



**UNIVERSITY OF GOTHENBURG**  
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## **Is Lean a waste of Time?**

A case study of Kjell&Company and the Implementation of Lean into their  
Central Warehouse

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## ABSTRACT

Companies constantly strive towards increasing their efficiency by improving the daily operations in order to strengthen their competitive advantage in the market. The concept of lean thinking has presented tools to achieve higher efficiency by the elimination of waste, i.e. the reduction of non-value-added activities for the end-customer. Although the concept is well-established in the manufacturing sector, it is not as developed in other sectors, such as warehousing. A common denominator for all sectors is the difficulty that lies within the initiation process. The purpose of this study is to investigate a company's initiation process during a lean implementation into their central warehouse – what tools to adopt, how to include the employees, and how to measure the changes made – in order to become more efficient and achieve a sustainable competitive advantage.

An explanatory single case study, under the interpretivist paradigm with a deductive approach, has been conducted with help of the Swedish electronics peripherals company Kjell&Company. The data collection was gathered in Malmö with the help of interviews, observations and internal documents from the company. The study is limited to cover the lean implementation within the company's logistics department only. The key findings of the study show that 5S, VSM and the PDCA cycle are suitable tools, employees should be included on a bottom-up approach basis since lean requires its time and dedication, and the choices of suitable hard and soft KPIs should be connected to the 5 key principles of lean thinking and the lean strategy.

**Keywords:** *lean, lean thinking, lean warehouse, lean tools, culture, change management, performance measurements, KPI, measuring lean, lean strategy*

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# 1. INTRODUCTION

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*The chapter introduces an overall background of the subject of this study. The analysis of the problem, which is connected to the research purpose and research questions, is also presented. The delimitations are then briefly discussed and the chapter ends with a description of the case study.*

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Since the era of Taylorism, efficiency has been one of the five distinct movements on how companies compete with each other (Favaro, 2015). The competitive environment of the global economy has intensified and companies strive to increase their competitive advantage while reducing costs to stay ahead every day (Sim & Rogers, 2008). Although many management concepts and techniques have been developed, the concept of lean and lean thinking has become one of the most popular to use (Hu, Mason, Williams & Found, 2015). Lean thinking is a way to do more and more with less and less, with the continuous goal to remove waste, i.e. non-value added activities for the end-customer (Womack & Jones, 1996).

As Eleftheriadou (2008) puts it, companies should not hesitate to deeply reflect upon their current way of doing business and how to innovate, by means of adopting new management practices. Today still, companies compete by being efficient and the concept of lean thinking is widely used to create competitive advantages. The concept of lean has stretched from establishment in the manufacturing sector and spread to e.g. service, logistics and distribution, retail, and even to the health care and government sectors (Lean Enterprise Institute, 2016). While many companies believe they have become lean and implemented the concept of lean thinking, there is actually a long journey of truly *being* lean. Some companies believe that they are working in a lean way by simply implementing one or a few of the many tools available, however, it takes years to achieve such a state (Sörqvist, 2003).

Most companies once belonged in the category of a small company, but as their business model became successful the demand of their products or services grew. Companies need to continually grow and evolve in order to stay competitive (Capron, 2015). Small and medium sized enterprises (SMEs) are a major source of both innovation, creativity and entrepreneurial skills that emerge as global actors by participating in global production and supply chains (Eleftheriadou, 2008). SMEs also have the ability to rapidly and flexibly react to different circumstances and sudden changes (Olejnik, 2014). Growing as a company is seen as an advantage and a goal most companies strive towards, but important to remember is that with growth comes additional challenges (Hamilton, 2014). Keeping track of the financials are among the most central functions in a company and a challenge to keep track on, Hamilton (2014) writes, still other performance measurements and indicators are important to consider as well in order to grow in the right direction. When growing from an SME to a large company the need for identifying success with different key performance indicators (KPIs) rises and measurements that indicate improved efficiency become more important. Not the least to a



company implementing lean, as it is seen as a concept and strategy to help improve efficiency. Survival in many different sectors today depends much on the ability to have continuous improvement in quality, while at the same time reduce costs, Sim and Rogers (2008) state. They further explain that the key to success and having sustainable competitive advantage in the market is through resource efficiency, i.e. “producing more with less”, which is a success factor applicable to all sectors in the market. This is what lean is all about.

## 1.1 Problem analysis

The concept of lean is risen from the manufacturing sector, deriving from the Toyota Production System (TPS) held in Japan by Taiichi Ohno in the beginning of the 20<sup>th</sup> century (Womack & Jones, 1996). The concept has since then been developed and improved to further reduce waste and formed towards becoming a philosophy; a way of thinking (Bhasin & Burcher, 2006). The concept was developed from lean to lean thinking by Womack and Jones (1996), since they explained that it was possible to implement lean outside the manufacturing plants as well and into the way workers think and act. As the Lean Enterprise Institute (2016) explains, the concept has reached many new sectors over the last century and is today used as a tool in some instances and as a philosophy in other instances depending on the maturity level of the implementation. This is because lean has proven to be a useful method for continuous improvements that help to identify and reduce or even eliminate waste.

One impactful activity in the retail supply chain involves the central warehouse, where the flow of goods and information is critical for the daily operations to function. According to Myerson (2012) many companies have found its warehouse to be a good place to start an implementation of lean. The concept is, however, still in its early stages in supply chain and logistics, Myerson (2012) continues. The difficulty derives from the fact that user manuals of lean implementations have been well established and adapted for the manufacturing sector, but no real manuals have yet been constructed and developed for warehousing, although there is research upon it. Furthermore, Anvari et al. (2014) state that the selection of lean tools is one of the major challenges since it determines the success or failure in the implementation. Questions can therefore be raised about what tools to use and how to proceed with an implementation of lean in a central warehouse and how to make it work in the longer perspective.

Companies have in various stages of success implemented the concept of lean into warehouses as e.g. Bartholomew (2008) and Chen et al. (2013) show, but the challenge comprise of actually *being* lean, which takes years to become compared to just *believing* to be lean after having implemented only one or a few of many tools available. Lean thinking requires a cultural shift in the organisation where attitudes and communication of the concept is dealt with throughout the entire company, as the cultural aspects are seen as one of the

key success factors for the implementation (Achanga et al., 2006; Arnheiter & Maleyeff, 2005; Melton, 2005). This is, however, one of the main challenges to achieve. The problem therefore often involves the cultural challenges regarding the change. Changing the culture in a company is one of the hardest things to do and it requires that the entire company, from the top all the way to the bottom, is aware of this and works towards the same goals in order to actually accomplish the requested cultural change in the future. The importance includes involving everyone in the process, an effort companies tend not to do, especially when having the top-down approach in management. By involving and informing everyone, the resistance for changes might decrease and the desire of working towards the same outcome becomes easier.

At one point in time, companies are often faced with the need for structural or operational changes due to certain circumstances. Companies that have started off with only a few members or employees often operate with the learning-by-doing philosophy, solving problems as they appear at the moment. Most often they lack management resources and technological competences along with not having standardised documentation of procedures and activities (OECD, 2010; OECD, 2015). This becomes a problem when SMEs grow larger and face the need of structural and operational changes, while at the same time trying to fulfil customers' demands. How do companies change common practices and attitude toward changes? It might be important to inform the reasons behind changes made to everyone in the organisation. That can be a challenge when not done right or in time.

In many sectors, such as retailing and wholesaling, expanding and changing the central warehouse are one of the changes a company often needs to do in order to stay competitive in their industry and sector (Capron, 2015). Lean can be a good strategy to cope with those structural and operational challenges and it has been chosen by many companies as an appropriate means before. But since lean is a concept originated and established for the manufacturing sector, purely copying the lean concept from a manufacturing company into another sector is not a viable option. Changes to the lean concept are required in order for it to fit and be adapted for e.g. a warehouse. There are research showing that this has been possible to accomplish (Bartholomew, 2008; Chen, Cheng, Huang, Wang, Huang & Ting, 2013). Mostly customised concepts have been made for warehouses, but so far the focus has lied within creating general tools and changing peoples' perceptions and whether or not it has been shown to be a competitive advantage in the long run is hard to determine.

Implementing lean thinking into warehouses is nonetheless a challenge since each warehouse is unique in its shape and way of operating. There are many tools within lean to choose from that is trying to eliminate waste and the goal is to find the right tools for the specific warehouse. A shoe company like SHOES.COM handle rectangular boxes of less than a kilogram specifically whereas a retail store chain such as Clas Ohlson needs to handle goods that range from smaller and light weight screws to larger and heavier goods like lawn mowers (see

SHOES.COM, 2015; PostNord, 2014 for a video view). Each company's warehouse is unique, which shows that it is not possible to construct one standard way to implement lean. This is not an easy task and therefore, implementing lean while using the wrong tools can possibly be devastating and instead considered to be a waste of time.

The lean concept has nonetheless shown not to be a waste of time, but rather a success for many different types of companies. But in what ways has it been proven successful and a competitive advantage instead of just wasteful and time consuming? A common and effective way of measuring the success of an operation or activity within a company is with the use of performance measurements. Paramenter (2010) explains that KPIs are used as measures to see performance in both future and current success. It should therefore, be looked upon when the desire is to conduct measurements of a lean implementation to see whether it has contributed to increased competitive advantages or not. This form of measurement has, however, not been given clear instructions on how to measure the connection of KPIs and the lean outcome. Meyer and Waddell (2007) even suggest that other types of methods might be better suited when analysing the lean implementation. Does that mean that lean does not cope well with KPIs? Does that only include hard KPIs, i.e. those easy to quantify? Ingelsson and Mårtensson (2014) argue that such hard measurements cannot value intangible activities such as employee involvement and the understanding of customers, and therefore, soft measures must be taken into consideration as well. How would such soft KPIs look like? And are they really that relevant for measuring lean? Furthermore, is an increased competitive advantage possible to connect with lean and is it possible to actually be so specific to measure if a lean implementation in a central warehouse has been successful?

## **1.2 Purpose and research questions**

The purpose of this study is to investigate a company's initiation process of a lean implementation into their central warehouse. Moreover, to find suitable tools and measures to achieve sustainable competitive advantages as well as the cultural challenges that arise. In order to fulfil the research purpose, the following questions will be discussed:

- *From a central warehouse perspective, what commonly used lean tools are viable for an initiation?*
- *What cultural challenges might arise during the initiation process of a lean implementation?*
- *How is it possible to ensure that an implementation of lean into a central warehouse has contributed to a sustainable competitive advantage?*

The research questions will be answered with the help of a case study of the Swedish electronics peripherals company Kjell&Company, to contribute to the fulfilment of the research purpose.

### **1.3 Delimitations**

Due to the time limit of this project, the study is limited to investigate the central warehouse department at Kjell&Company. Although the concept is only viewed from this point, and questions to whether it is possible to make an investigation that does not include the whole company arise, these boundaries have been necessarily set. The study has, here over, been made from the point where all goods arrive, i.e. the gate of the central warehouse, to where the goods depart, and all the activities partaking within these two points of the central warehouse. All other activities together with other actors have been excluded.

### **1.4 The case study**

Kjell&Company is a Swedish electronic peripherals company founded by Kjell Dahnelius and his three sons Marcus, Mikael and Fredrik Dahnelius in 1988. The company has expanded hugely the last decade and is today in need of structural changes in order to keep up with the increasing demand. Their first physical store was located in Malmö and established in 1990, and in 1992 they handed out their signature catalogue for the first time, which has become a part of the Kjell&Company foundation. In 2007 Kjell&Company decided to move to a bigger central warehouse in Malmö and they also decided to open a central purchasing office in Shanghai to get closer to their Chinese distributors, and during the forthcoming years the company expanded their geographical coverage in Sweden with several new stores. During 2014 the company expanded with 11 new stores and had at the end of the year a total of 83 physical stores, including e-commerce. Their logistics centre in Malmö is 7 000 square meters and contains around 8 000 different products which are both well-known brands and brands of their own. (Kjell, 2016a)

During 2015 the initiative of implementing lean began due to the last decade's rapid expansion, where Kjell&Company went from being a small company with less than 10 stores to almost nine-fold that amount, along with expanding abroad and opening an e-commerce for their Swedish customers (Logistics manager, 2016). The expansion and transformation from an SME to a large company have resulted in that many of the day-to-day activities have become inefficient and contra productive. There have, for example, been a commonality to let the former employee train the new employee their way of running a work station, without standardised instructions on how to run certain operations in detail. There is also a general feeling that although they today count as a large company they see themselves as an SME and operate more in a way like a smaller company does with smaller quantities. This has had a

negative impact, similar to the bullwhip effect (Lee, Padmanabhan & Whang, 1997), meaning that if one small thing happens in one group this often affects another group in a greater scale.

The new logistics manager and the newly appointed lean manager have been assigned to cope with the issues the company has of operating inefficiently as they act smaller than they actually are. This has resulted in that Kjell&Company has a central warehouse that is not suited for their current operations major parts of the year, operations that are required from large companies. Their solution in the logistics department is to implement lean into the central warehouse to cope with this problem. In a later stage of the process the desire is to implement lean throughout the entire organisation. The company has come up with several reasons to why lean should be implemented and some main causes cover a lack of standardised operations and communication between group units. Both the logistics manager and the lean manager see lean as an opportunity to cope with these problems but they also see limitations with the concept. The questions of how to best implement lean into a warehouse, together with the attitudinal changes in the company culture and how to measure the advantages of lean have therefore been sought out.

## 2. THEORETICAL FRAMEWORK

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*The theoretical framework aims at giving the reader a broad knowledge of theories that are of importance for the analysis and conclusion of this study. Lean; its history, the concept of muda and its tools are first presented. Thereafter, the cultural aspects and change management are presented together with definitions of a company's size. Then, a section is given covering performance measurements, including definitions of the concept, efficiency and a presentation of previous practical experiences of lean implementations. The chapter ends with a summary of the literature connected to an analytical model, which has been constructed in line with the research questions.*

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### 2.1 Lean

This section presents the history of lean together with a definition of the Japanese word for waste: muda. Thereafter, some commonly used methods of implementing lean are given and an emphasis on 5s is placed since the observed company of this study emphasises on the tool.

