



**THE IMPACT OF PROCUREMENT ON QUALITY DEVIATIONS DURING A  
PRODUCTION TURNAROUND: CASE X**

Lappeenranta–Lahti University of Technology LUT

Bachelor's Programme in Supply Management, Bachelor's thesis

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Examiner: Junior researcher, Iryna Maliatsina

## ABSTRACT

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### **The impact of procurement on quality deviations during a production turnaround: case X**

Bachelor's thesis

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Keywords: Procurement, quality, quality deviation, production turnaround, relational view, supplier relationship.

This bachelor's thesis studies the impact of procurement on quality deviations during a production turnaround. This thesis is made for a commissioning company, case X, which is a large Finnish company operating globally in the chemical industry. The goal of this thesis is to find out ways on how to decrease the amount of quality deviations from procurement for the company's next production turnaround. The research's perspective is the relational view theory.

The research was conducted as a qualitative case study. Two types of data were used for the study. The primary data was gathered through semi-structured interviews conducted with five employees of the commissioning company. The interviews were then analysed with content analysis method. The secondary data was provided by the commissioning company, and it consists of reported quality deviations from the last production turnaround.

The findings of the study showed that procurement does have an impact on quality deviations during a production turnaround and that impact can be significant. The impact of procurement is mostly related to the supplier relationships of the company which is supported by the relational view theory. Since procurement's role in quality deviation management is major, it must be considered when making decisions in the company regarding supplier relationships and quality deviations.

## TIIVISTELMÄ

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Kauppätieteet, Hankintojen johtaminen

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### **Hankinnan vaikutus laatupoikkeamiin tuotannon seisakin aikana: case X**

Kauppätieteiden kandidaatintutkielma

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Avainsanat: Hankinta, laatu, laatupoikkeama, tuotannon seisakki, relationaalinen näkökulma, toimittajasuhde

Tässä kandidaatintutkielmassa tutkitaan hankinnan vaikutusta laatupoikkeamiin tuotannon seisakin aikana. Tämä tutkielma on tehty kohdeyritykselle, case X:lle, joka on suuri suomalainen globaalisti kemianteollisuudessa toimiva yritys. Tämän tutkielman tavoitteena on selvittää, miten kohdeyritys voi vähentää laatupoikkeamien määrää hankintatoimen avulla yrityksen seuraavaa tuotannon seisakkia varten. Tutkimuksen näkökulmana on relationaalinen näkökulma.

Tutkimus toteutettiin laadullisena tapaustutkimuksena. Tutkimuksessa käytettiin kahta aineistoa. Ensisijainen aineisto kerättiin puolistrukturoiduilla haastatteluilla viideltä kohdeyrityksen työntekijältä. Haastattelut analysoitiin sisällönanalyysimenetelmällä. Kohdeyritys antoi sekundääriaineiston, joka koostuu edellisen tuotannon seisakin raportoiduista laatupoikkeamista.

Tutkimuksen tulokset osoittivat, että hankinnalla on vaikutus tuotannon seisakin aikaisiin laatupoikkeamiin ja, että hankinnan vaikutus voi olla merkittävä. Hankinnan vaikutus liittyy enimmäkseen yrityksen toimittajasuhteisiin, jota relationaalinen näkökulma tukee. Sillä hankinnan rooli laatupoikkeamien hallinnassa on suuri, tulee se ottaa yrityksessä huomioon tehtäessä päätöksiä toimittajasuhteita ja laatupoikkeamia koskevissa asioissa.

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# 1 Introduction

Procurement has a major role in executing projects in large companies. The actions and decisions made in procurement can affect the operations of projects and deviations that may occur in them. These deviations can be related to quality, time management and costs which all impact the outcome of a project. These kinds of deviations can be substantially impacted by procurement. Procurement can ideally even decrease or completely erase deviations. The more complex a project is, the bigger chance there is for complex deviations. Therefore, there is an increasing interest in utilizing supply chain management in project management and in avoiding deviations. (Micheli & Cagno, 2016) Quality deviations can be defined as the unfulfillment of set quality requirements (Company X's internal source, 2022).

In order for any project to succeed, it is very important to have an effective procurement process. A major part of that process is selecting the right suppliers for each project and keeping track of their performance. (de Araújo, Alencar & Mota, 2017) The relationships between companies and their suppliers have been highlighted as very important for effective operations management and establishing of competitive advantage. They can also decrease the risk of deviations to projects resulted from the supplier. (Dyer & Singh, 1998)

Major projects for industrial companies that have plants are production turnarounds. Turnarounds are plant shutdowns where production comes to a halt so repairs, inspections and maintenance can be done to insure efficiency and safety of the plant. These turnarounds are done on plants that cannot be properly overhauled when production is running. Production turnarounds usually require more workforce than normal operations and therefore additional contractors and workers are often hired to execute the work. (Hadidi & Khater, 2015)

This thesis' topic is the impact of procurement on quality deviations during a production turnaround: case X. Its goal is to bring value to the commissioning company in the form of solutions and development proposals on how to improve their procurement processes in order to reduce quality deviations in production turnarounds. Production turnarounds in the commissioning company are large and require a lot of resources. Therefore, it is important

to find out what is causing these deviations from the procurement point of view and what can be done differently in procurement to avoid them. The company wants to avoid making the same errors and actions in their next production turnaround that led to the deviations in the previous one. There is a clear lack of research on this specific matter as it has often been researched from general point of view and does not account for specifics of the studied case company X. Even though this research is made directly for the commissioning company and utilizes its data, it can also possibly benefit others as companies often tend to have the same type of problems in similar industry and operations.

### 1.1 Purpose of the thesis and research questions

The purpose of this thesis is to research the impact of procurement on quality deviations during a production turnaround in company X and how to decrease the amount of those by the means of procurement. The thesis is made for a large Finnish commissioning company which operates globally in the chemical industry. The company wants to find out ways to decrease the amount of quality deviations especially for their next production turnaround.

Quality deviations, big or small, can have great impacts on companies' operations as they can lead to, for example, delays and unexpected added costs. These delays and extra costs are unwanted especially in large and important projects like production turnarounds. Some of the deviations are caused by or linked to procurement and the supplier relationships there. The goal of this study is to find solutions for decreasing the amount of quality deviations that happen due to procurement in company X. The solutions are researched with the help of defined research questions. The main research question to support the goal of the study is:

*Q1: What is the impact of procurement on quality deviations from a relational view?*

This main research question is also supported by three sub-questions:

*Q2: What are the current supplier relationships like?*

*Q3: What are the main causes of supplier related quality deviations?*

*Q4: What kind of actions are required to reduce supplier related quality deviations?*

To answer these research questions, this study will analyse what kind of quality deviations have occurred during the last turnaround, why they happened and what were the actions taken from them to change ways of working. The study builds on the relational view and investigates more closely whether the supplier relationships are strategic or non-strategic and what kind of relationships were the ones that deviations occurred from. Lastly, the study will offer solutions and proposals that procurement can use to decrease the amount of quality deviations.

