of the technical and quality specifications and the scope of the de-

livery. In this chapter we focus on processes and following chapter after this will focus on documentation.

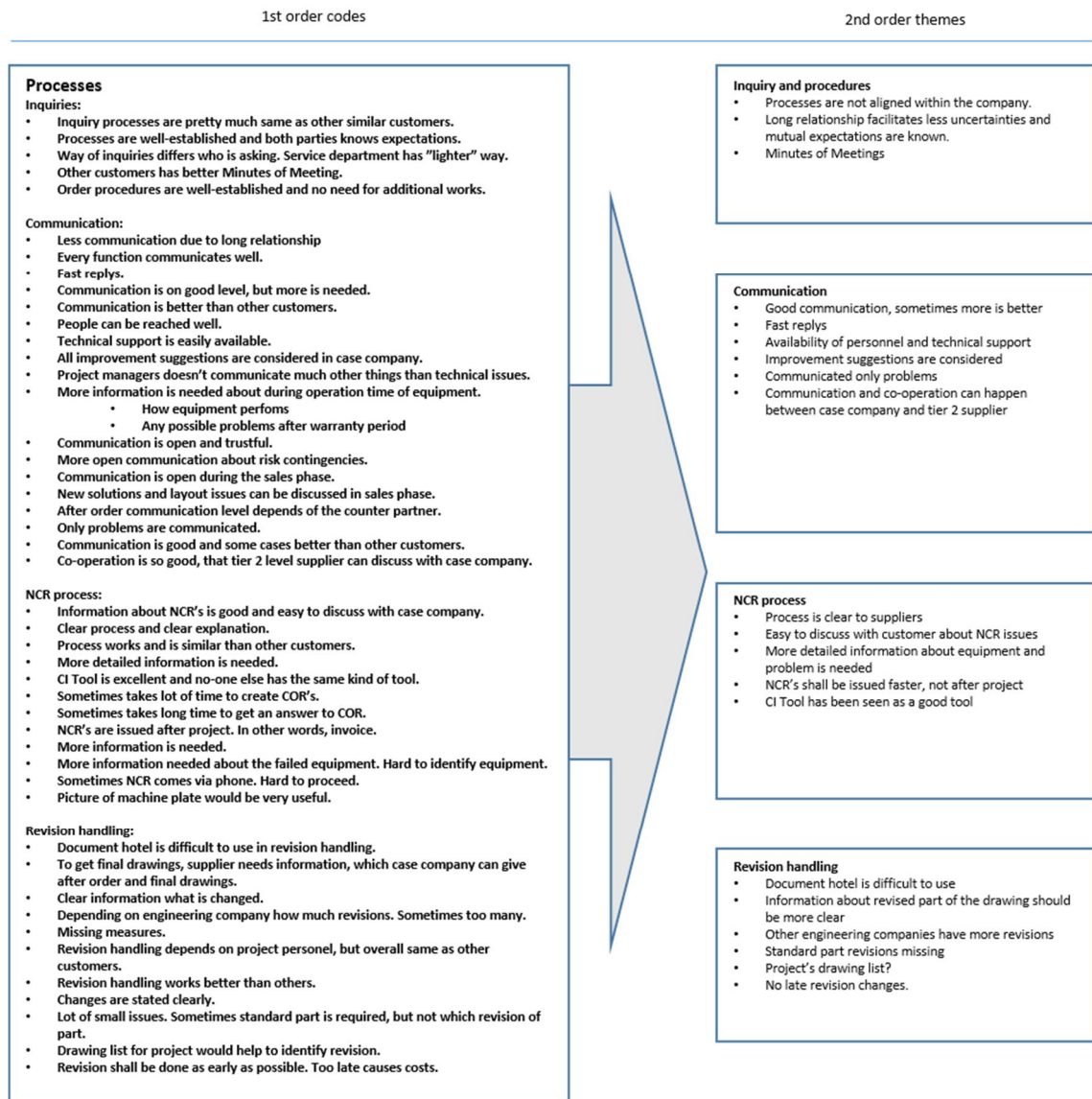


FIGURE 20, Code-aggregation diagram of processes

In this first question author asked suppliers to explain how they see the **inquiry** process compared to another customers. According to interviews process itself is similar than other customers, but some suppliers stated that case company has better process. One of the second order themes was that processes are not aligned within company. Inquiry process is different in capital department than service or environmental systems departments. One of the main points was that long relationship with case company facilitates less uncertainties, because requirements and mutual expectations are

known. One of the suppliers complained level of the meeting protocols. According to them, another customer has more detailed minutes of meetings, which helps later identify what has been agreed.

**Communication** have seen on very good level, but still more is required. Suppliers were satisfied about response time of open questions and availability of the personnel were considered on good level. According to suppliers, suggestion of improvements are taken into consideration. One of the suppliers stated that “communication and co-operation is so good that communication can happen between case company and tier 2 level supplier”. One of the negative comments was that “communication appears only when problems appears”. “Good communication will reduce contingencies and risk provisions” was stated by one supplier.

**NCR process** is one of the processes which is developed in case company. Case company is focusing on quality costs and this process is one of the important tool to identify, follow-up and analyse the development of quality level of suppliers. Case company launched new tool, called CI Tool. This tool was considers as “very good and useful tool” by the supplier. According to them, no-one else has same kind of tool, which can used at site for change order reports or non-conformances. Suppliers stated that case company NCR process is clear and it is easy to discuss about non-conformances with case company. One of the problems is information which is provided with NRC. Sometimes one picture from machine plate would be very useful to identify faulty equipment. Also some criticism came from the issue time of the NCR’s. Sometimes NCR’s were issued after project and in that case supplier does not have any capabilities to affect to the repair or other costs.

**Revision handling** is done through the document hotel. Document hotel were seen difficult to use as you may see few chapters below. Criticism got also how clearly new revision were marked, especially what has been changed. Supplier noticed that revision handling depends of the subcontractor. Some subcontracted engineering companies have lot of revisions, some do not. Also standard parts on the drawing do not have revision number and it is difficult identify which revision is needed. Couple of comments concerning timing of new revision came up. According to suppliers, sometimes revisions comes too late and have cost impacts.

#### 4.2.2 Documentation

Documentation plays significant role defining what case company is purchasing and is a base for the inquiries and order/contracts. Contract/order documentation defines the whole scope of the delivery and all other specifications and requirements. Documentation has significant impact what comes to the cost of the delivery for example in two following cases. Firstly, what are the specifications of the delivery? Sometimes quality is required according to local legislation or directive e.g. Pressure Equipment Directive (PED) defined by EU or requirements according to equipment's functionality. It is easy to over design and require higher quality requirements than actually needs. According to Saarijärvi (2016), especially quality requirements are in many cases too high and he stated in his research that technical or quality specifications will easily cause additional costs. According to his research, 5% cost reduction was easily found only focusing on technical and quality specifications of certain equipment. Secondly, if documents are not precise enough, unidentified requirements also adds uncertainties and suppliers easily marks up these contingencies, because every risk has a price tag.