#### 2.1.1 The history of lean

“Any customer can have a car painted any colour that he wants so long as it is black” (Chiarini, 2013) is a well-known sentence, which simply explains and define Henry Ford’s view of mass production in the beginning of the 19<sup>th</sup> century. Henry Ford has also come to be seen as the one who invented the assembly line (Liker, 2009). Womack et al. (1991) mention Ford’s key success to the mass production as to be the moving and continuous assembly line, but further argue that it rather is the simplicity of attaching the consistent interchangeability parts that are his key to success. The problem over time in the Ford manufacturing process was the inability to deliver variety, meaning requirements in both colour and specifications regarding the cars, which lead to the fact that every car looked the same (Lean Enterprise Institute, 2016).

Henry Ford’s moving assembly line came to be the foundation on what later on was going to be recognised as the “Toyota Production System” (TPS) in Japan (Abdulmalek, Rajgopal & Needy, 2006). It is today more generally known as “lean”, a concept that was later on introduced by Womack et al. (1991). World War II hit Japan hard and led to a great economic downturn and there were lack of both human and financial resources as well as material (Sörqvist, 2003; Abdulmalek, Rajgopal & Needy, 2006; Womack, Jones & Roos, 1991). The Japanese people quickly realised that their products lacked quality, an important factor to have in order to export products, and therefore searched desperately for methods increasing quality again (Sörqvist, 2003). The Toyota Motor Corporation also quickly realised that quality improvements needed to be made and due to the success factors they managed to accomplish in the West, Toyota’s leaders, among them Taiichi Ohno and Eiji Toyoda, went to Ford’s plants

to study their way of working (Dahlgaard & Mi Dahlgaard-Park, 2006; Liker, 2009; Womack, Jones & Roos, 1991; Sörqvist, 2003).

According to Sugimori et al. (1977), there were two distinct things they realised at Toyota Motor Corporation, which later came to be recognised as the foundation of the TPS concept. The importance of having high quality of products while at the same time have lower production costs and, in addition to that, realise that Japanese industries have their workers displaying their capabilities to the utmost (Sugimori, Kusunoki, Cho & Uchokawa, 1977).

Taiichi Ohno, Toyota's chief production engineer, quickly realised that Ford's way of working was preferable, but it did not fit their strategy and therefore Ohno developed his own approach with Ford's basics (Womack, Jones & Roos, 1991). In comparison to Ford's mass production of a few models on one assembly line, Toyota needed to find a way to create small quantities of different models on one line (Liker, 2009). Toyota's success with the TPS was mainly through the philosophy and thinking that standardised work together with visual steering and an even and balanced product load would help prioritise the important processes and focus on quality (Sörqvist, 2003). Liker (2009) quote Taiichi Ohno as to have said that:

*The only thing we do is to look at how long it takes from the moment the customer gives us the order to the point where we get the money. We simply shorten this period by reducing things that do not add value [...].*

This is a general definition of what lean is all about.

Sugimori et al. (1997) explain TPS as to have two basic concepts where the first one is to reduce costs through elimination of waste, which is further explained with the help of the two concepts just-in-time (JIT) and Jidoka. JIT (see section 2.1.3) helps eliminating time, which becomes a cost, while Jidoka (see section 2.1.3) is a system which makes it easier to prevent making too much of something and also to control and detect potential abnormalities quickly (Sugimori, Kusunoki, Cho & Uchokawa, 1977). The second concept is the full utilisation of workers' capabilities. The authors mean that you minimise the movement of workers, consider the workers' safety and give them responsibility and have confidence in each worker. Melton (2005) explains that Taiichi Ohno kept developing the TPS for a long time and got extensive help of the technological development during this period, and by the time of 1980s Toyota was considered to be lean both in its supply base but also in their distribution.

Womack et al. (1991) defines the entire development from mass production to lean production done by Toyota in their book *The machine that changed the world*, a book which has come to be the foundation of lean production. Lean production is according to Womack et al. (1991) characterised by teamwork, communication and using resources efficiently,

meaning that the focus is on reducing waste. Womack and Jones (1996) use the idea of their definition of lean production as to use outside the “machine” (by “machine” they mean the manufacturing process) and developed the concept called lean thinking, which is more about seeing lean as a way of thinking together with a way of working.

Adapting and implementing lean and lean thinking into a corporation is time consuming and not always successful (Bhasin & Burcher, 2006). In order for a corporation to fully utilise the benefits of lean, all systems and departments within the corporation need to change as well (Hancock & Zaycko, 1998). Bhasin and Burcher (2006) explain that lean needs to be seen as a journey for the entire corporation and applied in that way the corporation lives and breathes lean in all of its aspects. Furthermore, lean thinking is not a process but rather something that needs to be worked with throughout the entire chain in a corporation, lean thinking has also transformed into a philosophy or concept.

### **2.1.2 Muda**

The main focus of lean is to reduce muda, the Japanese word for waste, while at the same time maximise and utilise the value-adding activities (Womack & Jones, 1996; Abdulmalek, Rajgopal & Needy, 2006). Muda is, easily explained, anything that does not add value (Kasul & Motwani, 1997). Dahlgaard and Mi Dahlgaard-Park (2006) explain that muda has been concluded to be everywhere and it is also something that has become more and more important over time to consider. Taiichi Ohno defined seven deadly wastes that exist in the manufacturing systems (Hicks, 2007; Melton, 2005; Womack & Jones, 1996; Liker, 2009; Kasul & Motwani, 1997) and those are:

1. *Overproduction* – operations continue even after they should have ceased and this leads to an increase in inventory.
2. *Waiting* – inactivity and queuing for the next step in the process.
3. *Transport* – unnecessary motion and movement of materials.
4. *Extra processing* – redoing work or handling storage due to overproduction or defects.
5. *Inventory* – everything in stock that is not there to fulfil a current customer order.
6. *Motion* – extra steps that are needed to be done by workers and equipment.
7. *Defects* – products and finished goods that do not hold the expected quality and standard, leading to customer dissatisfaction.

Womack and Jones (1996) explain that lean thinking is a concept that can be seen as an antidote to muda since it is a way to do more with less, both less human effort and less equipment. Harrison et al. (2014) describe the concept as a cyclical route seeking perfection by eliminating waste where four key principles are involved in achieving the fifth (see figure 1). The five key principles are presented by Womack and Jones (1996) and those are:



1. *Specify value* – the value is created by the producer but is defined by the ultimate customer, and therefore, specifying the value correctly is critical.
2. *Identify value streams* – identifies the entire value stream for each product or product family and almost always expose much muda. Type I muda are steps that do not create value, but is unavoidable not to use since it is needed to proceed and type II muda are steps that are found directly and can be avoided.
3. *Flow* – is concerned with making the remaining steps that create value to flow.
4. *Pull* – makes it possible to provide what the customer wants only when the customer actually wants it. Pulling the product through the value chain instead of pushing it.
5. *Perfection* – the four previous principals interact and need to be redone over and over again, and therefore, to pursue perfection continuously is needed since waste is constantly uncovered and in need of elimination.

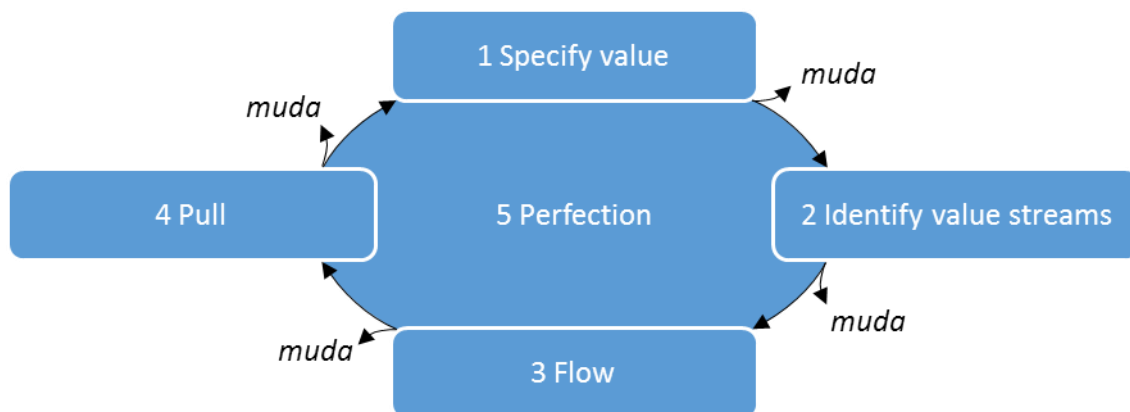


Figure 1: The key principles of lean thinking. (Modified after Harrison, van Hoek & Skipworth, 2014)

Eliminating muda is what lean is mainly all about (Melton, 2005). To be able to reduce and eliminate muda many different tools within the lean concepts have been developed, which in different ways can be helpful in order to achieve this (Abdulmalek, Rajgopal & Needy, 2006).

### 2.1.3 Lean tools

Within lean thinking there are a variety of philosophies, principles, methods and tools used to develop and guide the organisation to its future goals and eliminate waste (Sörqvist, 2013). For simplicity, those definitions have been bundled and referred to as *tools* when mentioned alone and all together. As Abdulmalek et al. (2006) mention, the challenge today is to adapt the ideas behind lean manufacturing for implementation in the situational environment. Instead of implementing lean in the manufacturing environment, the situational environment could concern warehousing for example. Abdulmalek et al. (2006) further suggest various lean techniques that can be used. As they put it, lean can best be explained by examining its distinct tools to pinpoint the major sources of waste and guide them through the optimal actions to eliminate waste. Anvari et al. (2014) mention that the selection of lean tools is one of the

major challenges companies need to make since this is the most important factor in the success or failure of the implementation. The selection is thus a critical factor and without the implementation of the proper tool, a high utilisation of lean cannot be achieved. According to them, “the lean tools selection is a multi-criteria decision making problem that involves subjective value judgements”. Sörqvist (2013) raises a concern with companies' choices of many of the tools being adopted under the influence of a current short term trend as history have previously shown. That does not mean that there are deficits within the concept of a tool, they all create value in their own way, but rather that companies have chosen their tools for faulty reasons and on less prudent ways (Sörqvist, 2013). Some argue that there is confusion to what actually separate certain tools from each other. As an example, Dahlgard and Mi Dahlgard-Park (2006) prove that the lean production concept and the Six Sigma steps are essentially the same and that both views have been developed from the same root, namely the Total Quality Management (TQM) practices. Figure 2 summarises some of the most common tools that appear when looking upon the concept of lean. These tools will be presented, but for a detailed depiction of these tools, other references specialised on the specific subject are recommended.

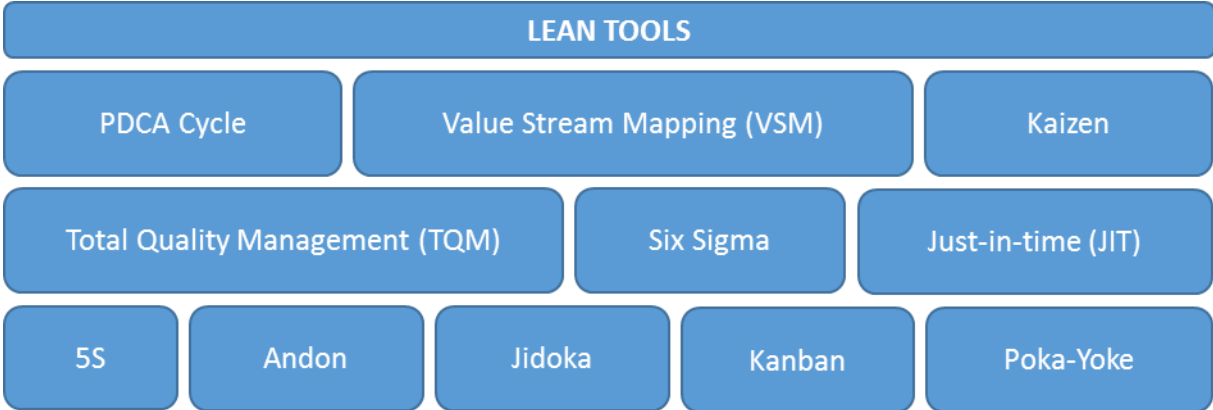


Figure 2: Summary of the mentioned tools to use when implementing lean.

*PDCA Cycle* – This is a quality control concept originated from Shewhart in the 1920s and later developed by Deming named the Plan-Do-Check-Act (PDCA) problem solving cycle (Womack & Jones, 1996; Sörqvist, 2013). Since lean is nothing a firm can implement and be done with, tools that describe the path towards lean, such as this one, are often used. The PDCA Cycle, shown in figure 3, describes a cyclical pattern to perform continuous improvement and make systematic changes for the control of processes and products (Sörqvist, 2013).

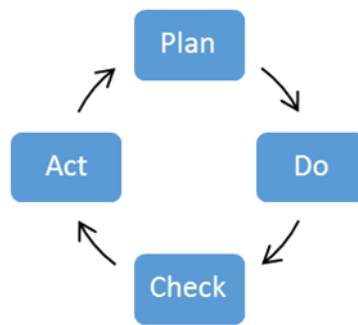


Figure 3: The PDCA cycle. (Modified after Sörqvist, 2013)

*Value Stream Mapping (VSM)* – The tool originates from Toyota and is there known as “Material and Information Flow Mapping”. It is used to depict current and future states in the process of developing implementation plans to install lean systems (Rother & Shook, 2003). Womack and Jones (1996) define the value stream as "a set of all the specific actions required to bring a specific product through the three critical management tasks of any business". These include the problem-solving task, the information management task, and the physical transformation task (Womack & Jones, 1996). These tasks consist of measuring, understanding and improving a flow and also important is to understand how all the exhaustive work activities interact to keep the company's costs, service and quality competitive by removing non-value added tasks known as waste (Keyte & Locher, 2008).

*Kaizen* – This is the Japanese word for *continuous improvement* and it is the process of making value-added improvements regardless of how small the improvements are to reach the goal of the lean concept to remove all waste that increase costs with no increased value to the customer (Liker, 2009). A company can launch quick and intensive improvement projects with the help of Kaizen workshops (Chiarini, 2013). These workshops teach smaller groups to work with problem solving efficiently, document and improve processes, gather and analyse data as well as practice self-directedness (Liker, 2009).