## 1.2 Structure and framework of the thesis

The chosen research method for this thesis is single case study and it will be done with qualitative methods of research. The case study will be conducted with interviews from the employees of the company along with the commissioning company's data of quality deviations from the last turnaround. The data of the quality deviations is narrowed down to the ones from the previous production turnaround and the interviews will also be focused on that time.

The structure of the thesis starts with the introduction where the topic and the background of it is presented among the goal of the study, research questions and framework for the research. After the introduction comes the literature review, which goes over quality as a topic in general, quality deviations and the relational view of supply management. Then the study will go into the methodology and the empirical research in which the interviews and provided data are analysed. Lastly, there will be the discussion and conclusions of this research.



## 2 Literature review

In this chapter of the thesis, a literature review of theories and studies related to the topic of the work is carried out. The purpose of this section is to deepen the understanding of already existing research related to the topic of the thesis. Firstly, the prior research of relationship management in supply chain will be reviewed, then the aspects of quality deviations in procurement and lastly the effect of supply chain relationships on quality.

### 2.1 Relationship management in supply chain

The focus of this sub-chapter will be on relationship management. The section will start with an outlook of supplier relationship management in supply chains then go further into collaboration and relational view theory.

#### 2.1.1 Relationship management

Prior research proposes that supplier relationship management (SRM) plays a major role in supply chains nowadays due to the fact that suppliers take a great part of the chain. However, this has not always been the case. In the early years of industrialization and especially later in serial production it was thought that the most cost-efficient supplier relationships were distant and mostly focused on volume. As the global industry spread wider, western industries got to see that there are other and better ways of managing suppliers such as having long-term, collaborative, and evolving relationships. (Iloranta & Pajunen-Muhonen, 2015, 77)

Organizations have different types of supplier relationships for varying needs. One way of dividing these relationships is by the well-known Kraljic matrix where the four different types are suppliers of: non-critical items, leverage items, bottleneck items and strategic items. Supplier relationship management for suppliers of non-critical items is commonly focused on the smoothness and easiness of the procurement processes since those suppliers

are used for occasional and smaller purchases. Whereas the SRM for suppliers of leverage items, which are pricey and bought in bulk, is focused on the efficacy of costs, savings, and schedules. The main focus for SRM on the suppliers of bottleneck items is the total accumulated cost and availability as there is low control on the supplier and not many or any other choices. When it comes to the SRM of suppliers of strategic items the focus is on long-term advantages, new innovations and the growth of competitiveness and processes since these suppliers come with high risk and high profit impact. (Iloranta & Pajunen-Muhonen, 2015, 313)

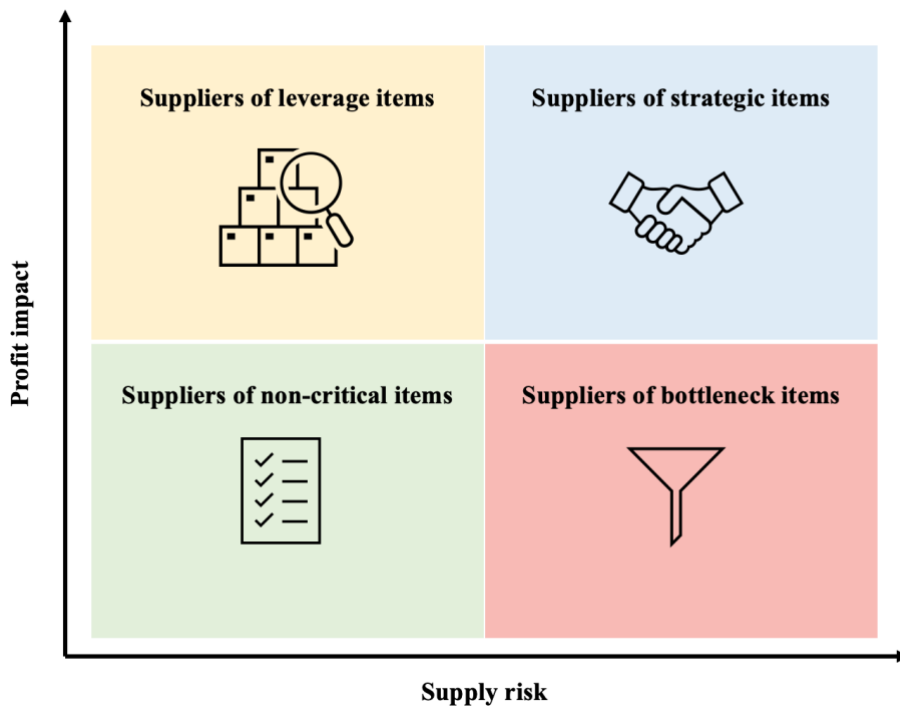


Figure 1: The Kraljic matrix of supplier relationships based on Iloranta and Pajunen-Muhonen

As mentioned before, the Kraljic matrix is just one way of categorizing supplier relationships in SRM. In addition to the Kraljic matrix there are multiple different ways and many influencing factors. However, these different methods all have in common the need to categorize supplier relationships in some way to be more cost efficient, achieve better results and to get the most out of the procurement process. (Iloranta & Pajunen-Muhonen, 2015, 315)

### 2.1.2 Collaborative supply chain relationship

Collaboration can have a major impact on SRM and developing supplier relationships by creating advantages. However, collaboration cannot be taken for granted as it requires work from both the purchaser and supplier, and it can also create some disadvantages. There can be different types of collaboration as collaborative SRM focuses on all the items of a supplier whereas supply chain collaboration is focused on one item. (Iloranta & Pajunen-Muhonen, 2015, 280) Supply chain collaboration can be divided into four stages: planning, forecasting of demand and supply, execution, and analysis. These stages usually occur in the given order but can also be in use at once. (Attaran & Attaran, 2007)

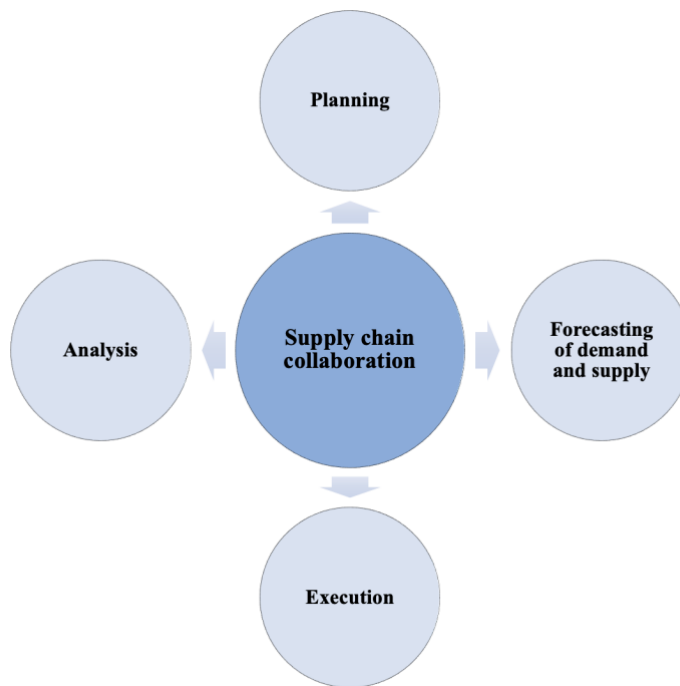


Figure 2: The four stages of supply chain collaboration based on Attaran and Attaran