Case company has certain enclosure order and it is standardized to cover all contract models from equipment deliveries to mechanical erections. Contract enclosures are listed here below:

1. Scope of Works
2. Performance guarantee
3. Specifications
4. Quality specification
5. Site arrangements
6. Drawings
7. Time schedule
8. Price breakdown and unit prices
9. Documents
10. Reporting and follow-up
11. Spare parts
12. Options
13. Erection and commissioning supervision and training
14. Packing, marking, shipping and storing instructions
15. Insurances

16. Bank guarantees
17. HSE
18. COR (Change order report)
19. Act on the Contractor's Obligation and Liability when Work is Contracted Out
20. General purchase terms and conditions

In this chapter suppliers were interviewed how they see documentation of case company in different stages of the procurement process and is it different compared to documentation of another similar companies. In figure 21 can be seen 1<sup>st</sup> order codes of the interviews and 2<sup>nd</sup> order themes. Author focused on second order themes and conclusions were taken from those themes.

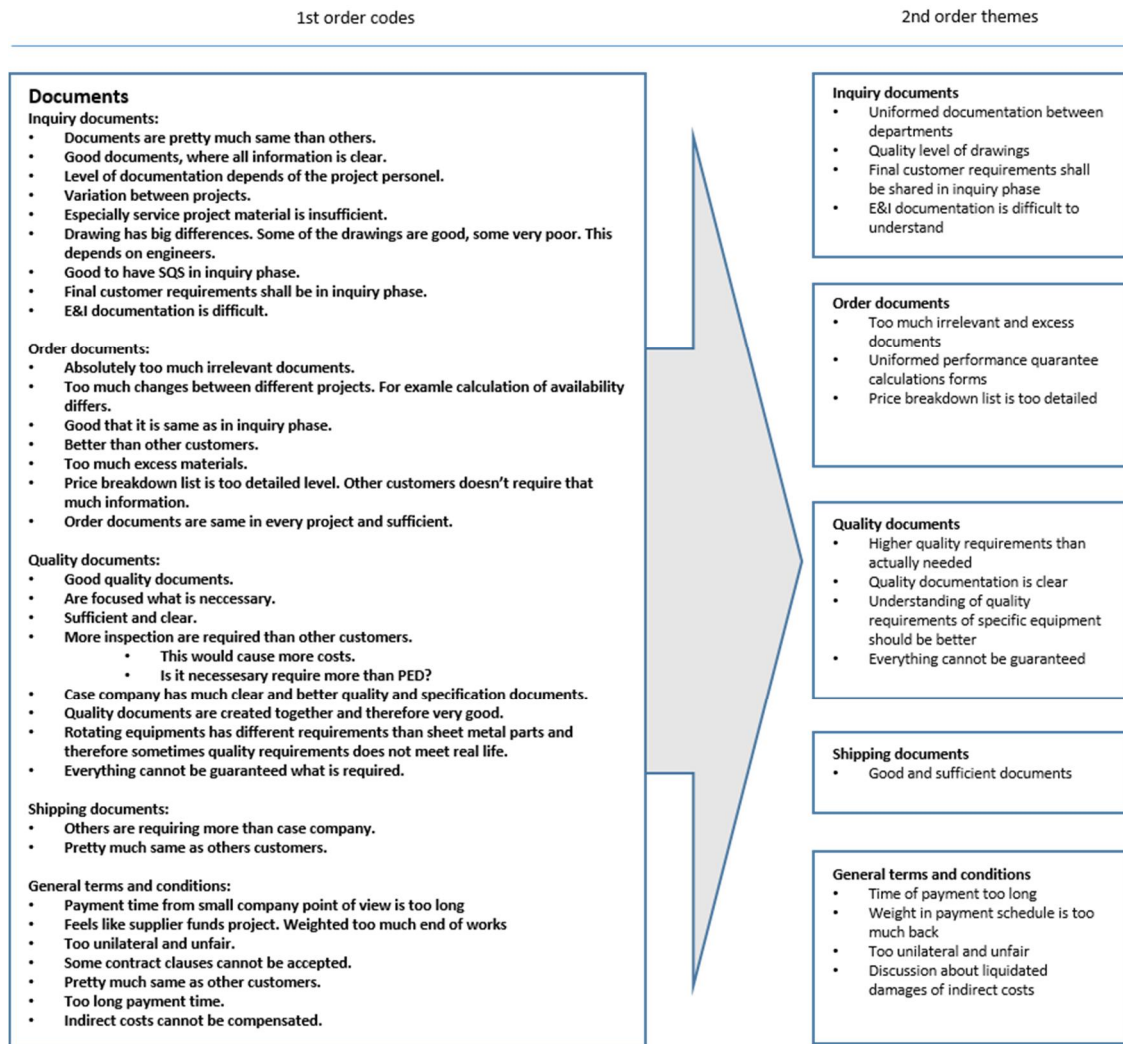


FIGURE 21, Code-aggregation diagram of documentation



**Inquiry document** were seen almost similar as other companies, which are in business relationship with interviewed suppliers. Most of the variances are seen within the case company. Different departments and also different personnel within same department are sending different types of the inquiries. Discrepancies on the quality level of the drawings have been noticed. Case company is using several engineering companies producing drawings and different ways to create drawings in these sub-contractors are causing mentioned discrepancies. One of the key issues was final customer requirements. Couple of suppliers addressed that final customer requirements shall be clearly stated in inquiry documents. This will cause less changes to the scope of the delivery in final negotiating phase. This actually applies also when inquiry documents are sent in sales phase. One of the suppliers found “E&I documents and requirement difficult to understand”.

**Order documents** consists all documents except quality documents and general terms and conditions, which are in their own chapters. Order documents were seen most controversial of all documents. Reason for this was that according to several suppliers, there was too much irrelevant documents, which have nothing to do with delivered equipment or service. Also too much of excess documents are included to the order, which do not add value, only possible risks and risks adds contingencies. In this part case company got complains about non-uniformed ordering material and also different ways to calculate availability of the equipment’s. This is directly related to the liquidated damages of unavailability, in other words performance guarantee. Third point in this part is price breakdown list, which is especially used when the works e.g. mechanical erection is purchased. According to suppliers, “other similar companies do not require that detailed price breakdown list, than case company”.

**Quality documents** evoked thoughts and opinions. Some of the suppliers thought that quality documents are good and sufficient, and others opinion was that there are absolutely too much irrelevant requirements. One equipment supplier stated that “static equipment has different requirements than rotating equipment and sometimes static equipment requirements are required from rotating equipment”. This is clearly problematic and shall be clearly understood, which are real requirements and specifications. One of the addressed points was what supplier shall guarantee. Supplier stated that case company has requirement’s which supplier cannot full-fill, but without acceptance they cannot get the contract, because it might be deal-breaker.

Overall opinion was that required **shipping documents** are same as other companies. According to suppliers, documents are good and sufficient and if there are any problems, shipping department will help with issues.