*Total Quality Management (TQM)* – This management philosophy is aimed at achieving high customer satisfaction through high quality by influencing a company culture and let all employees actively participate with continuous improvement efforts (Abdulmalek, Rajgopal & Needy, 2006; Dahlgaard & Mi Dahlgaard-Park, 2006). It arose from the Total Quality Control that had its heritage from tools like the PDCA Cycle and the seven quality tools when Japanese firms in the 1950s were experimenting with early forms of policy deployment and the management of quality improvement for each process in their company (Womack & Jones, 1996).

*Six Sigma* – Introduced in 1986 by Smith who was an employee at Motorola (Motorola, 2016). The concept standardised the way defects are counted and the desire is to produce products and services with no more than 3,4 defects per one million outputs (Liker, 2008). The term sigma comes from the mean of a process that has been divided into six deviations (named

sigma) and the more sigma that can be reached, the lower the probability is that defects occur (Tennant, 2001). The process was developed and implemented first in manufacturing and later adapted to the non-manufacturing areas of the company (Dahlgaard & Mi Dahlgaard-Park, 2006). It has since been further developed to being a complete improvement program with integrated tools derived from the lean concept (Sörqvist, 2013). Six Sigma is by some even seen as an extension of TQM (Liker, 2008).

*Just-In-Time (JIT)* – Arose at Toyota in the 1950s by Taiichi Ohno from the TPS method, designed to facilitate smooth flow within production to later include reducing the response times from suppliers (Womack & Jones, 1996; Liker 2009). With set principles, tools and techniques a company can produce and deliver products in small batches with short lead times (Liker, 2009). The characteristics of JIT is of a pull system, meaning that parts are pulled through the whole logistics chain only when demand from end-customers arise. The contrary of a pull system is a push system where parts are pushed to the end-customer whenever resources are available or there is a plan or schedule to meet (Harrison, van Hoek & Skipworth, 2014).

*5S* – This is a basic tool inherited from the TPS. The term derives from five Japanese words of practices with the aim to eliminate waste and create value through a systematic approach and attention to details. All unnecessary items are removed and every tool has a clearly marked storage place that is visible on the work area. (Womack & Jones, 1996) This tool will be further explained in section 2.1.4. below, with the reason being that the company of research has chosen this tool for their implementation.

Other tools that are often referred to and associated with lean thinking are for example; *andon*, a visual control device that displays certain status indicators of quality; *jidoka*, a method to automate detection of failure onto machinery instead of having human intelligence (workers) overlook every step at workstations; *kanban*, a scheduling system to control inventory levels so that suppliers for example know when to deliver more batches; and *poka-yoke*, a Japanese word translated as “mistake proof”, meaning that work or workstations must be rigorously standardised so that employees and machines can monitor their own work which makes it impossible for a defective part to be sent to the next step in a process. (Womack & Jones, 1996)

#### **2.1.4 5S**

Chiarini (2013) mentions that the tool named 5S is applied in a corporation to obtain and maintain order and cleanliness at the workplace. Chiarini (2013) further recommends companies to start off with this tool as it focuses on these matters. The company of study has chosen to use 5S and therefore, a closer explanation of this tool is given.

The aim of 5S is to embed the values of organisation, cleaning, standardisation, neatness and the discipline into the workplace (Gapp, Fisher & Kobayashi, 2008). 5S was from the beginning made for fitting the manufacturing sector, but have extended to other service sectors and industries, as Gapp et al. (2008) explain. By using this visual steering tool waste, which has been hidden due to previous lack of structuring, is recognised and can be eliminated (Liker, 2008). It is further explained that by implementing 5S, potential waste is found and the process stands for a continuous improvement of the working environment.

5S is based on the acronyms in Japanese as *seiri*, *seiton*, *seiso*, *seiketsu* and *shitsuke* (Liker, 2008; Gapp, Fisher & Kobayashi, 2008; Chiarini, 2013). What follows is an explanation of what the five concepts are and stand for (Liker, 2008; Chiarini, 2013). Figure 4 below also shows how the 5S tool is an ongoing process:

1. *Seiri* means to sort. It is about choosing those activities within a process that are useful and separate them from the useless ones. Therefore, the main thing in the first step is to choose and separate.
2. *Seiton* means to structure, set in order, or tidy up. This means that you tie up everything to its right place and mark their place if necessary, to make is easier and quicker when workers need to find a specific tool or similar.
3. *Seiso* means to shine and clean up. The basic thing in this step is to keep all areas clean.
4. *Seiketsu* means to standardise. Simple and easy-to-follow instructions are created to make the work easier for both supervisors and workers. The instructions and rules are created in order to maintain the previous three concepts.
5. *Shitsuke* means to sustain, create a routine. This is about making sure that all the other steps are followed and that the newly structured workplace is held to its concepts.

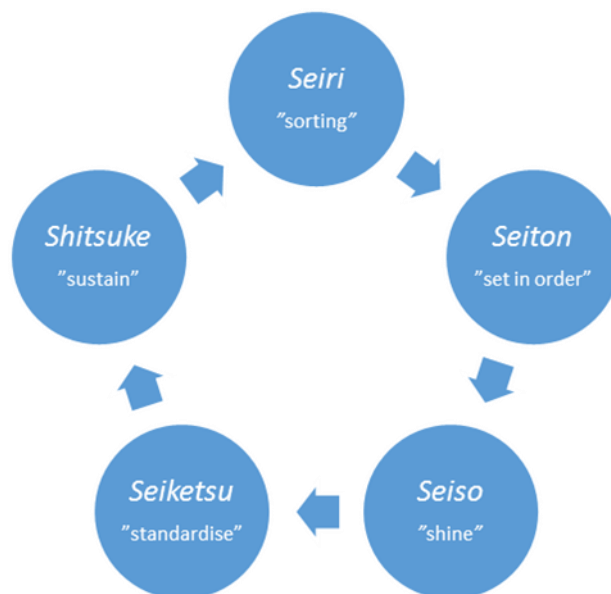


Figure 4: The 5S method. (Modified after Liker, 2009)

Gapp et al. (2008) explain the importance of 5S and the fact that it can reveal hidden problems, which might otherwise never have been discovered. They further explain that increased morale and organisational resilience is often an outcome of when 5S has been fully understood and implemented in its right way. When in need of continuous improvements this tool is a good way of starting, as was previously mentioned by Chiarini (2013) and in addition clarifies that it is first after the basics of 5S are implemented that other tools should be used. Liker (2008) does, however, highlight that companies in the past have decided to “become lean” and implemented 5S as a tool and after that considered themselves lean. But that has been the end of it. Lean goes further than just 5S, Liker (2008) explains, and a company is not lean only by implementing 5S. Misapplications of tools and the long process makes it difficult to become lean (Pavnaskar, Gershenson & Jambekar, 2003).

## **2.2 Culture and change management**

In this section the cultural aspects are taken into consideration, the importance of change management, the challenges with an implementation and change with something new, which is highly relevant for the subject of lean. But in order to do this, and to further analyse the subject in the following sections, a definition of the different sizes of a company needs to be clarified.

### **2.2.1 Small, medium and large sized companies**

Many companies have started off by being a smaller company that has grown bigger and bigger. According to the European Commission (2005) small and medium sized enterprises (SMEs) are the engine of the European economy and an essential source of jobs, entrepreneurship and innovation, and to foster competitiveness and employment. The definition of an SME is according to them firms that meet the following criteria (European Commission, 2005):

*The category of micro, small and medium sized enterprises (SMEs) is made up of enterprises which employ fewer than 250 persons and which have an annual turnover not exceeding 50 million euro, and/or an annual balance sheet total not exceeding 43 million euro.*

Successful SMEs will most likely grow larger and at one point overcome one or several of the criteria above. To cite Statistics Sweden (2010) who already use the above criteria, they mention that:

*The remaining group is classified as large companies.*

The same criteria and simple definition will be used here.

There are many reasons to why a company succeeds in becoming larger. Eggers et al. (2013) argue that the transformation a company undergoes in becoming larger and larger is an unsolved puzzle in management and business research. The authors do, however, continue to argue that understanding the effects of the decisions that have been made by the management is crucial and highly relevant, because such strategic decisions have the potential to influence the company's performance ahead. As a company grows larger, it must adapt to the new circumstances. Rymaszewska (2014) argues that SMEs frequently face the challenge of insufficient knowledge, even such methods that have been in use for years. This is especially in the case of family owned companies where they hold all the managerial responsibilities.

The choice of implementing an improvement initiative like lean is one such challenge which is mentioned above, but that does not go without advantages as well. Some of the advantages included are the ability to have involvement from the top management in the day-to-day operations, have informal structure and culture which increase cross-functional exchanges and have smaller teams that aid in efficient decision making (Dora, Kumar & Gellynck, 2016).

Egels-Zandén (2015) explains that SMEs have greater opportunities than large companies to try out new strategies that are bold and potentially seen as high risk projects. In other words, being innovative because they are often not as tied up by partners or media as large companies are. If large companies' innovative approach backfire their relational partners could withdraw and the media would possibly publish a damaging story to the public. Still, Dora et al. (2016) mention that SMEs also have multiple challenges or disadvantages that concern lack of resources, lack of training, lack of having long-term planning, shortage of staff and lack of having resources for major consulting (Dora, Kumar & Gellynck, 2016). Meaning that being an SME is not totally without disadvantages and challenges.

Hu et al. (2015) argue that initiatives that could be used to support a lean implementation, such as a well-developed KPI system, is a potential disadvantage of SMEs that may not have had this kind of figures before, and for that reason cannot support such a decision. Developing or having such a system may result in the contrary.

### **2.2.2 Culture**

Schein (2010) explains organisational culture to concern three different levels: assumptions, values and artefacts. This means that assumptions are things that are taken for granted to be in a specific way, values are about the social principles and philosophies, and artefacts are the visible and tangible results of the activities made through and grounded in the values and the assumptions. But crafting an organisational culture that push lean concepts forward is a hefty challenge, yet it has the potential to yield the greatest return on investment (H.O.W, 2009).

According to Liker (2009), managers are crucial for the outcome of implementing lean and Sörqvist (2013) mentions that a successful lean project presumes an employee participation that is based on commitment, responsibility, team work and a strong will to develop and improve. This is because the whole organisation and its different processes are comprised by the employees. The manager's role is to change the culture within the company and that is made by being involved in the work of identifying waste and conducting e.g. a VSM (Liker, 2004). The importance to highlight people around the lean concept is vital since they make the operation (Sörqvist, 2013).

Any implementation process of improvements can create insecurity among employees, especially when transformations to the working processes occur and thoughts or fear of losing one's job might then negatively impact the mind or attitude. It is thus important that the lean implementation is planned and driven from an employee perspective where suggestions and ideas can be handed by them through constant involvement. Participation, education, communication and equitable bonus- and wage system are impactful components for the perceived safety and motivational sense among employees. (Sörqvist, 2013)

Womack et al. (1991) claim that lean is by far the ultimate and best way of producing and making things. But over the years there have been concerns regarding to whether lean is good to use or not and whether it is possible to implement in every type of organisation or not. Sörqvist (2013) mentions that, in order to implement lean, there has to be a well-developed leadership, which is not always the case. Wangwacharakul et al. (2014) state that implementing and working toward lean takes longer than expected and Sörqvist (2013) highlights stubbornness, engagement and long term perspective as needed standpoints when even considering implementing lean. That is also why a democratic leadership is of utmost importance.

Negative aspects of lean have been considered as well, as Womack et al. (1991) further present. They mention that arguments have been made that lean production can be seen as worse than mass production, which on an analogy basically just see the worker as a machine. The authors do, however, think that this is not the case if lean is conducted in the proper way. It is nonetheless a concern that people have and it can therefore be seen as negative for the development of lean.

Samuel (2013) mentions the fact that lean has a stressful impact on the workers. Conti et al. (2006) further highlight the fact that working with a lean approach means, in many cases, that there is a big load put on the workers. They also mention the fact that lean often means making the operations autonomic and monotonic and that the work pace is strict, which in turn contributes to a stressful environment. Sörqvist (2013) notes that with lean comes changes in the culture of the corporation and whether this is good or bad is on an individual level. Another thing often circling around the concept and the word lean is that it is connected



to layoffs in companies, due to the fact that the work becomes more autonomic and monotonic and the workers do not seem needed in the same amount as before (Arnheiter & Maleyeff, 2005).

### 2.2.3 Change management

The historical perspective of change and change management can be traced all the way back to the construction of the Cheops pyramid in Egypt, where values and norms of the workers' behaviour can be found (Dawson, 2003). During the end of the 19<sup>th</sup> century the principle of scientific management, also known as Taylorism, rose and the main pillar concerning this was to find the best possible way to work and perform the operations, train and also develop the workers (Taylor, 1911). Although Taylorism has become an important part of theory, there are still debates of whether human relations are taken into consideration or not in the concept (Dawson, 2003). Therefore, a well-known study was conducted in the 1950s at an American company where the studies showed that there were great benefits of having a democratic leadership and using the employees in the decision-making (Roethlisberger & Dickson, 2003). This contributed to incentives to the notions of why to work and why to follow.

Phillips (1983) developed a change management model consisting of four phases, that gives a clear picture of the different steps an organisation needs to go through in order to succeed with a change. The four phases are shown below in figure 5:



Figure 5: Change management model. (Modified after Phillips, 1983)

When the intention is to change and reorganise individuals, teams or the entire organisation, Phillips (1983) suggested three critical components to successfully changing an organisation. A *new strategic vision* needs to be developed and with a new vision often *new capabilities* are needed within the organisation, while at the same time *support for the change* needs to come from the entire organisation in order to make it happen (Phillips, 1983).

Coping with change is individual and can be done in many different ways. One of the ways and models which can be used is the model created by Deming named the PDCA Cycle (see section 2.1.3). A model which in some way is similar to Phillips' (1983) phases, since it involves systematic changes and constant controls for continuous improvements (Sörqvist, 2013).

There are, however, more aspects related to the concept of change than just finding new ways of working and organising (Dawson, 2003). Dawson (2003) mentions the importance of not only looking towards quantity, but also put effort into quality and this could possibly be done

with the help of the tool named JIT. Some of the key reasons to why a structural or organisational change does not work is mainly due to lack of sustained management support over a longer time and the commitment and engagement from employees (David & Foray, 2016). In order for a change to become reality, these aspects are crucial to consider since the entire organisation needs to cooperate towards the same goal, something that can be directly related to a lean implementation (Womack & Jones, 1996).