The advantages reached through collaboration can save resources such as time, amount of personnel and total costs. The advantages can be reached on all the dimensions of the earlier mentioned Kraljic matrix. Mutual development, efficient operations and lesser conflicts are possible through collaborative partnerships. These all make the supply chain smoother and more efficient. However, reaching these advantages is not self-explanatory. In order to have successful collaboration both parties need to share the same goals and have the same level of importance for each other. (Iloranta & Pajunen-Muhonen, 2015, 280-281)

Collaborative supply chain relationships can also cause disadvantages especially to the purchaser. Risks of collaboration in supply chains are higher if the trust between the purchaser and supplier is broken. Increased dependence on the supplier can lead to a situation where the purchasing organization loses control over costs and development. It gives the supplier an upper hand of controlling the relationship and its terms. This can happen knowingly but also unknowingly and over a longer period. Therefore, it is very important to keep track of collaborative relationships in supply chains and be aware of both the advantages and disadvantages. (Iloranta & Pajunen-Muhonen, 2015, 282-283)

### 2.1.3 Relational view

Another way of looking at relationship management in supply chains is through the relational view theory which was defined by Jeffrey H. Dyer and Harbir Singh in their 1998 article *The Relational View: Cooperative Strategy and Sources of Interorganizational Competitive Advantage*. (Dyer & Harbir, 1998) Dyer and Harbir (1998, 661) define relational view as “*a competitive advantage that focuses on dyad/network routines and processes as an important unit of analysis for further understanding of the sources of interorganizational competitive advantage*”. This means achieving greater results through the power of cooperation with others compared to only working alone. Relational view is illustrated by and consist of relational rents which occur in different relationships that generate competitive advantage in a way or another. (Dyer & Harbir, 1998) Relational view can be viewed as similar to collaborative relationships.

Relational rents are divided into four categories by Dyer and Harbir (1998, 662); “*1. investment in relation-specific assets; 2. substantial knowledge exchange, including the exchange of knowledge that results in joint learning; 3. the combining of complementary, but scarce, resources or capabilities (typically through multiple functional interfaces), which results in the joint creation of unique new products, services, or technologies; and 4. lower transaction costs than competitor alliances, owing to more effective governance mechanisms*”. These four categories will next be explored closer.

Relational rents that come from investments in relation-specific assets depend on two key subprocesses: the duration of safeguards and volume of interfirm transactions as they impact the ability of alliance partners generating those rents. Substantial knowledge exchange related relational rents depend on partner-specific absorptive capacity and incentives to encourage transparency and discourage free riding which can be achieved with e.g., equity arrangements. Complementary resources or capabilities need the ability to identify and evaluate potential complementarities and the role of organizational complementarities to access benefits of strategic resource complementarity as it is critical for them in becoming relational rents. The fourth category of relational rents, effective governance, depends on the ability to employ self-enforcement rather than third-party-enforcement governance mechanisms and on the ability to employ informal versus formal self-enforcement governance mechanisms. (Dyer & Harbir, 1998)

These relational rents must be maintained and some mechanisms to do so are interorganizational asset interconnectedness with which the potential of investments in alliance relationships are discovered by cumulative effects. Another mechanism is partner scarcity which illustrates the importance of operating quicker than others when it comes to identifying and allying with partners. The third mechanism is resource indivisibility as the resources and capabilities of partners can change and evolve together over time and therefore control over resources is restricted. The fourth mechanism to maintain relational rents is institutional environment as they are preserved because of different inabilities of competing firms. (Dyer & Harbir, 1998)

Another view related to the relational view is key supplier management (KSM). Ivens, van de Vijver and Vos (2013, 137) define key supplier relationships as “*those supplier relationships on which the buying company heavily depends, now or in the future*” and KSM as “*the continuous process of integrally coordinating, developing, and maintaining key supplier relationships by a focal buying company*”. Organizations and their procurement can gain multiple benefits from key supplier relationships and KSM is becoming more important. However, KSM requires effort and maintenance from the procurement department and as in collaborative supplier relationships dependency is possible. (Ivens, van de Vijver & Vos, 2013)

## 2.2 Quality deviations in procurement

In this section the focus will be on the theory of procurement related quality deviations. This section will also cover overall quality related to procurement, as there is more previous research on that, quality management in general and frameworks related to the matter. Procurement operations become more complex when additional factors such as quality need to be considered and therefore there must be methods and systems for quality related practices in procurement (Asker & Cantillon, 2010).

Quality management in organizations is important and covers many operations. Quality in organizations concerns stakeholders, customers, internal customers, external supply chains, society, employees, suppliers, and investors. (Hoyle, 2007) Hoyle (2007, 10) defines quality as “*the degree to which a set of inherent characteristics fulfils a need or expectation that is stated, general implied or obligatory*”. Quality is one of the key attributes considered in procurement when making a purchase. However, the expectations of quality must be applied according to the services or goods being purchased. This is because the quality considered high for one product or service can be low quality for another as they are not all equal and do not serve equal purposes. Procurement must define their expectations and monitor the implementation of purchased goods and services. Quality can be categorized into three areas, quality of design, quality of conformance and quality of use which all tie in together. If a product or a service lacks quality in one of these areas, it is considered of low quality. (Hoyle, 2007)

Quality management can be done using standards and quality management systems. One of the most popular international standards used for quality management in organizations is the ISO 9001 standard and its versions. The extent of the ISO 9001 can be applied to an organization’s needs. This is done by establishing a quality management system (QMS), its process and the need for it. (Natarajan, 2017) The benefits from implementing ISO 9001 QMS are listed by Natarajan (2017, 17) as: “*assessing the overall context of organization for stating objectives and identifying new business opportunities, consistently meeting and exceeding the expectations of customers, resulting in new clients and increased business, increasing productivity and efficiency, bringing internal costs down, meeting statutory and regulatory requirements, expanding into new markets, as some clients require ISO 9001*

*before doing business and identifying and addressing risks associated with organization”.* In order to successfully use the ISO 9001 QMS it needs to be implemented, maintained and improved with care. The ISO 9001 QMS is updated regularly so organizations must keep track of that and renew their own regularly. (Natarajan, 2017)