**General terms and conditions** are defined from the risk management point of view. Many times general terms and conditions of the contracts are interpreted when contractual parties have disputes. According to suppliers, GTC's were seen too unilateral. One of the problems of the GTC's is that whoever creates them, GTC are more favourable to them. Suppliers stated that same situation appears with other companies. Suppliers were quite critical about time of the payment. Weight of the payment milestones were seen to be too much end of the project, because they criticized lack of net working capital. One supplier stated "they feel that suppliers funds the projects". This statement appeared when long payment times were discussed. They said that prevailing situation of the payment times is untenable and small companies may suffer financial problems because of that. One of the topics was also compensation of the indirect losses. According to suppliers, they do not accept any LD's for indirect losses. This matter comes up every time, when contracts are negotiated.

#### **4.2.3 Document Hotel and Delivery Management System**

One of the important parts of deliveries and capability of tracking of the shipments are IT based systems. More and more of this works is automated and suppliers use integrated IT systems to book transportation and create packing list e.g. shipping documents. Here in figure 22 are supplier interviews decoded on first order codes and second order themes.

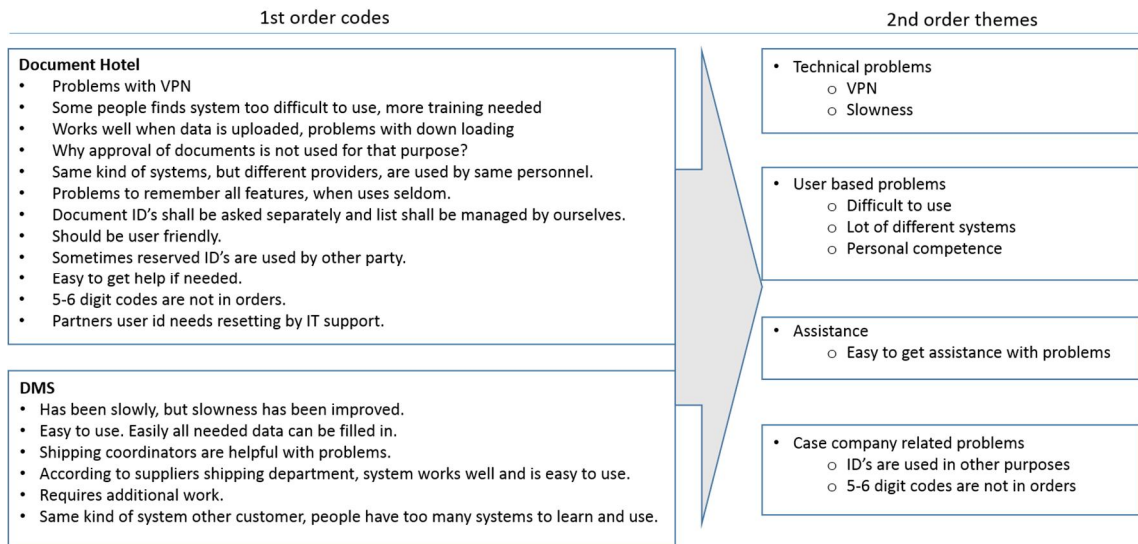


FIGURE 22, Code-aggregation diagram of IT systems

Second order themes were focusing on technical issues, user based problems, availability of assistance and problems attributable to the case company.

According to suppliers **Document Hotel** is sometimes difficult to use. **Some technical problems** have been experienced as a problem. Especially VPN has been problematic and assistance has been requested many cases for VPN related problems. Also slowness of the system were stated as a one of the issues. Document Hotel has more **user based problems** than DMS system. Document Hotel is used so seldom that people who are using it, forgets how to use it. Also supplier personnel has several similar systems in usage and that causes problems among supplier personnel. Also personnel's individual competence has been seen as an issue. Some of the personnel copes very well with IT systems and tools, but some of them have lot of problems. Although many supplier stated that "it is easy to get **assistance** and help with issues". Case Company's help desk or personnel helps suppliers with issues and that was seen as positive thing. Some of the **case company related problems** were also seen. For example in Document Hotel reserved ID's are sometimes used in other purposes and Document Hotel's 5-6 digit codes are not in orders. If these codes would be in orders, identification of the deliveries would be better.

**DMS** system, in the other hand, has been seen easy to use and more user friendly. DMS systems did not have that much problems as Document Hotel, but also slow-

ness was bothering the DMS users. This systems also requires additional efforts from the suppliers, but shipping coordinators are very helpful and assisted any time when help was needed. Couple of suppliers sent special thanks to the shipping coordinator, who has been very kind and helpful. In the future suppliers will use third IT systems to book transportations. Implementation of that system is ongoing and user opinion cannot be get to this study. But as it has seen, more work and responsibility of deliveries in Finland will be moved to suppliers. No deliveries to third parties, but predetermined locations, like case company's workshops or external packing service provider locations. There are still deliveries which are taken care of case company personnel e.g. direct deliveries to sites and abroad.

#### **4.2.4 Openness and trust**

In case company's SRM, the openness and trust is defined one of the key features and therefore suppliers were asked how they see openness and trust between case company and the supplier. Many suppliers stated that case company's words can be trusted, even without written document. One of the suppliers wanted to deepen collaboration to annual frame agreements, but "price level would been too low to accept". Another department of the one supplier is also in business relationship with case company and according to supplier "openness and trust has seen problematic because of the some previous projects". Even though the trust exceeds between case company and suppliers, non-disclosure agreements are signed in many cases, especially when business is started with new suppliers. Confidential information like drawings or specifications cannot be forwarded to third party without case company's approval. One comment was concerned IPR and confidential information: "one of the case company's competitor was accusing the supplier that the supplier informed case company about one possible solution in erection works. This comment was absolutely wrong and harmed relationship between supplier and customer". This comment stated that sometimes it is easy to harm trust and business relationship and it can take long time to build up trust back to the previous level.

All suppliers stated that openness and trust is on very good level and suppliers were asked to give grade between 1 and 5. Average of the answers were 4.5, so trust and openness is on very good level.

#### 4.2.5 Improvements

One of the questions was how suppliers would like to improve co-operation with case company. In this chapter suppliers improvement suggestions are summed up. First indication was that suppliers did not have much improvement suggestions and therefore similar data analysis method was not necessary to use in this chapter. Here are listed improvement suggestions as a 1<sup>st</sup> order codes.