What have been shown by multiple authors and scientists in the literature is that people resist change (Dent & Goldberg, 1999; Phillips, 1983; Thomas & Hardy, 2011; Watson, 1971). Dent and Goldberg (1999) argue that people do not resist change in the sense that is often explained in the literature. They rather argue that, what people resist with a change, is the loss of status, loss of comfort or loss of pay and not the actual change per se. Thomas and Hardy (2011) highlight the importance of change and that it is something organisations are constantly working with and need in order to keep up with the globalisation. Change is always needed, but how to cope with change for the management is individual for each organisation.

## **2.3 Performance measurements**

Different performance measurements are presented with an emphasis on KPIs and their definition. Then, a section covering efficiency as a competitive advantage is presented, followed by a discussion on how to measure lean in general with examples of companies' choices on how to measure lean.

### **2.3.1 Key performance indicators**

Performance measures and KPIs are two concepts very similar to each other. Paramenter (2010) explains the different types of performance measurements as to be of four categories:

1. *KRIs* – Key Result Indicators that are used to explain what have been done on a perspective or critical success factor.
2. *RIs* – Result Indicators that explain what has been done.
3. *PIs* – Performance Indicators tells or give information of what to do.
4. *KPIs* – as mentioned, Key Performance Indicators explain what to do to increase the performance dramatically.

KPIs have been used for a long time and Paramenter (2010) defines them as:

*KPIs represent a set of measures focusing on those aspects of organisational performance that are the most critical for the current and future success of the organisation.*

Lindberg et al. (2015) explain that KPIs are mainly used in the aspect of measuring the performance in a company and at the same time it is a way of identifying waste. They further explain that often the main reason for low performance is due to waste in different forms. Paramenter (2010) have done a lot of research on KPIs and come to the conclusion that KPIs have seven characteristics:

1. Nonfinancial measures.
2. Measured frequently.
3. Acted on by the CEO and senior management team.
4. Clearly indicate what action is required by staff.
5. Measures that tie responsibility down to a team.
6. Have significant impact.
7. Encourage appropriate action.

These characteristics and the above definition of a KPI will hence be used and referred to.

### **2.3.2 Efficiency**

Efficiency is one of the five distinct movements companies compete with, as was mentioned before, and the purpose is to form an organisation in a way that it uses the least amount of wasted time, labour and materials (Favaro, 2015). Since the global economy is ever growing it has become vital for companies to both establish and constantly strive towards increasing sustainable competitive advantages (Sim & Rogers, 2008). Working towards becoming more efficient can, therefore, be favourable for organisations. Ax et al. (2015) present their view on efficiency:

*The term efficiency is defined as degree of target achievement.*

It is an expression for the extent a company has achieved a goal. The degree may be set as a certain measurement and the target achievement is then the set goal decided by managers. Meanwhile, the Lean Enterprise Institute (2016) defines efficiency as:

*Meeting exact customer requirements with the minimum amount of resources.*

Depending on what view is taken, efficiency may be labelled differently, but the goals set are always dependent on the focal point. For example, Hu et al. (2015) provide their view of efficiency as to focus on improving quality and/or productivity or to reduce waste and/or costs in conjunction with considering lean aspects. In order to stay competitive and increase the competitive advantages Sim and Rogers (2008) highlight the importance of constantly working

with continuous improvements, also known as Kaizen, which was a one of the lean tools Liker (2009) mentioned.

The concept of lean and efficiency are interrelated. Lean is about becoming more efficient in order to increase its competitive advantages, by eliminating waste and utilise the value-adding activities (Abdulmalek, Rajgopal & Needy, 2006). The process of increasing efficiency is directly connected to the five key principles identified by Womack and Jones (1996), which can be seen in figure 1. Bevilacqua et al. (2014) explain that a good tool to use to strengthen the competitive advantage, is with the help of the VSM tool. It focuses on eliminating waste on several areas, which result in more efficient processes. From a lean perspective, elimination of waste is becoming more efficient.

For this study there are two different aspects of efficiency that are taken into consideration: resource efficiency, and flow efficiency. Resource efficiency, a term defined as producing more with less by Sim and Rogers (2008), is also mentioned by Womack et al. (1991) as to be one of the main characteristics of lean production. Flow efficiency, on the other hand, is not about increasing the speed of the value-adding activities. Rather, it emphasizes on maximising the concentration of value transfer and the elimination of non-value-added activities (Modig & Åhlström, 2012).

### **2.3.3 Measuring lean**

Chiarini (2013) writes that one of the main principles of lean is to solve a problem directly when it occurs instead of postponing it. This is made possible when having access to key indicators. It is also important when adopting the values of lean to design a measurement system that reflects the initiatives taken (Ingelsson & Mårtensson, 2014). Furthermore, the indicators should be shared within the organisation, easy to measure, and measurable in real time (Chiarini, 2013). Bhasin (2008) thinks similarly but emphasises that the benefits of lean are very difficult to quantify and measure. It is further mentioned that determining performance measures is known to be challenging and that it is of great importance that the managers dwell on the cause-and-effect relationship strategy, since it is needed to link the measurement to the strategy. Consequently, Bhasin (2008) mentions that perhaps the best measure in tracking lean progress is through a total product cycle time that can be logged through a scorecard approach.

A list of common lean KPIs can be found in appendix 1 that are most used in the manufacturing sector of lean organisations. Indicators such as turnover, on-time delivery, lead time, process cycle efficiency, waste etc. are found to be valid lean metrics (Chiarini, 2013). The performance measurement indicators that can be used from e.g. the 5S tool are according to Chiarini (2013) reflected by productivity, amount of space gained, defects, WIP/Lead time, and accidents and injuries. An important note is Bhasin's (2008) conclusion that a variety of

performance measures are required to accurately assess whether an organisation has successfully adopted lean or not. According to Ingelsson and Mårtensson (2014), measurements of organisational success have mostly been focused on financial results and hard measurements despite the fact that cultural changes have been pointed out as an important factor for successfully implementing lean. With that they state that the use of soft measures in the analysis of a lean progress can be used in monitoring cultural change and other qualitative aspects. While tangible benefits of a lean implementation are well suited in the manufacturing sector it is not always as clear in other sectors and therefore the use of soft measurements can be beneficial indicators for measuring intangible factors. Those include for example a better understanding of customers, cross-team synergies, and a rise in employee motivation and morale (Ingelsson & Mårtensson, 2014).

Marr (2013) suggests that there are really only four KPIs that need attention, and those include: customer satisfaction, internal process quality, employee satisfaction and financial performance index. In the example of the 5S tool above, Chiarini (2013) states that due to its focus on order and cleanliness, the tool immediately helps reduce activity time at workstations, free up space, improve ergonomics, and safety. These contributions will ultimately result in increased employee satisfaction, Chiarini (2013) continues.

The example given of the 5S tool shows that both hard KPIs and soft KPIs are relevant for evaluating an implementation of a tool. Kollberg et al. (2006), who studied the implementation of lean in a hospital environment, concluded that apart from measuring KPIs connected to the lean principles, i.e. hard KPIs, a company must – in order to fully capture the lean changes – include KPIs that reflect upon satisfaction (both customer and employee) and referral management etc. Concluded is therefore, that soft KPIs need to be used as well.

Looking at some practical experiences of lean adoption show that more than one measurement is used to measure the implementation as is suggested by Bhasin (2008). Also, many of the KPIs mentioned by Chiarini (2013) are used. These few practical experiences are presented below to show what type of KPIs were relevant in *their* measuring of lean. A clarification of definitions to the presented KPIs can be found in appendix 2. For detailed description of these measurements, a referral to other literature is suggested.

Bartholomew's (2008) article on the organisation Menlo Logistics specifically mention a lean implementation into warehouses and they use the KPIs from table 1 for measuring lean.

Table 1: KPIs used by Bartholomew (2008) for measuring lean.

KPI:
Productivity improvement
Picking error reduction
Inventory accuracy
Safety (lost-time accidents reduced)
Warehouse space saved

Bartholomew (2008) explains that there is no “one size fits all” process of implementing lean into warehouses and one of the key principles of lean is to go out on the floor and follow a part or process. The company do however use VSM and monthly kaizen events on each warehouse, that is later complemented with tools like 5S.

Chen et al. (2013) show in their study that the efficiency of warehouse management can be improved with lean implementation as the total operation time in their observed distribution centre was reduced by 79 %. They used the KPIs found in table 2 as presented measurements with the help of VSM of current and future state.

Table 2: KPIs used by Chen et al. (2013) for measuring lean.

KPI:
Waiting time
Unnecessary operator moving time

Myerson (2012) analyses how lean tools can work well in a warehouse and finds that 5S, VSM, team building (kaizen), problem solving and error proofing, Kanban’s/pull systems, line balancing and cellular applications, and general waste reduction are all applicable. Myerson (2012) continues with mentioning what KPIs to keep track on and those are given in table 3.

Table 3: KPIs used by Myerson (2012) for measuring lean.

KPI:
Shipment accuracy
Inventory accuracy
Order fill rates
Order cycle times
Budget performance

The first four KPIs are also measures of waste and the KPIs should be tracked on a monthly basis (Myerson, 2012).

Cantone (2012) from Georgia Tech Supply Chain & Logistics Institute holds webinars on lean warehousing and the emphasis lies on measuring a lean implementation with the KPIs found in table 4.

Table 4: KPIs used by Cantone (2012) for measuring lean.

KPI:
Lead time reduction
Headcount reduction
WIP reduction
Space reduction

More practical experiences have been found but to limit the scope of this study the examples above help indicate what measurements are commonly used and associated with measuring a lean implementation of a warehouse.

## 2.4 Summary of the literature

Three main areas have been identified within the literature in order to fulfil the purpose of this study. The three areas include the concept of lean thinking, cultural challenges within changing companies, and performance measurements used. The areas are summarised in the model shown in figure 6.

From the lean thinking area different tools have been identified to suit the retailing sector in general and warehousing in detail. There is a great deal of literature within lean, and much focus today lies on the manufacturing and service sector. Studies on the implementation of lean into warehouses have been made as well, but they are fewer and there was therefore a need to identify many different tools within the concept in order to see whether or not they could be applicable for Kjell&Company. They started off as a family business and still consider themselves to be an SME, even though they fall into the definition of a large company. Their company culture has had to adapt thereafter and due to that occurrence, this area of literature was relevant to study to find possible challenges within changing their current cultural principles. The performance measurements area contains general knowledge of measurements in order to understand the development of one's actions of decisions, the importance of efficiency and the connection with competitive advantages, and the mix of hard and soft measurements together with previous studies made on lean implementations into warehouses.

The interconnection between the size of the company and lean is that when a company grows they are in need of both structural and operational changes and lean has been chosen as the appropriate concept to cope with these changes. Further, to show whether lean is successful

or not, relevant performance measurements must be found and applied correctly in order to fulfil the research purpose. Finally, Kjell&Company has the desire to measure the success of their lean implementation and this will be done through performance measurements.

With the combination of these three areas a company will be able to hedge themselves against lean implementation failures, as well as increase their control through the results of the measurements, together with eliminating waste and avoiding complexity.

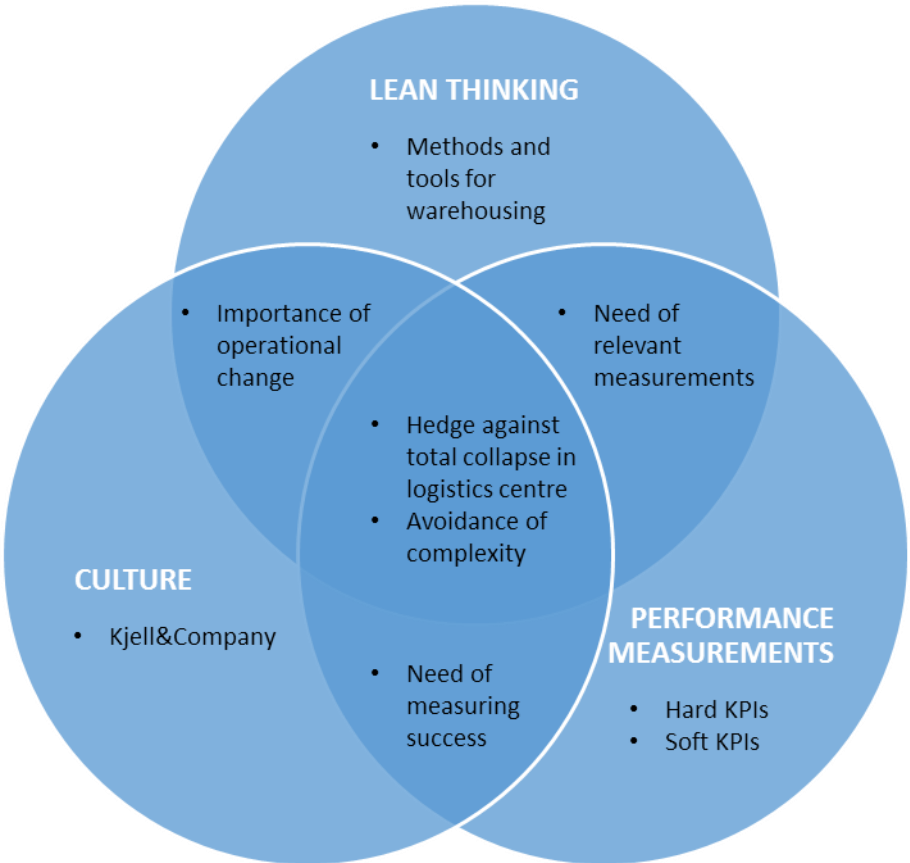


Figure 6: Own analytical model recreation of the literature review. (Inspiration taken from Maguire, 2016)

The three main areas all try to cover specific subareas on relevant theory that can possibly answer each of the three research questions presented in section 1.2 together with the empirical material gathered from Kjell&Company found in chapter 4. Lean thinking falls under the first research question in finding commonly used lean tools for an initiation; the second area covering culture tries to answer the second research questions concerning cultural challenges; the performance measurements area opts to guide in answering the last research question on how to ensure a positive contribution of a lean implementation. Figure 6 can thus be seen as an analytical model to help answer the research questions.