Quality deviations can be prevented in procurement with safeguards and barriers. Quality management systems can include different types of safeguards for varying needs. Safeguards and barriers aim to protect against consequences of possible deviations. The commissioning company demonstrates their safeguards and barriers with James Reason’s Swiss Cheese Model (SCM). Reason developed the SCM to evaluate safety levels of organizations and the model is widely used and well-known in the field of safety and quality (Larouzee & Le Coze, 2020). Example of safeguards in the commissioning company are design, governance, alarms, behaviour, and mitigation. The company defines that: *all barriers are safeguards, not all safeguards are barriers*. As seen in the illustration below of the commissioning company’s SCM, safeguards and barriers cannot stop all deviations from occurring, since there are “holes” in them, and some deviations still pass through them. (Company X’s internal source, 2022)

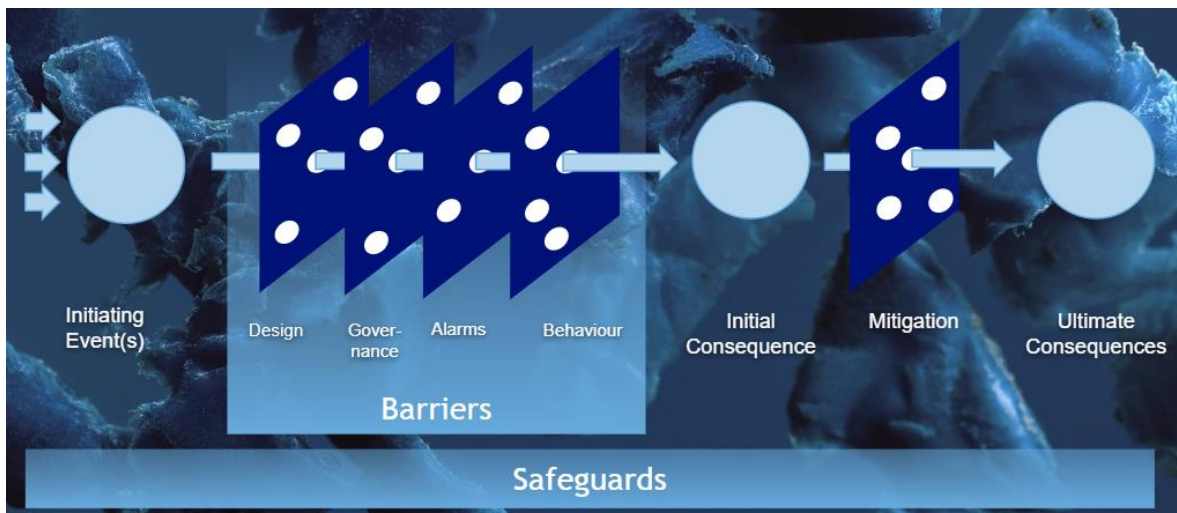


Figure 3: Illustration of safeguards and barriers (Company X’s internal source, 2022)

### 2.3 The effect of supply chain relationships on quality

The last section of the literature review will go over the previous research of the effect of supply chain relationships on quality. This section will define overall quality in supply chain relationships and quality management. The section will also go over the Lean Six Sigma method and its connection to quality in supply chain relationships.

Quality in supply chain relationships can be defined by supply chain quality management (SCQM). Foster (2008) defines SCQM as an approach based on systems to improve performance that leverages opportunities created by upstream and downstream linkages in relationships. The main themes of SCQM and the effect of quality can be seen on leadership HR practices, safety, customer focus, supplier relations, quality practices and business results of an organization. (Foster, 2008)

Another way of viewing the effect of quality on supply chains is through total quality management. Total quality management (TQM) considers the observation that checking the quality of already once checked work does not create added value and can add costs. This means that there must be profound trust and clear communication between all parties. As in collaboration, organizations must define joint goals to follow in internal operations and in external ones with other organizations. (Iloranta & Pajunen-Muhonen, 2015, 281)

Today organizations face a growing number of challenges regarding competitiveness and the increasing demand of quality. Organizations can conquer these challenges by implementing TQM into their operations. TQM is a versatile tool in controlling not only the supply chains but all operations of organizations. Whether TQM suits larger or smaller organizations better has been argued, however, it is popularly used in multiple organizations of varying sizes. (Doney & Doney, 2019, 26-27)

Among the achievable advantages of quality management in supply chains there are also risks and uncertainties concerning quality in supply chains. The sources for these risks have been categorized into five: environmental risk sources, demand risk sources, supply risk sources, process risk sources, and control risk sources. These risks can be controlled through various related supply chain risk management (SCRM) strategies. It is important to monitor



supply chains and their quality closely to avoid the above risks. Quality can influence supply chains in various ways and in all the parts of the supply chain. (Zhang, Wang, Li, Wang, Wang & Tan, 2011)

Lean Six Sigma is a process based off multiple tools to improve quality, competitiveness, productivity, and profitability for organizations. It is combined from two separate philosophies, Lean and Six Sigma. The Lean method was originally developed by Toyota Manufacturing Company, and it is focused on waste elimination and improving flow. The Six Sigma on the other hand was originally developed by Motorola Company for process variation reduction with statistical and problem-solving tools. Both the Lean and Six Sigma methods can separately give positive impacts to organizations, however when combined into the Lean Six Sigma method, organizations can reach even greater benefits and development. With Lean Six Sigma organizations can improve the quality in supply chains and control the way quality affects supply chain relationships. (Cudney, 2018) The commissioning company has implemented the Lean Six Sigma method in their operations.

## 3 Methodology

This section of the thesis is the empirical part of the research. It will first go over the chosen research method, study strategy and data of the research. Then the focus will be on the research data and analysis of it will be presented in the next chapter.

### 3.1 Research method and data

The thesis is conducted with qualitative methods of research. Qualitative research methods are based on previous research and theories, empirical data, and the researcher's own conceptions. Qualitative studies can be conducted from different types of data. It is characteristic for qualitative research to not have a hypothesis. (Yin, 2014, 30) The chosen strategy of the thesis is case study as the aim is to conduct an in-depth and specific analysis of the aspects of quality deviations and supply chain relationships of a chosen company. A case study is based on one case representing a phenomenon that is being researched or a small, selected group of cases. It is characteristic for case studies to be conducted about organizations or processes. A case study aims to get as comprehensive a picture of the case as possible by getting to know it thoroughly and therefore case studies combine different forms of data. (Yin, 2014, 31) This is why the thesis is conducted with qualitative methods of research and as a case study.

The study is conducted with two different types of data, primary data of semi-structured interviews and secondary data collected from the last turnaround. The semi-structured interviews were conducted with the employees of the company. Semi-structured interviews are made of interview questions and themes prepared in advance to guide the interviews. However, there is room for on-the-spot questions and little alternation in the execution of the interviews. (Yin, 2014, 110-111) The interviews were all conducted with same questions, but the interviewees answers guided to some varying added questions and allowed for versatile conversation about the subject to take place. The interviews consisted of ten

questions (appendix 1), and they were given to the interviewees ahead of the interviews so that the interviewees had time to get to know them and prepare their answers. All five interviews each took around 30 minutes of time and were recorded.