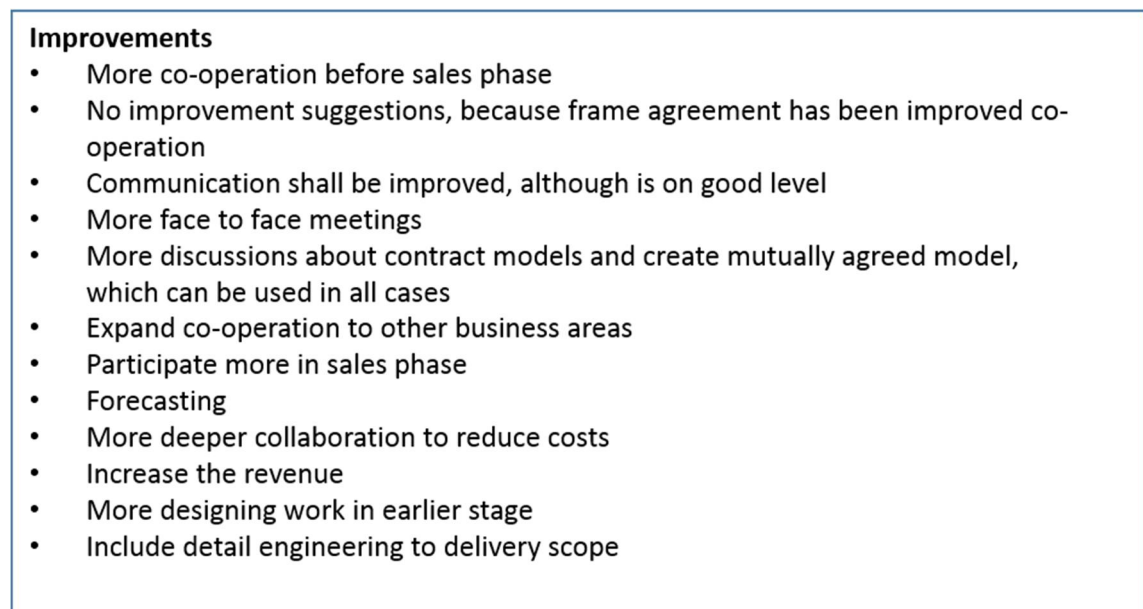


FIGURE 23, Sum up of improvement suggestions

Mostly supplier suggestions were concerning collaboration. Main features of collaboration suggestions were improving co-operation and get in deeper collaboration with case company. Also suppliers wanted to involve as early as possible. This is exactly what Johnson (2005) emphasized and according to case company's ESI, suppliers will be involved as early as possible. Suppliers desired to provide their knowledge and capabilities to case company processes to find cost reduction opportunities and develop processes and equipment together.

One topic was communication. Suppliers wanted more communication even though it is on sufficient level according to them. More face to face meetings was wanted to held even without any special topics, just to find out what is going on with case company and identify future business opportunities.

Also increasing the business was one issue they wanted to share. All companies were eager to expand the business to other business areas or just increase the sales within current categories. One way to increase business is to increase engineering work from basic engineering to detail engineering. For example suppliers wanted on take care of detail engineering, manufacturing drawings, manufacturing and erection.

Suppliers who have long relationship with case company and possible frame agreement did not have much improvement suggestions. The suppliers who are rather new and are more involved today, would like to have mutually agreed contract models. Today one of these suppliers is in collaboration with several units and almost every unit has unique contract model and unique requirements. Their wish was to have only one contract model which is used in all cases.

### **4.3 MNC benchmarks**

Author benchmarked four multinational corporations, who are in project business globally, except one. This one MNC is operating in heavy machine engineering and manufacturing business and reason for choosing that company was their highly developed supplier relationship management operations. Benchmark questions can be found from the appendix 4. Purpose of the benchmarks was to find out what kind of processes these MNC's have and are case companies processed similar and is there something taken care differently. Original plan was to benchmark more MNC's, but result after four benchmarks was that case company has similar processes and most of the processes and tools were developed even further.

Most significant findings from benchmarks are related to usage of ERP system, supplier management, KPI's, supplier approval and supplier development. Benchmarks are not analysed or thoroughly summed up same way as supplier interviews, but

mentioned most important findings from benchmarks are identified and embodied to discussion chapter 5.

## 5 DISCUSSION

In this chapter author will discuss about the findings of supplier interviews and how those correlate to current processes. These processes are also compared to results of the MNC benchmarks, are processes relevant and is there improvement possibilities.

### 5.1 Discussion from RQ1 point of view

Purpose of the supplier interviews was to find answer to research question no. 1, *“What kind of tools and processes are needed in order to manage the supply chain in project business and are the current tools and processes relevant”*. Answer to the question comes from the MNC benchmarks and conclusions of the suppliers interviews.

What comes to interviews first part, procurement processes, according to suppliers, case company's processes are pretty much same as other customer's. No any bigger differences could not found from the interviews. Communication were seen on very good level and is efficient, although more communications was suggested. One common problem in companies' internal and external communication is, what to communicate. It obvious that problems are more often communicated, but it is also important communicate positive things, this is many cases forgotten. Communication does not necessarily require official agenda, sometimes free communication and meeting can be fruitful if people who are working in supplier interphase, attend to these meetings and brainstorming possible development ideas. One of the suppliers are so called partner supplier, which is integrated case company's processes and new products are developed together. They stated that communication is so efficient and developed, case company can communicate directly with tier 2 level suppliers. Efficient, open communication reduces risk factors. Risks have a price tag and if risks are mutually clear and even shared, contingencies will be deducted from the quotation.

NCR process itself was seen clear, but in this part of the processes, most of the improvement suggestions were given. Two main issues in this part needs improvements: First thing is when NCR's are issued. Suppliers stated that in many cases



NCR's are issued too late, sometimes even after project. It is very important issue NCR's so supplier has possibilities respond and take needed actions to correct NCR's. Second issue is information. Sometimes NCR's do not contain enough information about the equipment which is defective and what is the problem. This issue is easy to improve e.g. adding the picture of machine plate. When these two mentioned issues are improved, suppliers will get more detailed information and they do not need to spend excess time to identify equipment or ask more details about the problem. Case company has launched new tool, called CI Tool. This tool is for NCR's and change order reports from suppliers. This implementation is huge step forward, because previously case company did not have a system, which manages NCR's. This tool does not need any special installed programs, because it is web based. Case company can follow-up and manage NCR's and it is easy to find and collect certain suppliers NCR's before meetings.

Revision handling process had many comments and improvement suggestions. First of all many said that document hotel is difficult to use, what was seen in previous chapter findings. Sometimes it seems that revision changes are not clearly marked and standard part does not have revision number. It is same in revisions as NCR's, these both shall be issued as soon as possible. Later revision is released, more additional costs occurs. It was also noticed, some engineering service providers have more revision than others. Projects are sold shorter and shorter delivery time and engineers have to provide drawings quicker and at earlier stage and therefore hurry and too high work load creates errors in drawings.

Second part of supplier interviews was case company's documentation in procurement process. Documentation is considered as a collection of enclosures which are listed in chapter 4.2.2. As it was earlier stated, case company is using same enclosures order in every order or contract. Content of the enclosures is depending of the scope of the delivery. Sometimes it consists only scope enclosure, but largest contracts e.g. mechanical erection, consists all mentioned enclosures. Main reason why case company keeps enclosures in same order is consistence. Whoever reads or creates contracts can be sure that same enclosures are in same order in every contract and numbering of enclosures are not needed to be updated. Also suppliers can be sure that whatever is in contract, it is always in same place. This was a point which suppliers mentioned that it is good to have same enclosure order in every contract

and many cases basic enclosures are established and used every time. Although one problem has been that contract and enclosure order has not been same within company's business unit. Another location e.g. Sweden, is using different contract template than Finland. This is causing interpreting issues especially multi-unit projects, where contractors are in same site with different contract. This is will be changed, because contract models are revising phase and new global contract models will be taken in use beginning of next year. This will increase inconsistency of enclosures and contract clauses, which was one improvement suggestion from suppliers. This is good improvement especially in multi-unit projects, when all contracts have same enclosure order and same terms and conditions.