### 3. METHODOLOGY

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*This chapter starts with presenting the strategy of the research followed by the research design, explaining the detailed plan and how the research have been conducted. Thereafter, the reason for selecting the case of Kjell&Company is explained and subsequently the research method is presented, showing how the data has been collected and analysed. The chapter ends with a look into how the research is evaluated regarding quality of the study.*

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#### 3.1 Research strategy

The lean concept is a way of thinking or a sort of philosophy and to be able to grasp as much as possible of this intangible concept the gathering of data has been taken from multiple sources so that a deeper understanding of the concept can be attained.

As research until the 19<sup>th</sup> century had focused on the physical world, conducting objective experiments and observations under the positivism paradigm terminology, the industrialisation era brought the attention towards social phenomena, giving interest on people and their subjective perceptions as well under the name of interpretivist paradigm (Collis & Hussey, 2014). Interpretivism therefore, in comparison to positivism, gives a deeper importance to the subject of people and their institutions, meaning that the empathic understanding of human behaviour is deeply valuable (Bryman & Bell, 2007). Collis and Hussey (2014) continue arguing that under the interpretivist paradigm social reality is not seen as objective but highly subjective since it is shaped by our own perceptions whereas the positivism paradigm sees reality as independent and observations and experiments can be conducted objectively without us interfering.

With that in mind, the research strategy of this study will take upon an interpretivist paradigm, where the concept of lean can be measured subjectively from many angles including both employees and the surroundings together with observations and numbers. This paradigm gives the opportunity to interact and be a part of the data collected and it gives depth to the intangible philosophy of the lean concept, an angle that the positivism paradigm would not allow for. It must be mentioned that the chosen paradigm could yield a high degree of bias since the analysis and conclusion are based on subjective material and thoughts (Collis & Hussey, 2014).

Since the collected data is analysed to find an understanding of the implementation of the lean concept together with how to measure its success, qualitative data will be gathered. Data in numerical form, i.e. quantitative data, will be collected as well to grasp as much information as possible in the aim to give depth to the analysis. As Collis and Hussey (2014) describe it, the emphasis in an interpretivist paradigm is to find in-depth and qualitative data that are rich in detail and nuance. The collected data is reflected from preselected theories that have

identified these collections as important. This approach is furthermore known as a deductive form (Collis & Hussey, 2014).

### **3.2 Research design**

This research aims to investigate an existing phenomenon within its real-life context in-depth and therefore a case study is appropriate (Yin, 2009). Further reasons for using a case study is that, since more than one method to collect data of the specific phenomenon is used, a case study is suitable (Collis & Hussey, 2014). According to Blumberg et al. (2011), using more than one method is preferable because it gives the researcher the opportunity to compensate weakness of one approach with strength of another one. With a case study the opportunity is given to collect data through both monitoring and communicating (explained more in detail in the next section) and by this increase the possibility to answer the research questions correctly.

The case study is designed as a single case study and the reason for this is that the case is unique and has never been conducted for this company before (Yin, 2009). Blumberg et al. (2011) explain that it is often more appealing to use multiple case studies since they are considered to be stronger. But since the opportunity was given from this specific company, the single case study is considered appropriate as the case is unique and there is only one company being researched into. A case study can be of different character and this study will have an explanatory case study approach, as is explained by Blumberg et al. (2011) to be useful when the researcher is using theories to account for what is happening and the different causes for the specific phenomenon that are rising. However, similarities to the research with the type of case study that is presented by Collis and Hussey (2014) as the opportunist case study has been acknowledged. They define an opportunist case study as to be when a phenomenon occurs due to access and connections to particular businesses or people to the research. Nonetheless, with lack of references regarding this type of case it is more appropriate to identify this research as an explanatory case study since, as explained by Collis and Hussey (2014), aiming at using existing theories to understand the situation and be able to explain it in the context of this research

The scope of the research is limited to only focusing on one specific company, in this case Kjell&Company and their central warehouse, which therefore becomes a delimitation for this thesis since no other company is taking part in this study. The delimitations of this study has been deeper discussed and can be found in section 1.3.

### **3.3 Research case selection**

The motive for choosing Kjell&Company as case company was partly due to already established relationships with the company. At the same time, the concept of lean is highly relevant and further knowledge within the subject was given due to this implementation and in conjunction with this project. The opportunity was therefore seized. As is common with other companies where cases are handed out to students for further research, Kjell&Company has never conducted such a research before. Compared to earlier studies this cooperation provides an in-depth view over the logistics operations of their business together with the implementation process of lean into a central warehouse that has fixed issues on a momentary basis.

### **3.4 Research method**

This section aims at explaining the techniques used when collecting the data. Both primary data and secondary data has been collected and the primary data collected was made through three different techniques: interviews, observations and documents.

#### **3.4.1 Primary data**

In this study the primary data collection was done with the help of interviews, observations and internal documents received from the company, which according to Blumberg et al. (2011) is a good combination of methods to use when conducting a case study. That is because the researcher is given the opportunity to both monitor and communicate on the collection of suitable data.

#### **Interviews**

12 interviews, with 6 different respondents, were conducted in the central warehouse in Malmö, which are all presented in table 5. All interviews undertaken were performed face-to-face, which gave the ability to ask more complex and sensitive questions, something Collis and Hussey (2014) highlight as an advantage. Bryman and Bell (2007) explain that tape-recording and transcribing interviews are very common in a qualitative research and give insight not only in what the respondent answers but also in what way they explain it. Tape-recording the interviews was, however, not possible during this study since all interviews were undertaken inside the central warehouse where there was a lot of noise. Therefore, notes were taken by one person during the entire interview while the other kept the conversation and interview going. This, however, as Bryman and Bell (2007) define it as to be a cost for the research, did not contribute to the interviewee feeling self-conscious about what he or she was saying since they were not recorded. Due to Swedish respondents only, all interviews were held in Swedish, which they were also transcribed into. This was to make the interviews easier and

the respondents more comfortable (Bryman & Bell, 2007). Although the authors were well aware of that when translating it into English it could lead to some distortion of the data. Considerations concerning this have been made and the belief is that this was possible to overcome by careful translation of the transcriptions.

The interviews were of semi-structured approach since the aim was to give the interviewee the opportunity to talk more about its topic and encourage them to further narrate on their special interests in the matter (Blumberg, Cooper & Schindler, 2011). At the same time the ability was given to ask follow-up questions outside the interview guides (appendices 3 and 4). The purpose of the interviews was to understand the respondents’ situation and the overall situation in the warehouse. When that specific purpose is needed Collis and Hussey (2014) highlight semi-structured interviews to be appropriate. The interview questions were of an open question approach (Bryman & Bell, 2007; Collis & Hussey, 2014; Blumberg, Cooper & Schindler, 2001), but formulated to fit and fulfil the research questions and the purpose of the study. With the help of previous theoretical research on the subject and the need for understanding the process inside the warehouse in-depth the questions were formulated as to answer this.

The selection of respondents for the interviews was done through purposive sampling (Collis & Hussey, 2014). Since an in-depth overview of the entire warehouse was desirable it was important to interview the people who were able to provide that specific information. Since the warehouse was divided into three sections each team leader was interviewed due to their experience and knowledge about that specific area. This, together with other top managers and workers on the floor, gave insight to how the warehouse is operating daily. However, all interviews conducted were done internally and because of this the risk of bias occurs. As the case study is done in favour for the company, the belief is that untruthful answers have not been given, since that would result in and limit the outcome for the company.

Table 5: Summary of the amount of interviews which have been done during the visit.

Position \ Date in 2016	26/1	27/1	28/1	29/1	30/1	31/1	1/2	2/2	3/2	4/2	5/2	Interviews
Lean manager	x						x	x		x		4
Logistics manager	x									x		2
Warehouse manager								x				1
Team leader, receipt							x			x		2
Team leader, optimisation									x	x		2
Team leader, picking											x	1
<b>Total:</b>												<b>12</b>

The interview held on the 26<sup>th</sup> of January (see table 5) was done with the help of the interview guide found in appendix 3 and the interviews held with the team leaders was done with the help of the interview guide found in appendix 4.

## **Observations**

Together with the interviews, observations were made during five whole days, in order to receive a clear picture of the central warehouse. The observations were made in a natural setting where the aim was to capture real life situations, an event that Collis and Hussey (2014) emphasise as important when using the interpretivist paradigm. Structured direct observations, as Blumberg et al. (2011) put it, were performed and that means that the observations were personally and physically monitored where the work took place. This type of observations was done in order to see the flow of goods inside the warehouse and how each operation within each team functioned. By doing this, contributions to the purpose of the study and answers to the research questions could be intensified. Maps of the warehouse, showing the flow through the entire warehouse, was studied before the observations took place in order to gain knowledge of what was expected and also to acknowledge dissimilarities with the maps.

## **Documents**

The third method for collecting data was through documents from the company, a good method to use when conducting a case study (Blumberg, Cooper & Schindler, 2011). The documents were first internal flow charts and visual maps over the warehouse. These were mainly used to understand the context, to get a deeper knowledge about the area in order to actually understand the data that was collected through interviews and observations (Collis & Hussey, 2014). Other relevant internal documents used in a later stage were surveys conducted from the staff and information in forms of numbers they are currently using as indicators. They are confidential and only used in order to get a full understanding of what needed to be looked upon more. All these types of documents can be seen as organisational documents and were useful to strengthen the analysis of the case (Bryman & Bell, 2011).

### **3.4.2 Secondary data**

To perform this study secondary data was necessary to collect in order to find the gap and the research field to study. For the theoretical framework, secondary data was collected in order to understand the history around the context and to give depth to this study. The sources which have been used to collect secondary data are from the databases: SUPERSÖK, ScienceDirect, Business Source Premier, Business Retriever, Google Scholar and Web of Science together with books from the University of Gothenburg's libraries. Blumberg et al. (2001) illuminate the importance of the secondary data to assess the specific problem the research aims at investigating. This has been taken into consideration and all references have been evaluated to make sure they are viable and of high quality.

Other secondary data has been collected directly from Kjell&Company, both from their own webpage but also internal documents, which have been helpful in the aim to fulfil the purpose of this study. Important to consider and have awareness of is the fact that the internal

document could be angled to the company's benefit. But since they have provided the material with the hope of suggestions for improvements and comments, this has been concluded as unlikely.

### **3.4.3 Data analysis**

With the help of the summary of the literature (see section 2.4) identification of the most important areas was made in order to ease and support the collection of the primary data. An analytical model was created to make the analysis easier to understand (see figure 6). The observations of the current operations and functions in the warehouse (see section 4.1) were done to get a broad perspective of the situation and full understanding of the daily operations. This was accomplished to further deepen the analysis and to be able to answer the research questions correctly.

Due to the chosen paradigm and the fact that all data collected, except the internal documents which are mainly for supporting the data collected through observations and interviews, are of qualitative approach the data was not to be quantified. Reduction and restructuring of the data was done in different steps during the research period and this was necessary in order to structure the amount of data collected and to fully understand it (Collis & Hussey, 2014). Coding of the data was in some cases also necessary in order to categorise them to ease the analysis when putting the empirical material in relation to the theory (Bryman & Bell, 2011).

During the collection of the data it was to some extent analysed in order to understand and make it possible to reorganise for further analysis and restructuring. This was made to facilitate the next step of analysis. When the data collection was completed it was to some extent reduced and categorised, to further ease the process of structuring and fitting it with theory (Collis & Hussey, 2014). This type of structuring of data was done in order to ease the analysis and to find relevant patterns connected and disconnected to the theory. With this way of analysing the data the research questions will be answered and the research purpose fulfilled.

### **3.5 Research evaluation**

When evaluating a study various criteria have been suggested, where the most common ones are reliability and validity (Bryman & Bell, 2007; Blumberg, Cooper & Schindler, 2011). It has, however, been argued that those terms are more suited for a study with a quantitative paradigm rather than for a qualitative paradigm (Golafshani, 2003). Collis & Hussey (2014) explain that the evaluation of an interpretivist study can instead be done with the four criteria concerning trustworthiness presented by Guba (1981) and later also by Lincoln and Guba (1985). Hence, the evaluation of this study is based on the framework by Guba (1981), who

evaluate the quality of a qualitative research differently. Thus, internal and external validity, reliability and objectivity is replaced with credibility, transferability, dependability and confirmability, as seen in table 6 (Guba, 1981; Lincoln & Guba, 1985).

*Table 6:* Evaluation of the quality for the different paradigms. (Guba, 1981; Lincoln & Guba, 1985)

Quantitative paradigm	Qualitative paradigm
Internal validity	Credibility
External validity	Transferability
Reliability	Dependability
Objectivity	Confirmability

*Credibility* is concerned with a correct description and identification of the subject of the research, in order for the study to be correctly conducted (Collis & Hussey, 2014). This is conversely very similar to the quantitative paradigm and internal validity, where that type of study seeks to measure or test what is actually intended (Shenton, 2004). To ensure high credibility of this study different sources and methods for collecting data have been used, which by Lincoln and Guba (1985) is mentioned as triangulation and a preferable choice for increasing the credibility of a study. All data collected was also discussed with the original source to make sure it was correctly reported, which contributes to increased and established credibility of the data, a method Lincoln and Guba (1985) called member checks. Referring back and constantly considering the purpose of the study was crucial throughout the entire process since that made it possible to always stick to the subject and conduct everything correctly (Shenton, 2004).

*Transferability* aims at making the findings of the study applicable to another similar situation, which gives the study a broader generalisation (Collis & Hussey, 2014). This is considered true in this study, but reservations are, however, made regarding this since all observations and interviews are made individually and the context might differ from another setting (Lincoln & Guba, 1985). This is thus considered difficult in all interpretivist studies. Hence, due to the theoretical framework and background descriptions, transfer can be expected as a possibility nonetheless.

*Dependability* is in comparison to the quantitative paradigm the reliability of the study, which is to make sure that the study is possible to repeat with the same outcome (Collis & Hussey, 2014; Guba, 1981). Since the data collection was done with two different methods, mentioned as overlap methods, weakness in one of the methods is compensated with the other and by this increases the dependability of the study (Guba, 1981; Blumberg, Cooper & Schindler, 2011). Dependability and credibility go hand in hand, one gives the other, and this is credible since overlap methods are used, which is similar to triangulation (Shenton, 2004; Lincoln & Guba, 1985). The research method is well defined and explained in detail, contributing to that

even if a qualitative research is hard to redo with the exact same results, which is why reliability is not preferable to evaluate, it is possible to use it as a “prototype model” for future studies (Shenton, 2004).