The interviews were conducted on Google Meet with five employees of the commissioning company. The commissioning company is a large Finnish company which operates globally in the chemical industry. The company employs thousands of people and has operations around the world. The interviews were all conducted with Finnish procurement employees and were done in Finnish. There were five employees interviewed from procurement who will be called “A”, “B”, “C”, “D” and “E” to retain anonymity. All five employees have slightly different roles or similar roles in different areas of procurement. Interviewee A and B are category leads in different areas of procurement, interviewee C is a procurement manager, interviewee D is a turnaround procurement lead and interviewee E is a sourcing manager.

The secondary data was given by the commissioning company, and it consists of quality deviations collected from the last production turnaround. The quality deviations in the data have been analysed through a structured procedure that the company uses. The data includes written reports of occurred deviations and the actions taken from them. The data is in an excel format and it separates each quality deviation. There is information on each deviation on the excel but there are also links to the company’s own reporting system where more information on the deviations can be found. Some of the deviations in the data are not connected to the topic of the thesis and therefore will not be included in the research.

## 4 Analysis of interview data

Content analysis method will be used for analysing the interview data. First, it was checked what was said directly by interviewee. Then, the primary concepts were identified. These concepts were grouped under major themes. The four major themes found from the interviews were 1) supplier relationships, 2) communication, 3) taken actions, and 4) turnaround procedures. Next the interviews will be analysed through these four themes.

### 4.1 Supplier relationships in company X

The supplier relationships in company X were described by the interviewees as diverse and varying. The common theme that arose from the interviewees was that the number of strategic suppliers is lower than the number of non-strategic suppliers used in the company's operations. However, the interviewees pointed out that it is difficult to define the supplier relationships strictly into two as they vary according to the needs and projects. So, one supplier can have both strategic and non-strategic relationships with the company depending on with what business unit and project they are working on.

Voiced by all the interviewees was the need for more long-term and strategic relationships. The interviewees described that this would better the relationships but would also require more work from both the company and supplier. Most of the interviewees agreed that the current amount of non-strategic suppliers is too high compared to strategic suppliers. Interviewee A mentioned that the company has multiple suppliers that are contacted and used when needed but the collaboration in between those contacts does not exist. An interesting point brought up by interviewee B was that a supplier's employee can have a long-term and deep experience working with company X even when the supplying company itself might only have a surface level relationship with the company. Interviewee B described the disadvantages of not having long-term deeper relationships with suppliers as stated below:

*“Because we don't build long-term cooperation, we both lose. After all, it is not profitable for the chosen contractor to invest or develop anything if they do not know if there will be work in three years. Undoubtedly, supplier relationships should be deepened from the current level.”*

- Interviewee B

However, the disadvantages of long-term supplier relationships were also discussed. As mentioned in the literature review, suppliers can take advantage of long-term relationships as they get to know the company. This can lead to the supplier ignoring rules and instructions that they know aren't constantly supervised or even dictating their own rules. In these cases, the company can slowly start to lose control over the supplier and their operations, and the end result is not optimized or wanted. Company X wants to avoid this but also better the situation regarding supplier relationships and is therefore currently working towards it according to the interviewees.

It was also discussed whether the type of supplier relationship can affect the possibility of occurring quality deviations. This divided opinions between the interviewees. Some were thinking that the non-strategic and occasional suppliers would cause more deviations since they aren't as familiar with the company and possible risks. However, the opposite point of view was also proposed of strategic long-term suppliers causing more deviations. This is in a way inevitable as within longer period more deviations are bound to happen than within a short period of time. But there is also the aspect of long-term suppliers not caring as much of instructions and avoiding them creating a higher risk of deviations occurring. All this said, the interviewees all pointed out that a clear correlation between supplier relationship type and the number of deviations occurring cannot be defined as there are many more factors affecting that.

Regarding production turnarounds, the supplier relationships are usually long-term relationships as they can be considered more reliable and there isn't room for additional risks in turnarounds. Long-term suppliers are familiar with the operations of the company and the maintenance related to those, so it is profitable to hire them for turnaround projects. On the other hand, turnarounds require more workforce than normal operations and this can mean

hiring new suppliers and suppliers from abroad. Interviewee C mentioned that an issue in the last production turnaround regarding supplier relationships was the subcontractors of contractors. It is difficult to keep track of them and make sure that everyone is on the same page. Also, the difficulty of predicting needs makes it more difficult to create long-term relationships or to make sure that a contractor has enough own workforce and will not need subcontractors.

## 4.2 Communication in company X

One of the greatest challenges in handling quality deviations in procurement mentioned by the interviewees was poor communication. This was brought up by all five interviewees as one of the first things when asked about challenges related to quality deviation management. Communication related challenges seem to be both behind many deviations and also impacting the management of already occurred ones. Communication issues impact supplier relationships, the company's own quality requirements and the management of quality deviations. The most common issue with communication is a clear lack of it or the communication containing wrong information.

The issue with poor communication originates from company X's internal level and reaches all the way to external communication with suppliers. Communication challenges between procurement and the field are apparent in the management of quality deviations. The issue arises when it comes to reporting and handling the occurred quality deviations. Information about the deviations often does not make it outside the field and therefore procurement does not have proper knowledge of them. This can lead to inconsistent knowledge and actions about the deviations when procurement does not get to know all the deviations, or they find out when it is a bit too late. Interviewee A described this issue as stated below:

*"It has been noticed before that this information does not always come to procurement as it would be expected. These issues remain in the field which are not known to be defined as quality deviations, and procurement is not actively contacted, even if there is reason to do so."*

- Interviewee A

Communication issues with the suppliers on the field can cause quality deviations when, for example, only the main contractor's foreman gets information and training about working on the field, but the information stops there, and the actual workforce does not get to hear about it. Communication challenges between the field and procurement can also reflect to suppliers in the way that the supplier receives, for example, different instructions and or requirements from the two which then creates unclear working conditions for the supplier. This creates risks from many points of view.

Due to the poor communication and other factors four out of the five interviewees responded that the management on quality deviations is not on a good or a wanted level in the company at the moment. The four interviewees voiced the need for improvements and changes so that the quality deviation management can be considered good and adequate. Only one interviewee thought that the current deviation management is overall on a good level, but they did also agree with other interviewees that the level of communication is not as good as it should be. The interviewees mentioned that the management of deviations depends a lot on the type of deviation. Safety related deviations are managed quickly and well with claims to suppliers, but quality deviations lack the same level of management.