As it is stated in chapter 4.2.2., where supplier comments are summed up, there seems to be some issues what comes to inquiry and order documents. Main issues seems to be excess and irrelevant documents. And as it is seen, it is depending of the engineers or projects personnel, what is the level of the documents. Sometimes drawings are lacking of critical information and needs to revise later. Suppliers mentioned, it is important to add final customer requirements on inquiry phase. Overall opinion was that case company's documents are on same level as others, but some mentioned that even on better level. It is same in quality documents, it is clearly seen that quality documents are too wide and consists irrelevant requirements. General purchasing documents are, of course from supplier's point of view, too unilateral and time of payment is too long. This is general trend and first step extending of the payment time comes many times from case company's customers. One suppliers stated that case company's inspections requirements are higher than competitors and additional NDT inspections can cause at least 50.000 euros additional costs. This is definitely something to investigate, where these requirements are coming from and is there opportunities to reduce inspection requirements.

One part of the interviews was how suppliers see the usability of the IT systems. Case company has two IT-systems, which suppliers are using in procurement process: Document Hotel and DMS. Clearly it was seen that DMS was more easy to use. Some technical problems may occur sometimes, but this can happen when people are using IT-systems. Capability to use IT-systems is individual and naturally others are more capable that others, but main thing was that every time assistance was available when problems occurred.

According to findings of the question of openness and trust, the openness and trust is on very good level. Suppliers, which are categorised by case company as important partner or key suppliers, which have long relationship and existing frame agreements, found the trust and openness on extremely high level. All of them gave highest grade to that question. This clearly shows that more deeply collaboration between case company and supplier is, more openness and trust exists on business relationship.

MNC's were asked about their ERP system and how they use it in procurement function. According to MNC's, ERP system is used in every benchmarked MNC on some stage. It was clearly seen the bigger company is, more features in ERP system from procurement point of view they have. In their ERP systems, main procurement functions can be found, but one MNC had two different systems, one for procurement and one for project management. Biggest benchmarked MNC integrated ERP system to document management system. For example all procurement document can be found directly from the purchase order or even from inquiry phase, e.g. quality documents, drawings, etc. This same supplier has structure of the delivered equipment in their system, where you can find every purchased part. They also told that inquiries are sent via ERP system and they have to have at least two alternative suppliers for every delivered equipment and that specific supplier information can be found from ERP system. This is how they try to avoid situation where company has only one supplier for needed delivery. According to Krajlic portfolio matrix in chapter 2.1.5, it is important to reduce supply risk, which is located in the low right segment, where market is a monopolistic for some categories. Having several suppliers, this risk is mitigated significantly. Case company is developing new ERP system, which will be launched starting 2017 one location at the time and most significant thing is that every business unit will have same ERP system, which creates more integrations and process visibility within company. Suggestion is to have a supplier intranet, where supplier have an access to ERP system with limited functionality e.g. possibility to confirm orders directly to ERP.

Supplier management, described in chapter 2.1.3, includes inter alia cost management, continuous improvement, etc. Supplier selection and development can be considered as part of supplier management process. Some of benchmarked MNC's do

not accept new suppliers easily, only for really good reason. Their supplier approval process is long and consists several different steps. If they have approved new supplier, it can be used in every location globally without additional approvals. Large MNC's are focusing lot of supplier development processes. One benchmarked MNC has own supplier development team, just focusing on supplier approval and development projects. According to them, they have achieved improvements in quality and delivery performance and received significant cost savings. One of the supplier development processes are design to cost (DtC) or early supplier involvement (ESI). As Johnsen (2005) mentioned that ESI brings clearly positive results and therefore should be considered as part of supplier management processes. This was also clearly seen in supplier interview results, most of the suppliers wanted to increase business and especially mentioned willingness to be involved as early stage as possible.

One of the biggest differences from procurement process point of view, compared to MNC's, was supplier development and supplier approval processes. Other companies are developing processes with supplier regularly. They have identified certain amount of supplier development projects, which have to be completed annually. Possible quality or delivery problems gives indicator to start SD projects. According to MNC's, significant development of KPI's have been achieved since SD projects have been started. Main goals have been improvement of quality, delivery accuracy and cost savings. Author suggests that SD projects should be started with possible partner suppliers and expand it to other important suppliers.

As it was mentioned, one of the MNC's are approving new supplier only through SD department and they are owners of supplier approval process. Other MNC's do not accept new suppliers without justified reason e.g. cost saving, but in case company suppliers are approved frequently. Reason is that sometimes case company is selling new products, which do not have suppliers. Or work site is on new location and from cost or another reasons, only possibility is to purchase services or products from new local supplier. New suppliers are always a risk, not only from technological point of view, but also financial. To reduce the financial risk, financial report's analysis should be included to approval process. Today case company checks the third party financial report, but deeper analysis is not done. Author created in earlier course, accounting in business context, a financial score card which can be used for this purposes. Main risk indicators of the financial score card as follow:

Risk indicators that represents creditworthiness are:

- D&B Rating
- D&B Risk Assessment, financial strength
- D&B Risk Assessment, risk indicator
- Emma-score
- Payment-score
- Failure-score
- Delinquency-score

Indicators that represent liquidity, capital adequacy and profitability are:

- Current ratio (should be  $> 1$ )
- Acid test (should be  $> 0.5$ )
- Equity ratio (should be  $> 20\%$ )
- EBIT (should be positive)
- ROI (should be positive)
- Asset turnover
- Indicator developer

Risk supplier's financial indicators can be monitored by following table (table 3). This table gives clear indication, if supplier's financial risk has been increased. When potential financial risks are identified, procurement should be done considering these risks.

TABLE 3, Risk supplier's financial key indicators development

	2012	2013	2014	2015
Turnover	15387,4	19186,1	16897,9	18393,2
Operating result	484,4	-2593,5	-2457,1	-1567,6
Net profit	0,1	-2755,2	-4902,6	-1944,4
Net profit %	0,0	-14,4	-29,0	-10,6
Current assest	8796,1	7454,9	5996,6	3586,7
Inventory	1244,1	914,7	513,6	319,7
Noncurrent assest	3716,6	3458,5	2393,3	1765,1
Total assets	12512,7	10913,4	8389,9	5351,8
Cash	2591,5	19,4	204,6	302,4
Cash / turnover %	16,8	0,1	1,2	1,6
Cash / short term liabilities %	49,2	0,3	3,0	7,6
Long term liabilities (noncurrent)	1792,0	1344,0	1483,6	3163,5
Short term liabilities (current)	5268,7	6410,7	6770,3	3997,2
Total Liabilities	7060,7	7754,7	8253,9	7160,7
Total Liabilities / turnover %	34,2	33,4	40,1	21,7
ROI	8,5	-38,0	53,1	27,2
Equity ratio	49,7	26,2	1,7	-34,8
Current ratio	1,7	1,2	0,9	0,9
Quick ratio (acid test)	1,4	1,0	0,8	0,8
Gearing ratio	0,7	0,6	0,7	0,8
Debt equity ratio	2,4	1,8	2,0	4,2
Assets turnover	1,2	1,8	2,0	3,4

According to table 3, supplier's financial risk is increased from 2012 and it can be seen from few indicators.