*Confirmability* is a shift from the quantitative paradigm’s objectivity (Guba, 1981). It refers to whether it is possible to confirm that the findings actually derived from the collected data (Collis & Hussey, 2014). All material from the data collection was written down directly after the collection and therefore confirmability can be considered high in this study since the findings reflect the informants’ views instead of the researchers’ own perceptions (Shenton, 2004). Additionally, open questions were given to all respondents to further increase the possibility for the informant to give their own view of the situation, instead of the researcher leading them in a particular direction, and by that increase confirmability of the study. Lincoln and Guba (1985) explain that in order to ascertain confirmability the technique of triangulation is useful, which further establishes the confirmability of this study since the technique is used throughout the entire research process.



## 4. EMPIRICAL FINDINGS

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*This chapter presents the empirical findings, which have been conducted through semi-structured interviews and observations at Kjell&Company's central warehouse in Malmö together with internal documents received from the company.*

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An introduction of Kjell&Company was given in section 1.4 with a brief history of their rapid geographical expansion as well as their move into the central warehouse in Malmö. The reason for their location in Malmö is due to the family's roots in and around the area. This warehouse, of 7 000 square meters containing around 8 000 peripherals, is as of today still their main hub of distributing goods to the increasing number of stores. The peripherals concern electronics of data-, mobile-, audio-, video-, television/satellite-, and telephone-type mainly (Kjell, 2014). They compete in the Swedish and Norwegian market of electronics peripherals so companies such as Teknikmagasinet, Clas Ohlson and Elgiganten in Sweden, and Komplet in Norway are all competitors with whom they share the market (Bohlin, 2010; Stokke, 2015). They also have their e-commerce in Sweden and compete with an online store as well. One of the main reason for their continuous drive to open new physical stores is due to their will to compete with service, to deliver the best service to their customers will create revisits and that is a value hard to develop through online presence only (Dahl, 2014). In 2014 Kjell&Company was considered to be Sweden's 10th strongest retailing brand (Kjell, 2014). Their succeeding progress in the market has not always been of a family owned charge. Up until 2005 the company was wholly operated and owned by the family Dahnelius (Kjell, 2016a). The year after, the investment company Hakon Invest (today known as ICA Gruppen) acquired 50 % of the shares with reasons being that Kjell&Company had strong concepts with good development and expansion potential (Hakon Invest, 2006). In 2014 Hakon Invest sold their shares and FSN Capital acquired 75 % of the company with the expectation to expand the company abroad as well as to improve the online presence and cooperation between online channel and physical store network (FSN Capital, 2014). From the annual report of 2014 their turnover amounted to 1 040 million SEK and the company was operated by close to 800 employees (Kjell, 2014; Kjell, 2016a). At the time of writing, the latest official publication shows that the stores add up to 92 in Sweden and 8 in Norway (Kjell, 2016b; Kjell, 2016c).

A study visit to their central warehouse took place between the 1st and the 5th of February 2016, where observations of the goods flow was made and interviews were conducted with 6 key employees, including: lean manager, logistics manager, warehouse manager, and the team leader for each task force of: receipt (inbound logistics), optimisation, and picking as the logistics department is divided among three group stations for handling of all the goods. The activities that were taken are shown in figure 7 as a simplified reconstruction. A detailed description will follow in section 4.1.

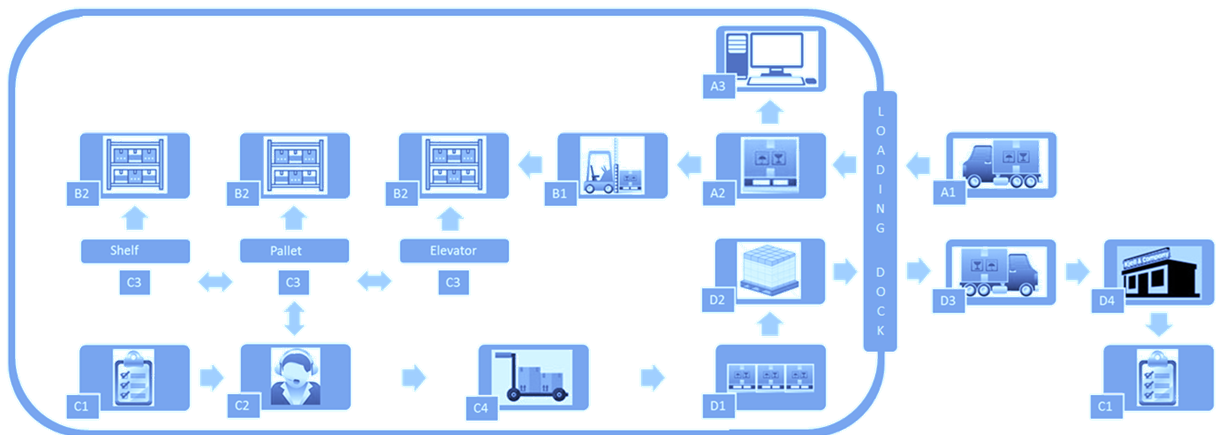


Figure 7: A simplified overview of Kjell&Company's central warehouse activities.

Interviews with the logistics manager and the lean manager were also held a week prior to the study visit. According to the logistics manager the company grows at a rate of 10-15 % per year and that has led to difficulties within the logistics department, especially during peak seasons around Christmas and summer vacations etc. That means that the central warehouse space is insufficient for much time of the year. The warehouse must be ready to ship peripherals to each of Kjell&Company's physical stores that in turn are divided roughly around 30 % of the total space as a store and 70 % as a warehouse. This division enables each physical store to have at least one product of each assortment physically available to the end-customers. This was explained to be of high importance in order to maintain a certain service level of quality for the end-customers. As of now, the logistics manager described the central warehouse activities as being a push system into the inbound logistics and then as a pull system of the outbound logistics out to the physical stores.

By having the same central warehouse serving all the existing and new physical stores, as was mentioned in section 1.4 where it was described that the last decade's expansion has been nine-folded, the daily activities have become inefficient and many reasons for implementing lean are presented. The main reasons for implementing lean into the organisation have been summarised in table 7 (taken from internal documents, 2016) and the main causes can be summarised as having a lack of standardisation and communication between groups.

Table 7: Kjell&Company’s reasons for implementing lean. (Internal documents, 2016)

Reasons for implementing lean in Kjell&Company
• Same problem over and over again
• Uneven workload and sometimes high level of stress
• Short term solutions
• Each department is isolated from the others work
• Everyone does it in its own “best way”
• Lack of relevant goals and follow ups
• Lack of transparency for workers and lack of possibility to influence
• Customers demand better quality

The following part of the empirical findings will be divided into two main stages; firstly, an initial description of the daily operations that were observed will be presented to show every step in the logistics department and perhaps, wasteful activities can be found; secondly, the interviews that were held will be presented according to the three subareas found in the analytical model (see figure 6) consisting of tools, culture, and measurements. These findings at Kjell&Company will contribute to the answering of the research questions.

#### 4.1 The daily operations in the central warehouse

Kjell&Company’s manufacturing process takes place mainly in and around Shanghai, China. The goods are afterwards shipped to the central warehouse in Malmö mainly by sea transport but also by air when in need of a faster goods transportation. As they reach the central warehouse the goods pass by four different areas (A is receipt, B is optimising, C is picking and D is outbound) in the warehouse. The entire flow of a product through the central warehouse can be seen in figure 7 and is a simplified re-creation of the maps the lean manager has constructed with the help of a co-worker. The first area is covered by receipt as shown in figure 8.



Figure 8: Warehouse area A: Receipt.

A1: The goods are transported from the port with the help of trolleys and the logistics manager explains that this activity is outsourced to another company and therefore Kjell&Company does not handle the trolleys themselves. The trolleys deliver the goods to the gate of receipt at Kjell&Company’s central warehouse and this is where the work for the first team in the central warehouse, the receipt team, has its starting point.

A2: The goods are delivered on pallets and a signal shows in the warehouse when a new delivery has arrived. With the help of trucks, the pallets are moved from the loading dock to the area of receipt.

A3: The barcode of the pallets gives the information of what is supposed to be carried. The goods are repacked to fit the shelves of the warehouse and each new box gets a specific barcode, clearly showing what and how much it contains together with where to place it. The decision of where in the warehouse to place them (the options are on a picking shelf, on a pallet shelf or elevator shelf) is subjectively decided and there are no specific rules or guidelines of where to place them. No preferences more than the ones given to you by the person who taught you how to do your job, the team leader of receipt explains. The team leader further explains that there are many different parameters involved in the decision of locating each product and some of those are:

- Frequency – they use the labels A-D with A being the most popular and sold products.
- Size – depending on the size of the product, and therefore also amount of products in one box, it can be beneficial to place on either picking shelf or pallet shelf.
- Space – if there is space for the product in the specific shelf.
- Time of year – is the product usable this time of year or not.
- Weight – it might be beneficial to place smaller products on picking place and heavier products on pallet place.
- Trends – for example sports equipment and other complementary products that are extremely popular at the moment.
- Campaign – if so, the product will probably be sold in bigger quantities and needs to be easy to collect.
- Flammable – a specific area is predetermined for these type of products.
- Theft-prone – a specific area is predetermined for these type of products.

These are some of the aspects the team leader of receipt considers, mainly when placing the products in the different areas of the warehouse. Meanwhile the team leader says:

*I work in the way that I have always been doing it and I believe that the preferences and parameters I work after are useful for the next group in the chain. But since everyone does it in their own view of best way, nobody knows what actually is the best way of where to place the products.*

When the boxes are labelled with barcodes and given a location, the whole pallet gets a specific barcode. The last step for this team, the team leader explains, is to place the pallet with the boxes in a specific zone and notify the optimising team that the pallet is ready for placing. That is where the optimisation group takes over (see figure 9).

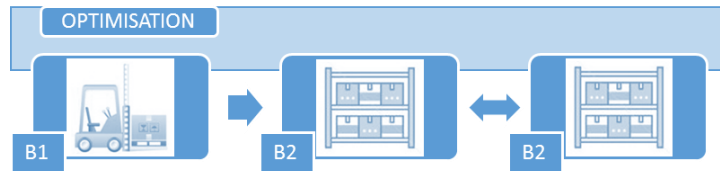


Figure 9: Warehouse area B: Optimisation.

B1: The optimising team gets notified about the pallet in the pick-up zone and with the help of a truck they pick up the pallet and scan the barcode that represents the entire pallet. Information is then given regarding where to place the different boxes in most optimal way.

B2: By scanning the barcode on the shelf and also the barcode of the box the worker confirms that he or she is at the right place.

The optimisation team’s leader explains that this subsection of the work is done in two different ways. Either the person from the optimising team places the box on the shelf in the picking area, or puts the box on the buffer shelf<sup>1</sup>. The other subsection in this team is when they get orders to move goods from one place to another, from buffer to picking; they are called picking and are illustrated in figure 10.

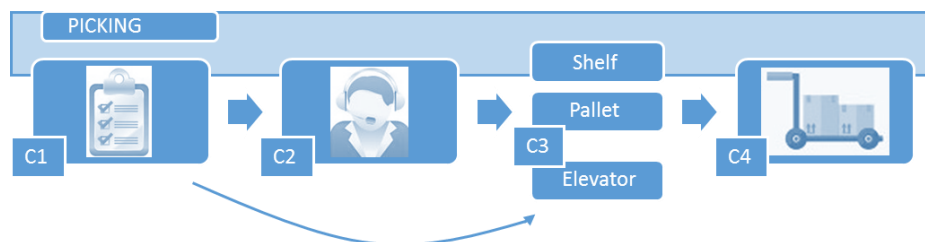


Figure 10: Warehouse area C: Picking.

C1: The picking team’s leader explains that the first thing they do is to log in and print a list, which then is his or her specific picking order.

C2: A voice in their headphones explains which shelves and which places on the shelves the products are to be picked up from and the picker confirms this by answering the voice with specific commands and numbers, in order to confirm the right places in the warehouse. When picking in an elevator this step is not used.

C3: Each shelf and each place on all shelves are labelled with unique numbers. All pickers have a minimum of rows<sup>2</sup> that need to be picked per hour and this is considered as a standard, but the number is today comparatively low. Many more rows can be covered on a normal basis.

<sup>1</sup> The upper shelves, not reachable without a specific truck

<sup>2</sup> A row is when you are at a location and pick one type of product. This is independent of if one or fifty products of the same type is picked from the specific location, it concerns the unique product in that location.

The actual picking is done from three different places in the warehouse. The three different zones are shelf, pallet and elevator. The picker does not move between the different zones, except for extraordinary situations, and therefore he or she only works in one zone at a time.

C4: When the order is complete the boxes are taken to an offloading area by the picker and all boxes for each store are gathered from the different picking zones (shelf, pallet and elevator). The picker confirms that the delivery is done with the voice or manually, depending on what type of picker it is. The last step in the warehouse is outbound logistics, as seen in figure 11.

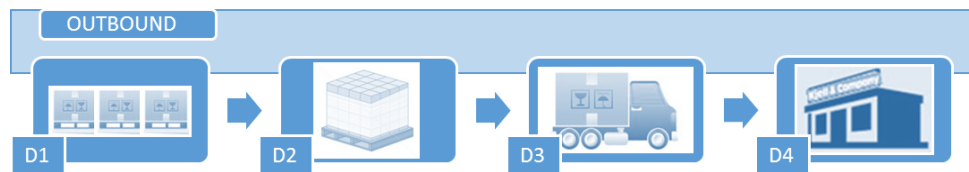


Figure 11: Warehouse area D: Outbound.

D1: The picker has confirmed the finished pallet and the worker in the outbound section, also a part of the picking group the team leader explains, gets a notification that it is ready for the next step in the chain.

D2: The pallet is wrapped in plastic, to ease the transportation, and thereafter moved to the loading area. This is where the daily operations for the picking team ends. The team leader also mentions that this is the end of the value chain for the central warehouse.

D3: Transportation from the central warehouse to the stores is also outsourced to another company, the logistics manager explains.

D4: The goods reach their first final destination and end-customer, which from the central warehouse's view is the physical store.