Interviewee E mentioned that there is a lack of a centralized system where to report all the deviations easily. The company currently uses a reporting system that deviations are reported on, but some of them are reported lacking needed information and some never make it to the system. Investing into a new reporting system would require an investment from the company X for the system and for training all employees into using it correctly. However, it would be more profitable for the company to focus on improving the use of the current system and the implementation level of it instead of going for a brand-new different system. The current reporting system has potential of being very beneficial in the process of quality deviation management but the knowledge of how and when to use it is lacking. Implementing, training, and tracking the use of the current system would make the management of quality deviations more coherent and efficient.

### 4.3 Actions taken in company X

Agreed by most interviewees was that the role of procurement in the managing of quality deviations is great in size. Interviewee B mentioned that procurement's role could be properly fulfilled if communication was better, and procurement could get the chance to do more. Procurement's role in quality deviation management includes gathering the team to handle them and leading the process. Interviewee E pointed out procurement's role's importance and part in the start of any process:

*“Procurement does all the initial work, i.e., selects the candidates from whom work is requested and conducts the inquiries, procurement is the first contact between the company and the contractor.”*

- Interviewee E

The interviewees brought up inconsistency found within the actions made to manage quality deviations. This has to do with the previously discussed poor communication between the field and procurement. Often when procurement hears about a deviation, the field has already done some actions in managing that. The problem is that procurement might not get the information about this and will then handle the matter with the supplier for a second time. The field's and procurement's procedures can be different, which then shows as an ununified line to the supplier. This is not good for the image of the company and for the supplier relationships. After receiving different instructions and consequences from both the field and procurement, the supplier might be even more prone to making mistakes or not willing to work. Therefore, there needs to be adequate communication between the field and procurement and unified communication towards the supplier.

Actions that the interviewees think should be taken are more conversations and agreements with suppliers to make sure everything is clear to them. Two of the interviewees mentioned that these have already been taken into practice or are being planned at the moment. Other actions that the interviewees think should be taken are background checks, close monitoring and establishing clear standards for suppliers. Also taking corrective measures to each deviation, practicing lessons learned and conducting training for suppliers. Interviewee D



also mentioned the importance of collaboration with HSEQ (health, safety, environment, and quality) team for these actions.

Also, what needs to be established is what is good enough in terms of quality. Interviewee E mentioned that sometimes the quality requirements in company X for suppliers are even too high and that makes collaboration more difficult. These requirements should be established together in the company's HSEQ team, procurement and field and then be clearly established to the supplier. The requirements might need to be amended according to the project, work or supplier in question which requires added effort but is important. All parties must be aware of the same "game rules".

#### 4.4 Turnaround procedures in procurement of company X

Production turnarounds are special projects large in size and require more attention than everyday operations. The risks for quality deviations are higher during the time of turnarounds as there are more workforce on the field, more money put into the projects, and crucial steps. Therefore, the consequences of quality deviations are also larger and riskier. Because of this, it is important to make sure that all operations in turnarounds go as smoothly as possible and the number of quality deviations stays as low as possible.

Interviewee D brought up an interesting point about challenges that different work and leadership cultures can bring up in turnarounds. As turnarounds require more workforce, some is inevitably hired from abroad. Work cultures and especially leadership cultures can vary heavily depending on the home country of a member from the workforce. This can make administrating instructions and managing quality more difficult. Instructions, requirements, and training are provided for the main contractors but those are then left for the responsibility and depended on the leadership culture of the main contractor to make sure that all subcontractors also get the needed information. The higher quantity of workforce also creates risks in terms of overall management. The more people are working on the site, the more possibilities there are for accidents.

The last production turnaround was done during the COVID-19 pandemic and that brought its own challenges and uncertainty. The pandemic brought new safety regulations and the monitoring of those took away from the monitoring of other possible deviations. The interviewees mentioned that during last turnaround many reports of deviations were made of pandemic related safety issues but consequently the number of other reports were lower. The uncertainty caused by the pandemic impacted both the company X and the suppliers it uses.

Interviewees C and D mentioned that the procedures and actions considering supplier performance done during turnarounds are stricter than in normal circumstances. This is because there is no room for added uncertainty or mistakes and second chances cannot be given if the risks are too high. To avoid same mistakes from happening in the next turnaround, interviewee D mentioned the hiring of a new quality manager:

*“Now we have a quality manager for the next turnaround, with whom we will determine the process for the turnaround on how deviations are managed and monitored.”*

- Interviewee D

On the other hand, there are also incentives for suppliers to perform well during turnarounds. Interviewee E mentioned that at times a supplier hired for a turnaround can be promised to be hired for the next turnaround as well if the supplier performs well and as expected. These incentives motivate suppliers and can also be important in establishing long-term and strategic supplier relationships.

## 5 Analysis of secondary data

This chapter will introduce the analysis of the secondary data of quality deviations from the last turnaround. Firstly, the data was categorized to causes of quality deviations and actions taken from those. These were then linked to similar themes and the themes found from the analysis of the interviews.

### 5.1 Common causes of quality deviations

Firstly, the secondary data was analysed through the common causes of quality deviations. There are many varying causes behind occurred quality deviations, but the most common ones found repeating in the background of the deviations were included in this analysis. There are four groups of causes identified.

The first and one of the most common causes is people and knowhow issues. People and knowhow issues can be difficult to decrease as human error is always present in what people do. The increased amount of workforce during turnarounds can increase the risk of people and knowhow related quality deviations. The increased amount of workforce also brings in workforce with different work cultures, as mentioned earlier, and differences in cultures can be behind people and knowhow issues. These causes can be decreased only up to a point as said before, and they are almost always inevitable.

The second cause of deviations that rose from the secondary data and was also mentioned several times in the interviews was communication, the lack or the poorness of it. Again, the large size of workforce makes the risk for poor communication and it leading to deviations larger. Communication related causes can occur in many different turnaround procedures and in different phases of them. Turnarounds being special projects, they require an added amount of communication and communication that is very clear to all parties. They can also be strongly related to people and knowhow related causes.

Another common cause for quality deviations during the last turnaround was the lack of or incorrect instructions and incorrect procedures. This can also be tied together with communication and people and knowhow related deviations. These cause deviations when suppliers and contractors do not get enough instructions or get incorrect ones. These can then lead to incorrect knowledge of procedures and lead to issues.

Another cause that was commonly behind quality deviations is maintenance, inspection and supervision not being done. This cause can be due to internal and or external issues. Similar to this cause is incorrect products, materials and or services. These often follow from a mistake of the supplier. There seemed to be more deviations following the maintenance, inspection and supervision not being done compared to the ones that were caused by incorrect products, materials and or services.

All the mentioned common causes can be tied together and can also be the causes and or consequences behind each other. For example, poor communication can lead to spreading of incorrect instructions and then to wrongfully done service. Therefore, quality deviations usually cannot be defined by just one cause as they often have multiple smaller causes contributing to another. It creates a chain reaction, and this illustrates how even just one small issue can impact the outcome of bigger projects.