- Turnover is increased slightly since 2012.
- Operating result and net profit are heavily negative, but direction is still toward positive figures.
- Cash is significant indicator of financial strength and company had cash 2013 much less than 2012. This is alarming, because 2015 company has cash only

7.6 % of short term liabilities. Although this indicator is also improving, which is positive signal.

- Equity ratio should be above 20%, but in this case it is -34.8 %.
- Current ratio is alarming, because it is below 1. That indicator should be  $> 1$ .

Company in this example is suffering financial problems and risk of procurement is significantly high. According to trend of indicators, company is improving its financial strength, but still should be follow up the trend of indicators.

## 5.2 Discussion from RQ2 point of view

In this part the discussion is considered from research question 2 point of view: *“How to measure performance of supply management and how to implement measurement processes to case company”*.

One way to measure of the effectiveness and development of supply management is KPI's. According to Gordon (2008, 47) is it important to have a good reasons which metrics are selected. In many cases same KPI's do not work in another company and therefore KPI's shall be selected to support own company's objectives. Gordon (2008, 161) emphasizes that evaluation process of supplier performance should be two-way flow of communication.

Usually companies are measuring objective figures e.g. on time deliveries and quality. Basic method is to use PPM figure (parts per million), basically how many defective parts per delivered million parts consists. It is easy to define PPM levels for that kind of objective figures and it is easy to use serial production when receiving happens at the factory floor and term of delivery is e.g. DAP. In project deliveries it is not that simple, because many of the deliveries are delivered directly to the work site or to another suppliers, who makes preassemblies e.g. fan supplier needs electric motor for testing and final assembly of fans. Or tube delivery from the work shop to the supplier who prefabricates piping's. In many cases term of delivery for site deliveries is FCA, because shipping department has negotiated transportation contract and conditions are negotiated from specific project requirements point of view. Term of

delivery varies, because sometimes from the risk point of view it is safer to use term DAP.

Benchmarked MNC's are collecting and following KPI's on some level. Basically delivery and quality numbers, but also cost management figures. According to benchmarks, bigger company is, more detailed scorecard of KPI's is used. Mainly these KPI's comes directly from ERP system, but who is entering the data into ERP, is another issue. There are some difficulties enter delivery data to ERP if deliveries are not delivered to the workshop. For example site personnel should enter receiving's into ERP to maintain the delivery log. Quality figure is difficult to collect automatically if NCR's are not entered into ERP system. Significant improvement in case company, is implementation of CI Tool. This tool gives information of NCR's, which can be used defining KPI's.

According to MNC benchmarks case company has wide selection of internal KPI's, which other companies are not using. Main issue is lack of supplier KPI's. Project business is difficult from measuring point of view, because volume is very low and deliveries are spread to several locations. It is hard to keep track of deliveries and are equipment delivered on time. New CI Tool helps case company keep a track of NCR's, but this requires commitment to use it. One possible process to implement is supplier evaluation system. This kind of evaluation systems are very widely used in serial production companies and in this process selected supplier are evaluated according to their KPI's. Possible KPI's could be objective figures like delivery, quality and cost management figures, and in addition subjective KPI's e.g. cooperation, integration and suppliers internal processes or certificates. This annual evaluation will grade suppliers. This should be two-way communication process, where case company gives supplier feedback how they have managed past year and how suppliers have been developed their performance during years. This process should be visible within case company, because if some other location is sourcing new suppliers, they might look at possible candidates from that evaluated supplier list and if supplier performs well, they can be sure about capabilities and quality level of the supplier. This would be one of the future development tasks. Author's suggestion is to create a supplier score card, which shows supplier performance and should be updated annually or biannually.



### 5.3 A-SCM in case company

Adaptive supply chain management was chosen as a framework for this research, because when all aspects of A-SCM is considered and supply management processes are aligned with them, supply management will be competitive, sustain and will survive. As it is explained in literature review in chapter 2.1.1 and in goal tree (figure 2) the A-SCM framework's supply chain consists four main drivers: **Integration, Coordination, Agility** and **Sustainability**. In this chapter author will focus on these four main drivers of supply chain according to interviews and benchmarks.

**Integration** of suppliers is on good level. Case company has defined different level of suppliers and most important suppliers are called partner or key suppliers and these suppliers are integrated processes. Key and partner suppliers have a significant impact to the processes and customer satisfaction and they also produce value in supply chain. Partner and key suppliers are integrated to SRM, SQM as well as to processes and systems. Especially these suppliers are integrated to case company's processes in very early stage and innovation (appendix 5) and DtC (appendix 6) projects will be started with them. According to example of DuPont analysis (chapter 2.1.6.) 2% cost decrease will increase margin 5.9%. This is one important reason to have DtC projects with supplier to identify cost saving potentials. As earlier supplier involvement happens, higher possibilities to get savings and implement supplier's solution to project. It was also seen from interviews that partner and key suppliers were more satisfied about cooperation level than other suppliers and they gave maximum grade for trust and openness.

**Coordination** of the supply chain management is second part of SCM. Case company has implemented category management program few years ago and has defined most important categories which are implemented and category managers nominated. Their responsibility is to create and implement category strategies and implement those globally. Procurement in projects are taken care of other procurement personnel and their main task is to create procurement plan for each projects and purchase needed materials and services according to that plan. Also case company has implemented new tool for SRM, which is used also for CRM. Coordinated procurement processes of case company is shown in appendix 1. Cooperation can be considered as

a part of coordination and cooperation was one of the main topics in interviews. According to suppliers cooperation is on very good level. Also communication is important part of the cooperation and according to supplier interviews, communication is on good level, but still have room for improvements. When communication is effective and precise, possibilities of misunderstanding decreases.

**Agility:** Case company is using ERP and other IT-systems and according to supplier interviews, systems are user friendly, but some improvements are needed. Although processes are pretty much same as competitors, but according to benchmarks, systems can be more versatile and have more features. Case company is working on implementation of new ERP system. Hopefully new ERP system will integrate suppliers more. Latest versions of ERP systems allows suppliers to log in on some level to ERP system and get order, forecasts or other defined information directly from there. This will increase responsiveness of supplier base.

**Sustainability:** Case company has put lot of efforts to make supply chain more sustainable. Case Company's one of the core values is sustainability and case company is participating in CSA (explained in chapter 2.1.1). Sustainability is also defined as one of the key elements of SCM. This is very important, because e.g. Beske and Seuring (2014) emphasized in their research that corporations who launched and followed sustainability criteria in their business strategy and used these certain practises in SCM, shows the quality of relationship inside the supply chain and quality of relationship to external stakeholders as well. This is not considered good only from stakeholder point of view, but case company's customers are developing heavily their sustainability and demands their suppliers to follow sustainability policies. Case company's supplier approval process from sustainable point of view (appendix 7) includes sustainability check. If risk of supplier is medium or high, sustainable self-assessment will be sent and will be considered as part of approval process. If the risk of sustainability is high, separate sustainability audit will be performed.

When all above mentioned drivers are considered as a part of procurement processes and according to interviews, processes are well established, supply chain is flexible, effective, cost-efficient, stable and quality-effective according to Ivanov et al. (2010). Flexibility and effectiveness creates possibilities to react of changes in pro-

ject business, purchase best products and services and establish long-term collaboration relationships with suppliers.