## 4.2 The lean implementation and its tools

The practical phase of implementing lean started in the beginning of 2016 with the newly assigned lean manager in charge of how to proceed. The lean manager has been to meetings, workshops/seminars and to company visits prior to this in order to understand more of the concept. Initially a pilot project was being set up to one of the three working groups so that an evaluation could be made before implementing the concept on a broader scale. The group that was included in the pilot project was the optimisation group since the lean manager found that group to be the most suitable and flexible one on which they could try new operations on. However, a few weeks later the lean manager decided to let all three groups participate in the initiation phase. The reason to that was because the other teams started

showing interest into the project as well. A sort of curiosity spread on the logistics department's floor and therefore, the managers decided on including all the three teams. The first step with lean was per recommendation from those earlier visited workshops, to implement the tool named 5S. The lean manager implied that:

*We want to become lean and to accomplish that we will implement 5S in the week to come. We have already introduced the concept to our employees and will decide who does what. Later, we will work with continuous improvement tools such as the PDCA model.*

So, the lean manager decided to start off with implementing 5S throughout the logistics area with the help of the five practices of sorting, structuring, shining, standardising, and sustain daily activities. The main reason was to create standardised routines on the floor and documentation through Quick Reference sheets etc. This tool is now being implemented as a pilot for the coming months. Another change of tactics was the decision to implement kaizen groups (by the lean manager named 5S teams) that will support the 5S practices and act as a guide through the process.

The heart of 5S at the warehouse is with a customised action plan whiteboard showing the five steps for a specific area (see figure 12). The lean manager has initiated meetings with each of the groups to inform them of the different steps and what is expected of each. The idea is that they will write down what needs to be done by following the sheet. Under *sorting*, they should only keep material that is necessary for the process. Under *systemise*, the right tool must be at the right place in order to minimise unnecessary running around the floor. At *shine*, they must keep pathways clean and analyse the causation for occurring disorders and dirt. Within *standardise*, documentation must be created to what should be done at each station, and under *sustain*, awareness and creating habits to continue with the program together with conducting regular control checks must be performed. All these steps will be a part of the daily activities at the whole area.

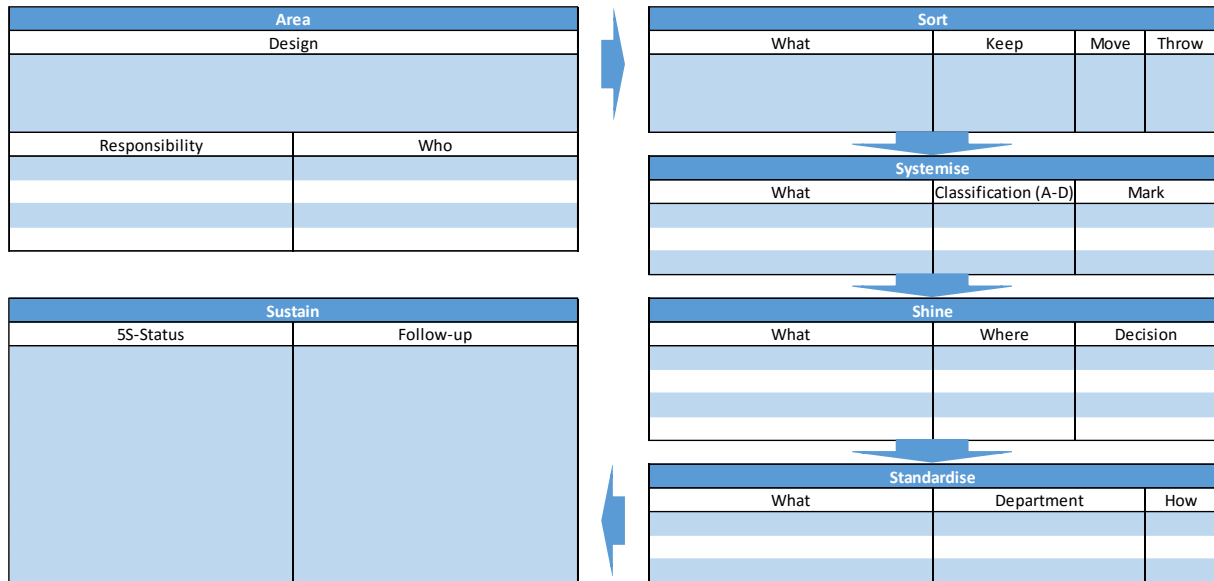


Figure 12: A recreation of the 5S whiteboard used by Kjell&Company.

To keep up with the last process of *sustain*, the lean implementation will be constantly revised through continuous improvement tools such as the PDCA problem solving cycle. This will ensure for controlling processes and to make systematic changes if needed. Other tools that go beyond the boundaries of lean will be incorporated as well, the lean manager mentioned. The lean manager will, as soon as the pilot is fully running go on rounds at the end of each week and do follow-ups to see whether each team has performed according to what the whiteboard says. The five principles will be checked based on a check-list and together with the assigned 5S groups activities will be followed up.

The reason for starting with 5S, the lean manager explains, is partly due to the problem that everyone does things in its “own best way”. The lean manager further says:

*What I want to accomplish with 5S is to establish routines and maps over how things are to be done and when everyone follows this we have finally achieved standardisations throughout the entire operation in the warehouse. Only by doing this, many problems will be eliminated and it is when this is done the real work with expanding the lean work begins. Therefore, the rounds regarding 5S are of great importance for the future stage of lean in the company.*

The logistics manager has come up with several notations of what needs to be changed with the current set up and the manager thinks that lean can be a positive contributing factor to support these changes. Today there is no type of documentation of e.g. how to proceed at a working station. The logistics manager says:



*When new employees enter the firm they get taught the way your supervisor feels is right. That will most likely have yield to at least 10 different outcomes today.*

With the standardisations involving documentation of the working processes, small changes can be made in order to prevent further problems and mistakes, which have been repeated over and over again due to the lack of standardisation, the logistics manager explains. Ultimately, when there is only one way of doing a specific working procedure, it will become easier to identify when faults are being made and thus, finding problems will be easier and quicker to target than before, the logistics manager continues.

The warehouse manager also mentions the need for eliminating waste and says:

*Unnecessary steps in the operations need to be eliminated. We are resource efficient today and this implementation is more about working towards being more flow efficient than we are at the moment.*

The team leader of receipt is furthermore considerate that any changes made to eliminate waste must fall within the concept of how the company works. Besides, they are dependent on their suppliers and when they arrive. As a principle they must serve any goods that come in first.

*The problem here at inbound is that we do not know at what time during the day our deliveries will arrive and thus, we allocate the first arriving packages to a suitable place in the warehouse without accounting for the packages that are to come. That sometimes lowers the overall efficiency.*

The optimisation team explained some of their issues and possible wastes that could be reduced. The system that is used today help deciding where to place goods in theory. In practice, however, that system is too primitive and calculates from the same starting point each time. For that reason, the optimisation group rarely uses the system for support of that kind. Instead, their opinions and earlier experiences decide where goods end up. As with the receipt team, the optimisation team finds the principle of serving any goods that come first a bit hindering at times. The goods cannot lay over night or throughout the day. This complicates planning ahead if e.g. they know that space is needed for tomorrow's deliveries more than today's deliveries. The principle then hinders the possible efficiency gains that could have been made.

When it comes to the picking team their first concern covers one of their main tools, the wagons. There are today three different types of wagons and they all function and fulfil their purpose. They are however not standardised and you have to know which one you take. The picking staff also use a voice system for the shelf and pallet station. For the elevator station they use a visual screen that provides information.

*There is excessive information on the screen today. No one is looking at everything but everyone is looking at different things on the screen [...].*

When they are done collecting the goods from the elevator shelf they either click on the screen to let the shelf go back into the elevator or they click on a physical button that is at the centre of every working station.

*We are supposed to click on the screen every time but sometimes it is more convenient to use the button since it is closer to you than the screen is.*

As workers from the elevator, shelf and pallet all drop their collected goods onto one pallet that is located at the offloading area (see C4 section above), they have created a system to communicate with each other through colour coded tape. The goods can through this colour coding be sorted onto the pallet efficiently, by e.g. having the heaviest goods be placed on the bottom of the pallet. Lastly, with Monday and Tuesday being the busiest days of the week, while closed during weekends, the workers need to work fast in order to fulfil the day's orders<sup>3</sup> and with multiple ways of working, this sometimes becomes impossible and orders need to be postponed to next day.

### **4.3 The lean implementation and its cultural aspects**

From the workers of the company's own perspective there was a certain note pointed out concerning their actual company size. The lean manager said:

*I understand that we are no longer a small company, but we act as if we were one.*

So, although they fit into the category of being a large company, their daily operations are run as if they were an SME. This statement was further backed up by the warehouse manager who explained that they this year have held their 25th year anniversary in the business. Despite of

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<sup>3</sup> An order is an order from a store of what is missing in their storage in the shop and needs to get refilled.

that the actual progress of the company is one of having been in the business for not more than 15 years. Thus, they are not acting as a large company yet and see themselves more of being a smaller or medium sized company.

One of the team leaders explains that the present culture within Kjell&Company depends and relies much on the fact that the company is family run and owned. Since there is a “Kjell way of doing things”<sup>4</sup> the team leader further highlights that changing things and making suggestions to change have been difficult, probably much due to the strong company culture that exists.

All teams have been given the task to create working manuals and therefore leave the earlier approach of doing it more like learning-by-doing. During the interviews it is noticed that this creates uncertainties or an uncomfortable situation for some workers. So far no one has questioned the way one works and now they are supposed to document their working procedures, which contribute to concerns regarding the implementation of lean. Questions raised in the teams are among others:

*Does that have anything to do with getting replaced?*

*Why is it that lean will be implemented now?*

The company culture among the warehouse staff is sort of divided into the three appointed teams and there is not much exchange between these teams. There is however an excellent communication within the teams, all team leaders say. The employees keep themselves within the teams and insufficiently share knowledge between teams. There are also very strong wills within each team. But one of the team leaders explains that when a team is in need of assistance the other teams come to its rescue, this is mainly during really busy days.

The internal documents covering employee satisfaction have a varying result. Using this as a measure and striving towards increasing this is one of the measures the logistics manager sees as a potential future indicator. A contributing factor to the varying results could be the example of their bad experience with their former thinking box, the logistics manager says.

*We had a thinking box where employees could put notes and come up with suggestions for changes and improvements. But the issue was that the suggestions never got any feedback or even a notification about if the idea was considered and that did not*

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<sup>4</sup> They have a very specific own way of doing things, when starting working at Kjell&Company you go the education program *Kjell academy* to truly get to know the company. This is much due to the fact that they for a long time have been family own.

*improve the impression of the fact that we are a company working bottom-up, listening to our workers.*

This is something the logistics manager hopes the work with lean and the increased effort with involving the workers will improve and that the workers will feel that they are being seen more than before.

One desire from one team leader would be for all workers to have the ability and knowledge about all working stations and operations within those. By this the working load could be more equally distributed between the teams and everyone would work as one team and not as three different ones. But it all comes back to the fact that it is sometimes hard to get noticed and to speak up about new ideas and getting them heard, and therefore nothing has never really been done about this situation the team leader says.

The lean manager explains that the organisation has had a top-bottom approach and will with the lean implementation come to work more towards a bottom-up approach and be more flow efficient. This is to make the staff members more involved in the day-to-day activities and to be more a part of the decision making process and contribute to potential future changes. They believe it is important to show trust towards the workers in order to get them involved and wanting to be a part of the change. The lean manager says:

*Many people see lean as being something that is similar to letting people go, that is not what it is about.*

The logistics manager also highlights what the lean manager says and explains that with lean and the more bottom-up approach the desire is to keep the “Kjell way of doing things”. But at the same time they want to evolve into being lean, but without destroying their unique image. This is extremely important to them and since one of the main reasons to why they decided to implement lean was due to lack of transparency for the workers, the logistics manager have the desire that the implementation will contribute to improvements especially in this area.

Better communication and cooperation between the different teams will be an outcome of being more flow efficient, the logistics manager states, and further explains that the cultural aspects and potential resistance to change also will be eliminated with the increased communication and transparency.

In the future, when lean has been successfully implemented into the central warehouse, the lean implementation will be further extended and become a concept and way of thinking throughout the entire organisation. By this they mean both the head office and the physical stores. Both the logistics manager and the lean manager realise that this will take years, but they are both determined that lean is the future for the company and they have the board

supporting this decision. They further discussed the issue of ever really being labelled as a lean company, only due to the fact that there are always continuous improvements to be made. The logistics manager says:

*When we have been in contact with companies working lean and asking whether or not we are welcome for a study visit to observe and see how they are working we have got the reply from at least one of them that they do not consider themselves as lean yet, and would prefer if they showed their lean work in a future stage instead. And this said a company who had worked with lean for at least three years, so we know what to expect from our implementation. This will take years but we are willing to give it that, we see a possibility to a positive change.*

The lean manager explains that in the longer perspective they will be lean, not only in the warehouse but throughout the entire organisation and that will also affect the culture of the company. Both the lean manager, the logistics manager and the warehouse manager are well aware of the time it will take. But they are all sure that with the help of the workers and their commitment to the changes, the success of the implementation will be a fact.

#### **4.4 The lean implementation and its performance measures**

The internal measurements used today within the teams vary and act as an indicator of how well they perform. Overall they seem to want to improve the way they cope with these numbers. As the logistics manager said:

*Today we are weak when it comes to KPIs. We have a lot of them but which ones are critical for the lean implementation that is starting now? What measurements can be used to measure lean?*

They use KPIs and have a lot of them but it is difficult to know which ones to link to the lean implementation. These KPIs could be found in their internal documents but due to confidentiality they are not reported here. Other than this, each department and team also use their own measurements. For example, KPIs that the warehouse manager is looking at are many. Those that concern the lean implementation are yet not known but there are indications of a few being closely related. One important index is available stock at hand. That is used to see whether the central warehouse is capable of delivering all the orders they receive. It would be beneficial to have KPIs that cover time to market and work in process, i.e. how many times an article is moved, the warehouse manager continues. When looking at the individual teams, the following KPIs were mentioned.

At receipt, the KPI used to measure performance is the inventory turnover rate. The number is today considered comparatively low and they want to increase that number. They also look at the vacancy rate of the warehouse space.