## 5.2 Common actions taken from quality deviations

Next, the common actions taken from quality deviations during the last turnaround will be reviewed. The found actions are generalized into five groups of the most repeating and used actions. Most of the actions also include more detailed steps and are adapted to the deviation in question but will be presented here as more of a general action for the sake on anonymity. The actions will also be tied into the causes mentioned in the earlier sub-chapter and compared to some of the actions presented in the interviews.

First group of actions identified from the data is instructions and training. Both can be used internally in the company X and also externally with the suppliers. Preparing new and

improved instructions considering procedures and restrictions is important to make sure that same issues do not arise again. Instead of only creating new instructions, it's important to improve the already existing ones and make them as good as possible. The importance and need for training were also brought up in the interviews. An issue regarding these actions brought up in the interviews is that often the instructions and trainings do not reach the full workforce of a supplier.

Other common actions taken from supplier related quality deviations are meetings and discussions with the supplier. In these meetings the reasons for the occurred deviations are figured out together with the supplier. Then company X can express their expectations and needs to the supplier who can then improve their own actions according to that. Collaboration is an important factor when it comes to these actions but also the company being firm about their requirements.

Another action that company X has taken in response to the quality deviations is review of procedures. This is an important action for the company to do internally as it is a way for the company to define their needs and find out if everything is done as it should be. After defining the needs and assessing current procedures the company can then communicate them to suppliers. This action can then be incorporated to the actions mentioned earlier and give the company an overall status of the situation.

Mentioned multiple times in the interview and data cause analysis is communication. Communication is also one of the actions taken from the occurred quality deviations. As an action, communication is being improved in company X with their own employees and also with the supplier. Again, this action is often found tying in with other actions and supporting the execution of them. As seen on the secondary data and interviews, communication can be both a cause for a deviation and also an action taken from a deviation depending on the quality and purpose of the communication itself.

The last common actions, found in the secondary data, taken from quality deviations are internal meetings and conducting lessons learned in company X. These being internal actions, they are not directly connected to suppliers but are often behind other actions connected to suppliers. These are done so that the company's own employees can have the

best knowledge and skills to handle the quality deviations. Lessons learned can be conducted with examples of quality deviations occurred earlier so that those will be avoided in the future. Conducting these meetings and lesson learned ensures that the employees of the company can then transfer some of the knowledge to suppliers and know how to deal with suppliers better which can then decrease the number of quality deviations.

These actions often go along with each other as quality deviations often have multiple different causes behind them which require different actions to be taken. The combination of different actions ensures that the deviation gets handled thoroughly. The relation of different actions to different causes of quality deviations is illustrated in the figure below. It illustrates how many deviations had the different combinations of causes and actions behind them and taken from them. It must be considered that a singular quality deviation can have multiple different causes behind it and multiple actions taken from it, so this illustration does not represent the actual number of all deviations but the volume of the different cause/action combinations.

Combinations of causes and actions		Actions					Sum
		New instructions and trainings	Meetings and discussions with contractor or supplier	Review of procedures	Improving communication	Internal meetings or lessons learned	
Causes	People and knowhow issues	9	7	11	3	10	40
	Communication issues	6	4	12	6	11	39
	Incorrect instructions or procedures	9	5	12	8	6	40
	Maintenance, inspection or supervision not done	7	7	8	2	3	27
	Incorrect product, material or service	5	6	4	4	2	21
<b>Sum</b>		<b>36</b>	<b>29</b>	<b>47</b>	<b>23</b>	<b>32</b>	

Figure 4: The combinations of causes and actions of quality deviations from the last production turnaround

## 6 Discussions and conclusions

The last chapter of the thesis will go over the discussions and conclusions of the research. Firstly, the findings of the analysis will be discussed and then the improvement suggestions to company X will be presented. After that the answers to the research questions and conclusions of the research will be presented. And lastly, the reliability of the research will be assessed.

### 6.1 Findings and improvement suggestions

The analysis of the interview data and secondary data revealed different causes behind quality deviations and actions that procurement can make in different situations. The issues of company X regarding supplier relationships and quality deviation management that stood out from the interviews were mostly about communication, the current state of supplier relationships and different instructions. The issues that arose from the secondary data were also mostly about communication, people and knowhow and incorrect procedures. There were common issues found from both interviews and the secondary data. The figure below illustrates the main themes found from both data.

THEMES GATHERED FROM THE TWO TYPES OF DATA		
INTERVIEWS	SECONDARY DATA	
	CAUSES	ACTIONS
Supplier relationships	People and knowhow issues	Meetings with suppliers
Communication issues	Communication issues	Improving communication
Taken actions	Incorrect instructions and procedures	New instructions and training
Turnarounds procedures	Maintenance, inspection and supervision not done. Incorrect products, materials and or services.	Internal meetings Review of procedures

Figure 5: Themes and findings from the research data

This chapter will present the improvement suggestions to the commissioning company X according to the findings. To improve the communication issues that company X faces, there must be wider and clearer communication created. This must first be implemented internally in the company through all business units and areas so that communication can also be improved externally. Once communication is successful in the company then the issues of poor communication between procurement and field can be eliminated. One way to improve the communication in the company would be, for example, implementing wider training of the deviation reporting system, making sure communication flows through it smoothly and creating clear instructions on what to report, when and how. Having successful communication in the company, the communication towards suppliers can also be clearer and more unified. This will reduce the amount of communication related quality deviations occurring.

In order to gain better supplier relationships and benefit from relational rents, the company should focus on creating more long-term strategic relationships. This could help to reduce the amount of quality deviations. The company would benefit from collaborating with suppliers and co-operation would make larger projects like turnarounds possibly run smoother. To form more of these strategic long-term relationships with suppliers, the company must first define its needs and try to predict their needs for the future. This must be done so that the needs can be presented to possible suppliers to find out if they are fit for the job. These relationships require meetings with the supplier and giving possible training to them. The possible disadvantages of long-term relationships must also be assessed and monitored throughout the relationship. In order to make sure that a supplier relationship is profitable and viable it needs to be maintained with collaboration and monitored through consistent checks. As said in the interviews, deepening supplier relationships would benefit both the company and supplier.

Lastly, this research would suggest the company to create improved and clearer instructions. It seems so that many of the current instructions regarding procurement, reporting quality deviations and turnarounds altogether are insufficient or unclear. This leads to misunderstandings in the company and with suppliers. The company needs to define instructions for procurement on what is to be expected and needed from them which would help procurement in creating longer term relationships. The current reporting of quality



deviations is lacking and often information gets left out leading to procurement not getting all the deviations to their knowledge. This can be improved by investing in the knowledge of how to use the already existing reporting system with the earlier mentioned implementation, training, and tracking the use of it. This way when all the deviations get reported correctly, they can be avoided in the future. It would also be beneficial for the company to create a universal turnaround instruction manual that could be easily applicable and adapted to different suppliers.