In addition one very important part of the A-SCM is trust in supply network. This was especially emphasized in Ivanov et al. (2010) research. Trust is not only concerning collaboration, but trust for information should be considered as well. According to suppliers, trust and openness is on very good level and this is, among others, one of the important key drivers to create adaptive supply chain management

## 6 CONCLUSION

The objective of this research was to study supply management processes and tools in the case company. Case company is operating in global project business segment and have many competitors globally. This is causing situation where cost and delivery time is playing more significant role in project's bidding phase and customers are expecting to get projects handed over earlier to get their investments back earlier. Of course you cannot forget the quality of delivered equipment or service, because every unplanned shutdown or modification of delivery at site is causing more costs. In projects, unnecessary quality costs are taken directly out from projects profit and therefore it is important to reduce quality costs as well as cost of deliveries.

Suppliers are integrated into companies' processes earlier and deeply than in past and companies are focusing more only on their core competences. Equipment's and services, which are not aligned with strategy, are outsourced. This is why supply management processes are so important and shall be developed. Purpose of the research was to study the case company's procurement processes and find answers following research questions:

*What kind of tools and processes are needed in order to manage the supply chain in project business and are the current tools and processes relevant?*

and

*How to measure performance of supply management and how to implement measurement processes to case company?*

One challenge for this study, was a development of the supply management in case company. During last couple of years case company has invested lot of time and money to development of the procurement processes. Processes which were valid in starting point of this research are developed further or replaced. Organization and roles are changed, new processes are implemented and strategy of SRM in redefined. This shows clearly that today case company, as well as other companies, are under-

standing the significance of supply management function and especially cost saving and quality improvement potential. Case company's annual spend to direct purchases is 1.5 B€ and 2% cost reduction in purchases leads to 30 M€ annual savings and this is cumulated directly to result of the case company. Of course it cannot be said that it is possible to save 2% automatically from everything, but gives a scale when annual spend is that high.

This case study was conducted from two perspectives and based on framework "adaptive supply chain management". According to Ivanov et al. (2010) this A-SCM framework can be implemented in all business areas. This framework is very useful for project type of businesses, because every project has different features and can be located areas, where case company has not been before. Project business is more or less unpredictable. Supply chain in project business shall be cost-effective, agile and quality-effective, without forgetting sustainability. According to this study case company's supply chain is all of that and processes are align with other similar type of companies and according to suppliers, processes are good and sometimes better than others. Of course world is not perfect and case company's supply chain is no either and there are definitely room for improvements.

What comes to RQ1: *"What kind of tools and processes are needed in order to manage the supply chain in project business and are the current tools and processes relevant?"* Tools and processes are basically same as other companies, which are operating in project business. Small differences can be seen, but what is encouraging, case company is developing tools (ERP) and processes to improve effectiveness of supply chain.

And RQ2 is: *"How to measure performance of supply management and how to implement measurement processes to case company?"* Supply management can be measured from two perspective. First is internal performance, where you can measure company's internal KPI's. Second is external performance, basically suppliers KPI's e.g. delivery and quality figures, cost management. Possibility to measure the suppliers performance shall be defined after ERP system is implemented. ERP system defines possibilities and ways to pull out supplier performance data and that can be used when defining and implementing supplier measuring system.

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### Appendix 3. Supplier interview questions

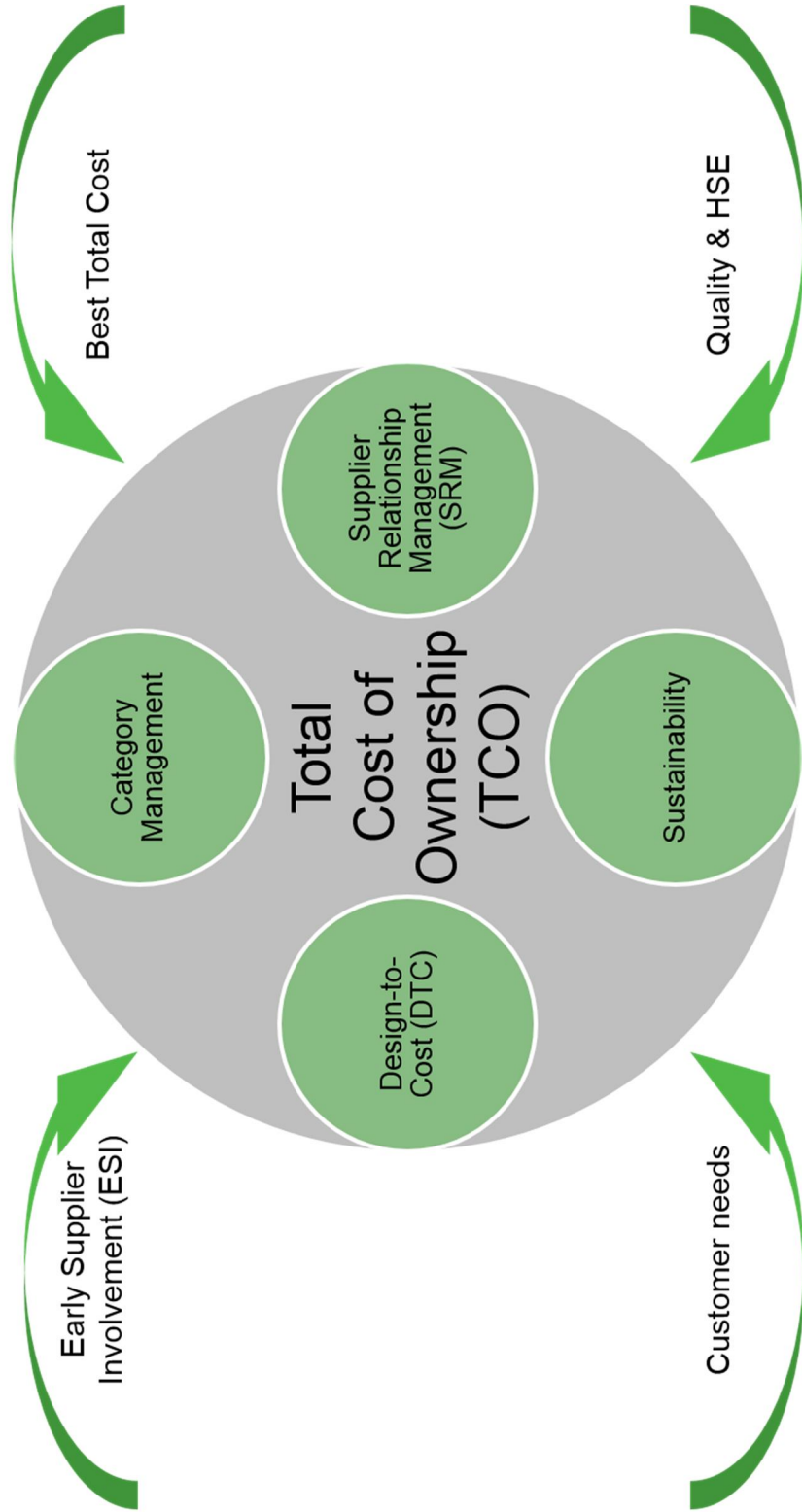
1. Please explain briefly your Company, organization and products.
2. Please explain your sales processes.
3. What ERP system do you use and how?
4. Please explain your CRM (customer relationship management).
5. Please explain your order to delivery chain.
6. How you see case company's processes compared similar customers as case company?
  - 6.1. Inquiries
  - 6.2. Order procedures
  - 6.3. Delivery procedures
  - 6.4. Communication before order
  - 6.5. Communication after order
  - 6.6. Reclamations process
  - 6.7. Revision handling process
7. How you see documentation compared similar customers?
  - 7.1. Inquiry documentation
  - 7.2. Order documentation
  - 7.3. Quality documentation and specifications
  - 7.4. Delivery documentation
  - 7.5. General terms and conditions
8. How do you see usage of systems?
  - 8.1. Document Hotel
  - 8.2. DMS
9. What is your opinion of trust and openness with case company?
10. Give a rate between 1-5 for trust and openness.
11. Do you have any improvement suggestions?