## 6.2 Conclusions

The next chapters will focus on answering the research questions presented in the introduction of the thesis. The main research question is: “*What is the impact of procurement on quality deviations from a relational view?*” and the three sub questions are: “*What are the current supplier relationships like?*”, “*What are the main causes of supplier related quality deviations?*” and “*What kind of actions are required to reduce supplier related quality deviations?*”. The sub questions will be answered first and then the main research question will be answered with the support of those.

The first sub question “*What are the current supplier relationships like?*” will be answered in this chapter. The state of the current supplier relationships was explored in the interviews which gave a basic understanding of company X’s current relationships. Although the full extent of the company’s supplier relationships cannot be deduced from five interviews alone, they do give an estimate of it. Described by the interviewees, the supplier relationships in company X are mostly short term and non-strategic ones. Factors impacting this is the difficulty of predicting needs and the changing nature of those needs. Agreed by all the interviewees was that the company should aspire to create more long-term relationships as they would benefit the company and suppliers. Suppliers chosen for production turnarounds are mostly and preferably long-term ones as it provides extra security to a large operation. The company is currently working on creating more long-term supplier relationships.

This chapter will answer the second sub question: “*What are the main causes of supplier related quality deviations?*”. These causes were found from the interviews and secondary

data. Causes brought up in the interviews were mostly related to communication and instructions. There are challenges in communication with suppliers and getting suppliers to understand and obey all the instructions. Another cause revealed in the interviews was the difference in culture and especially the leadership culture of a supplying company. Main causes found from the secondary data are people and knowhow issues, communication issues, incorrect instructions or procedures and maintenance, inspection and supervision not being done. These resonate closely with the causes mentioned in the interviews and these causes are also often linked to each other. Rarely a quality deviation has only one and unambiguous cause behind it.

The third and last sub question is: “*What kind of actions are required to reduce supplier related quality deviations?*”. These actions were analysed from the interview data and secondary data. The interviewees brought up multiple actions taken in the company and actions that the company should take. Some of these actions are conversations and agreements with the supplier, background checks and monitoring on suppliers and taking the required corrective measures to each deviation. Actions that the company should incorporate according to the employees are establishing the wanted and needed level of quality and also unifying actions with procurement and field. The secondary data presented actions already taken in the company in response to the quality deviations from the last production turnaround. These actions are instructions and training, meetings and discussions with the supplier, review of procedures, improving communication and having internal meetings. The actions revealed in both interviews and secondary data are very similar to each other like the causes are too.

The answers found to the sub questions will help in answering the main research question: “*What is the impact of procurement on quality deviations from a relational view?*”. The impact of procurement is rather large on quality deviations from a relational view since many causes of quality deviations could be eliminated by the actions of procurement. Almost all the interviewees described procurement’s role in managing quality deviations as large. Many of the solutions to reduce quality deviations are found or developed in procurement. The relational view theory focuses on collaboration with suppliers and the advantages of supplier relationships. Procurement is in the center when it comes to advocating collaboration with suppliers and improving supplier relationships. By doing that, procurement can positively

impact quality deviations and the number of those occurring by decreasing them. The impact of procurement being large on quality deviations from a relational view means that aside being positive, it can also be negative. If supplier relationships and collaboration with suppliers is not managed well by procurement, then the number of quality deviations can increase and also the severity of them can deepen. Procurement alone is not fully responsible for supplier related quality deviations as there are many varying factors that are often out of procurement's hands, but procurement does have a part in those, whether large or small, and it is important to make sure that procurement has done everything as well as it could. Therefore, the impact of procurement on quality deviations from a relational view is significant.

### 6.3 Reliability of research

This chapter will discuss the reliability and validity of this research and also give suggestions for future research. The reliability of a research means that a reader can trust in the researcher's abilities to conduct the research using justified and appropriate methods. It has often been assessed that the reliability and validity of a qualitative research is difficult if not impossible to determine. However, it is possible to assess the reliability and validity of a qualitative research and factors that add to them are similar results from different types of data, the researcher's own position towards the topic and the pursuit of truthfulness. (Puusa, Juuti & Aaltio, 2020, 173-180)

The reliability of this research is demonstrated with the similar results gathered from the primary and secondary data. The answers given by the interviewees were similar to the data of the reported quality deviations from the last turnaround. They supported each other and it strengthened the reliability of the findings. Another factor strengthening the reliability of this research is the number of interviews and the differing roles of the interviewees. This gives a wider understanding of the topic and different points of view to it. Truthfulness of the interviewees' answers was ensured by having anonymous interviews and making sure that the interviewees knew that. Therefore, the interviewees could freely express their opinions on the matters. Lastly, the researcher's own position towards the topic and knowledge of it can increase the reliability of the research. The researcher of this thesis has

experience from this topic and an understanding of the commissioning company's operations which also increases the reliability of this research.

As there is a lack of previous research of the specific topic of this research, comparing this research to previous ones is a bit difficult. However, the previous literature presented in the literature review of this thesis does support many of the findings of this thesis. There were limitations faced in the process of this research one of them being the lack of previous research. Another limitation was the limitation of time, as with more time, the secondary data could have been analyzed further in order to find more root causes. Further research on the topic would most likely be beneficial for the commissioning company. This could include the mentioned further research of the secondary data, the root causes in there and the current state of the actions made. The secondary data could also be further researched by finding out all the suppliers behind the supplier related deviations and then assessing the current relationship with them. This would also give a more detailed understanding of the current state of company X's supplier relationships. The interviews could also be extended to employees outside of procurement, for example, to the field and turnaround foremen and workers. This would give more points of view to the matters discussed and would also benefit the company in the planning of corrective measures and in the execution of those.

This research's goal was to research the impact of procurement on quality deviations during a production turnaround in company X and how to decrease the amount of those by the means of procurement. An understanding to it was found in the research and it can benefit company X in the future and in the next production turnaround. The findings of this research cannot be generalized to all companies in the field as it is made directly to the commissioning company, but it can be beneficial to other companies as well by giving an understanding of the topic to a small field of study.

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## Appendix 1.

### Interview questions:

- Could you tell a little about yourself and your job description?
- How would you describe the nature of supplier relationships?
- In your opinion how well does the organization perform in terms of managing quality deviations? How about quality deviations caused by suppliers?
- How big is the role of procurement function in reducing quality deviations in your opinion?
- In what ways does procurement affect quality deviations, do any examples come to mind?
- In your opinion how does the supplier relationship in our organization affect the possible quality deviations?
- In your opinion, what could be done to decrease the amount of supplier related quality deviations?
- Could you think about the last turn around? Which major challenges did you face in managing quality deviations? How is procurement preparing for addressing those challenges in the next turn around?
- What kind of actions are required to decrease quality deviations through supply chain relationships? Why are they important and how much effort do they require?
- Do you want to add anything?