#### Appendix 4. MCN benchmarking questions

1. Please explain briefly your Company, organization and products.
2. Please explain your procurement processes.
3. Please explain your SRM (supplier relationship management) procedures and processes.
4. What ERP system do you use and how?
5. Please explain your order to delivery chain.
6. Do you have general KPI's which you track?
7. How KPI's are collected?
8. Do you have supplier evaluation process?
9. How do you choose new suppliers?
10. How do you manage your supply base?
11. Do you have process for supplier development?

Appendix 5, Case Company's early involvement in innovation process (case company supplier day presentation)

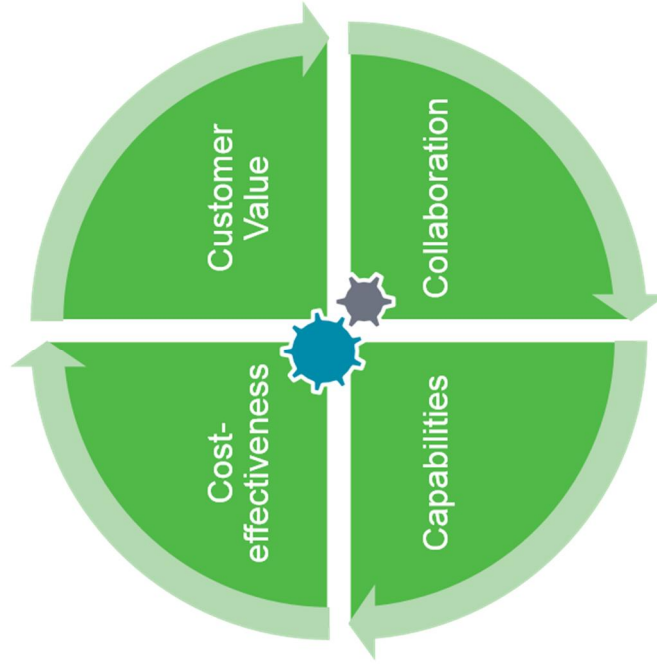
# Early Supplier Involvement (ESI) in Innovation process





# Design-to-Cost (DTC)

## Design-to-four C (DT4C)



**Customer value**

- ✓ End customer requirements and needs based solutions and products

**Collaboration**

- ✓ Collaboration with customers, suppliers and internal Valmet cross-functional teams

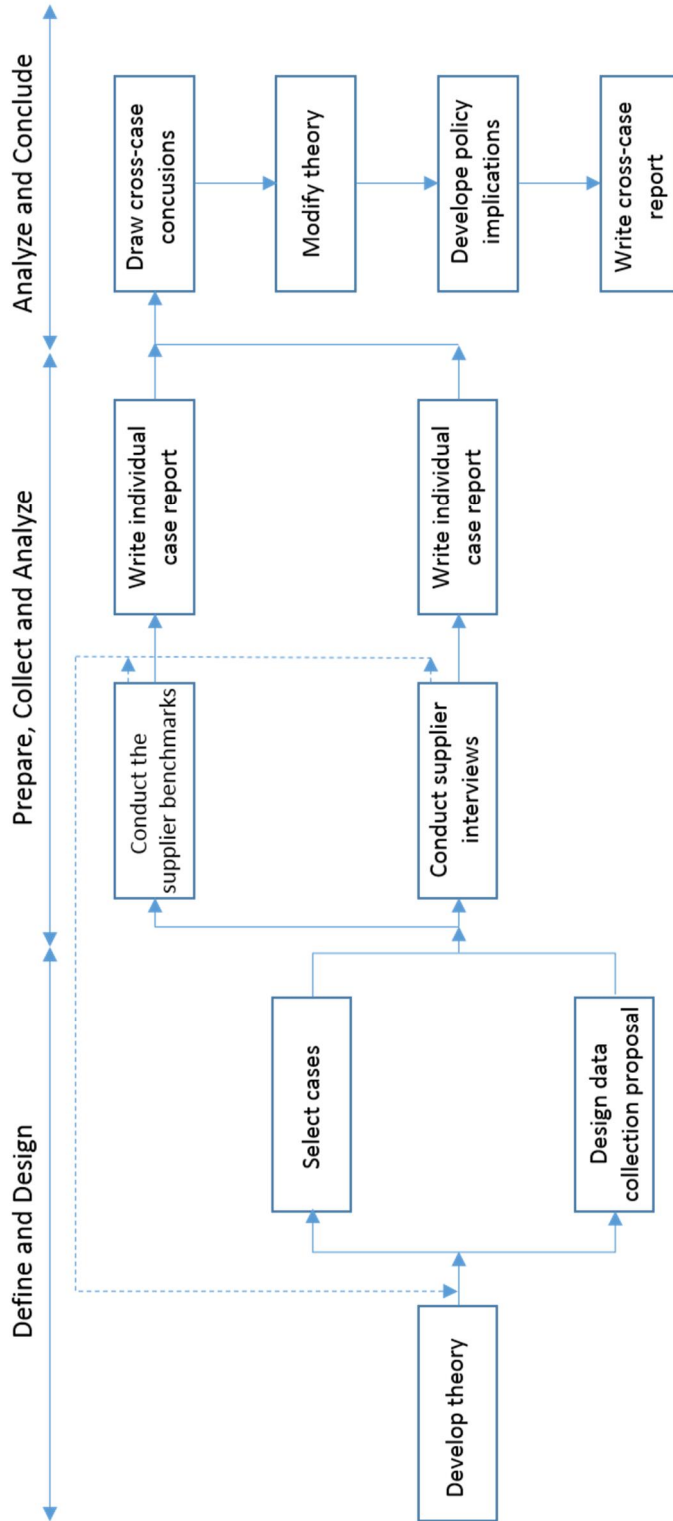
**Capabilities**

- ✓ Supplier and Valmet capabilities for developing products and solutions creating customer value

**Cost-effectiveness**

- ✓ Utilizing the most cost-effective sources for best total cost

Appendix 7, Adapted case study method to research



Appendix 8, New supplier acceptance process from sustainability point of view (case company processes)

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