The optimisation team leader mentioned that the pallet area (C3) is a bottleneck of a sort that affects the buffer or vacant space in the warehouse. They do not have one pallet space for each store and therefore have to mobilise quickly when one store is done to make room for another. In peak seasons this is a huge problem. If they count the warehouse space in square metres, where 100 % is max capacity, what vacancy rate is good? That was a figure they needed to reflect upon.

At the picking group there is a minimum row requirement for each of the staff member and the KPI used there is row per worker and that is dependent on the specified working area. Today the requirements are low and many are well above that requirement. It creates a buffer at times when capacity increases. A notion about counting rows concerns the elevators. Those elevators only work at a certain pace so the speed is hindered by that. Also, the elevators will receive different amount of rows depending on whether articles are at the same feeder or not.

Although these KPIs are some of the more important ones to keep track of, they do not necessarily reflect lean in particular. Specific and general measurements relevant for the warehouse will be sought in order to follow the development of lean and to make sure to work towards the right direction. The logistics manager explains that their aspiration is to have measurements making it possible to see progress and whether or not the implementation is successful. The manager emphasised the importance of also having soft measures because recognition regarding the importance of having satisfied employees have been made. Other soft KPIs could include the employees well-being and keeping track of accidents. In addition to that, they want to have relevant measurements that are useful in the short term perspective for the warehouse, but also have relevant measurements that can be used on a long term view. Finding KPIs that can be used based on these terms will be useful for other departments in the organisation as well when lean becomes implemented throughout the entire chain in the organisation.

#### **4.5 Summary of the empirical findings**

In order to grasp the central warehouse and all the activities, the empirical findings started off with the observations made, showing the flow through the entire warehouse. To fulfil the purpose of this study, the empirical findings thereafter presented each of the three main areas given from the analytical model (see figure 6). This was done for guidance to answer the

research questions. When connecting the areas of the analytical model with the empirical findings, the following overview appear (see figure 13).

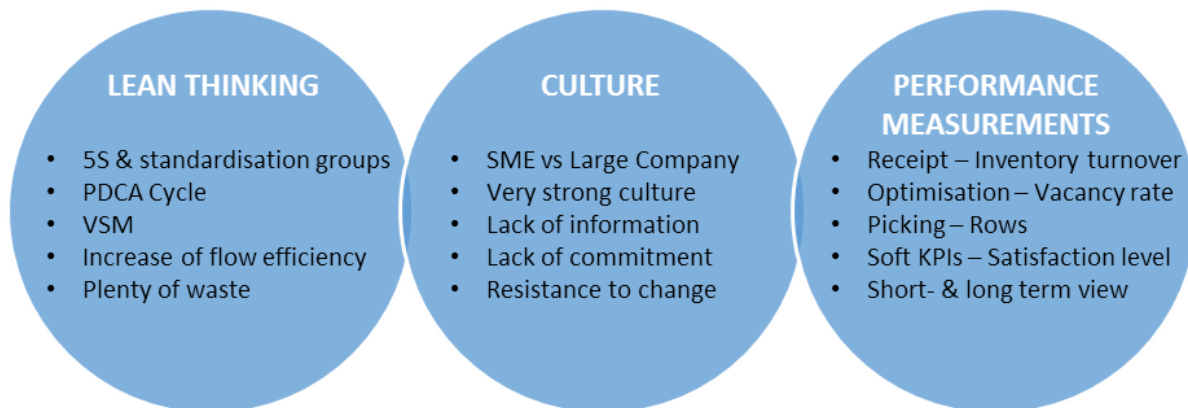


Figure 13: Summary of the empirical findings, with connection to the analytical model.

As seen in figure 13, the three areas of lean thinking, culture and performance measurements have been taken into consideration during the interview process. Under the lean thinking section the tools mentioned were firstly 5S. This is a tool to reach the goal of creating standardisations to the daily operations. Groups were also established in each team; whose objective are to focus on finding the most critical operations in need of change. The PDCA cycle and the VSM were also identified tools that are currently used by Kjell&Company for the initiation process. Several managers also highlight the importance and need for increased flow efficiency, and the need to reduce non-value-added activities in order to improve operations.

The cultural section shows that Kjell&Company has a very strong company culture and such strong values can be both appreciated and challenging. It is, however, considered hard to alter strong cultures. Furthermore, Kjell&Company act as an SME, although the proper definition of the company today is that of a large one. When it came to the implementation of lean, both before and during the initiation process, the workers expressed a lack of information regarding the changes observed. To some extent, this has led to a lack of commitment and resistance to the changes made. Later on, when more information was given about lean, curiosity and involvement also appeared from the teams that were not included at first.

Kjell&Company currently has KPIs for the warehouse, but they do not use them together with the lean implementation. All teams from the areas (receipt, optimisation and picking) use different indicators to monitor the operational progress. They mentioned inventory turnover, vacancy, and rows as important indicators used today. Relevant measures to evaluate the lean implementation are sought after, for both hard and soft KPIs. Another important note is the suitability of the measures: that they are valid both on a short term and long term perspective, and suited in the central warehouse as well as the entire organisation in the future.

The theoretical and empirical connection within and between the different areas in the analytical model will be discussed in the analysis that follows.

## 5. ANALYSIS

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*The analysis is divided into three sections in order to cover each of the research questions. It is analysed in conjunction with the analytical model of figure 6, found in section 2.4, and the empirical findings of figure 13, found in section 4.5. The areas looked into are: lean thinking tools, cultural aspects, and performance measurements from both a theoretical perspective and the viewpoint of Kjell&Company.*

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As Womack and Jones (1996) first mention about lean, the outcome of lean is primarily to eliminate waste, also known as muda. Muda is anything that does not add value (Kasul & Motwani, 1997) and should therefore be removed to maximise the utilisation of a company's operations. Dahlgaard and Mi Dahlgaard (2006) further explain that waste can be found everywhere. Kjell&Company has come to realise the issue of waste and has already begun to implement lean ways to cope with it. Both the warehouse manager and the logistics manager explain the need for elimination of certain steps in the operations in order to become more flow efficient. Just the fact that they have decided to document and create standardisations within their daily activities show that they have begun with implementing the concept of lean and are dedicated to continue with the process.

The wastes Ohno identified (Hicks, 2007; Melton, 2005; Womack & Jones, 1996; Liker, 2009; Kasul & Motwani, 1997) are all applicable on Kjell&Company to some extent. It can be argued that the deadly waste of motion is one of the most concerning one for them. Due to lack of communication between teams, a product can be moved to different locations much more than necessary and one reason for this occurrence is the individual preference. This leads to a drawn out of daily processes so that an operation might take longer than necessary or that the customer might not get what was expected.

The five principles of coping with muda is presented by Womack and Jones (1996) and shown in figure 1, modified after Harrison et al. (2014). The problem with Kjell&Company does not lie within specifying value or identifying the value stream but with the process of flow and pulling the products through the chain. As the warehouse manager stated, Kjell&Company consider themselves to be resource efficient today but they need to be more flow efficient. These two principles of coping with muda, flow and pull, are therefore hard to fulfil. The last part of perfection concerns continuous improvements and is fulfilled by doing operations over and over again. With time and dedication perfection becomes a closer reach. Waste is however constantly uncovered and its need for elimination is always necessary and a present matter.

### 5.1 Usable tools within lean warehousing

The various tools of lean thinking must be used depending on the situational environment, as Abdulmalek et al. (2006) mention. Anvari et al. (2014) also highlight the challenge of choosing



the right tools and the critical impact it has of the selection process. It is therefore important for Kjell&Company to first carefully choose the tools that have been proven to work in a warehouse environment, and secondly to choose tools that could suit their specific needs and strategy. To simply adapt any of the available tools that exist without making any deeper analysis of its impact, as Sörqvist (2013) mentions, is proven to be a common mistake for many companies. It is thus crucial for Kjell&Company not to fall into this situation and thoroughly analyse and evaluate the tools they will implement. It seems like the lean manager have taken these things into consideration and that they are working towards the right direction.

According to Phillips' (1983) change management model the first step to create change is to create a sense of concern. From the first interview held at Kjell&Company it was clear that the logistics manager had identified specific issues that needed to be dealt with. From table 7, the reasons to why Kjell&Company started the lean implementation are shown, and the majority and most crucial of them concerned lack of standardisation and lack of communication between groups. These two concerns have a critical impact on Kjell&Company's future development and since they are continuously growing the problems will continue to grow if they do not control these issues immediately. It is therefore very good that they have highlighted their main reasons for *why* they need to implement lean.

The team leader of receipt mentioned that their decision to place goods throughout the warehouse is an individual decision based on certain parameters. There are however no specific rules or guidelines of how to exactly work and it comes down to how the employees were taught by their supervisors and as stated, this employee works in the way that the employee has always done it. By working in this way it contributes to that one single act at a workstation can be done in – figuratively – ten different ways. This might have been a good idea when the company was classified as an SME but as it has grown, this way of working is no longer defensible and has become counterproductive instead. The logistics manager has realised this, but the difficulty lies within changing an old pattern and the way the workers are operating today.

The tools that are needed for Kjell&Company must be of such capability that it can fix the issues of their standardisation and communication absence foremost. The lean manager has thus come up with the conclusion to choose 5S as the implementing tool. Even though 5S is first and foremost created for the manufacturing sector, as Gapp et al. (2008) explain it, the concept is about cleaning and standardising the workplace. Both Chiarini (2013) and Liker (2009) explain that this tool is a suitable tool to initiate within this environment. The workshops the lean manager went to also suggested 5S as a suitable tool to begin with. This shows that it is well-suited at the beginning because it will help the logistics department to tackle much of the main issues that concern the of lack of standardisation. It can therefore be argued that the lean manager is working towards the right direction. By following the five steps of 5S the lean manager will be able to create a standardised structure at the workplace

that otherwise would not have existed. Out of the five steps *seiketsu*, also known as standardisation, will solve the issue of their lack of standardisation. The first three steps (sorting, structuring, and shine) are steps that each team together with the team leader must be responsible for whereas step number four and five are in the response of the lean manager foremost. By letting each team be responsible for these first steps the employee's own experience and knowledge will contribute to a customised standardisation that is suitable for each work station. The logistics manager stated that there today could be ten different ways of doing one operation and by eliminating that with the help of 5S and narrow it down to one way of doing an operation will, by that act alone, positively contribute to their lean implementation. The subjective multiway method of operating is being eliminated and instead replaced by the Quick Reference sheets of how to correctly operate a working station, as was mentioned by the lean manager. These changes show that the work with 5S is working and a first step in contributing to sustainable competitive advantages for Kjell&Company. The same goes for the picking team, where the team leader explained that the screen they are working with shows a lot of information and everyone looks at it differently. This is also a problem and by letting each team be involved in the changing process the outcome will probably meet most of the criteria workers have.

Other tools that will be used by the lean manager in the initiation process are the PDCA cycle, described by Sörqvist (2013), with the aim to create continuous improvement activities, and by forming Kaizen groups, also known by Liker (2009) and others as Kaizen workshops, within each of the teams that act as a sounding board between the employees and the lean manager. The PDCA cycle shows that the lean manager works in the right direction and seems to have understood the core principles of lean being a continuous and never ending process. It is thus a very suitable tool to implement into a warehouse. The lean manager mentioned the implementation of 5S groups as well, in theoretical terms named Kaizen workshops, and this shows that the lean manager is earnest in willing to listen to the employees on the floor and adapt a bottom-up approach. This is yet another tool that seem to fit into a warehouse environment. It is, however, important that the manager take the time to listen to what these groups have to say, otherwise the whole purpose of having the groups will be futile.

So far, 5S, PDCA cycle and Kaizen groups are the lean tools that have been clearly identified from the empirical material and discussed in conjunction with the presented theory. There are, however, more tools in the theory that are not yet adapted by the lean manager, that might be suitable for the continuing of eliminating further waste in the company. It is important that Kjell&Company does not get stuck with the chosen tools, but continue their work by adding tools that fit their purpose and are suitable in their central warehouse.

As is shown in figure 7 and also described in simpler terms during section 4.1, the lean manager has created a map over the entire warehouse showing how all activities are connected to each other. Although the lean manager is currently not using it as one, it can be

considered as a VSM of the warehouse. Womack and Jones (1996) highlight the usage of a VSM tool for mapping all the specific actions required in order to bring a product forward. It can be argued that this is what the lean manager has actually done. This map is not finished but under development and when the standardisation of all daily operations are made it can be beneficial for Kjell&Company to use this map to find relevant activities possible for development in order to take the next step in the lean implementation. Creating a VSM seems highly useful for finding potential waste and therefore, this tool can be seen as valuable to implement in a warehouse setting.

TQM is connected to the company culture and take steps to involve the employees (Abdulmalek, Rajgopal & Needy, 2006; Dahlgaard & Mi Dahlgaard-Park, 2006). Womack and Jones (1996) explain that the concept rose from tools like the PDCA cycle, a tool that is already used in Kjell&Company today. As the logistics manager's objective with the lean implementation to a great extent is to change the approach of being top-bottom towards a bottom-up approach, the TQM tool would be valuable to adapt. TQM can be useful in this kind of environment and arguments can be made that the work with this tool should be extended. TQM is a tool that in many ways cope with what 5S is presenting and to enhance the latter tool, the former tool could be used as an extension or a complement. It would not require a clean start-up for Kjell&Company to include this tool to their lean implementation so less resources would be needed to kick-start this project.

As Dahlgaard and Mi Dahlgaard-Park (2006) and Liker (2008) argue, Six Sigma can be seen as a philosophy that is very similar or even an extension to the TQM. Its root cause is nonetheless to minimise the amount of defects produced. As the team leader of receipt points out, errors would be reduced if there were a system for automated insertion of data instead of today's manual work. Kjell&Company could use Six Sigma as a KPI measurement to increase their customer satisfaction level. One reason for implementing lean is that their customers demand better quality overall. The responsibility would mostly fall into the hands of the picking staff to collect the right items and goods to send to the outbound zone. To let Six Sigma be implemented as a philosophy could be redundant with TQM in mind but letting it act as its core function of calculating the amount of mistakes per million outputs could better help a warehouse. Even with that said, the best usage of this measurement still lies within automated working procedures with machines.

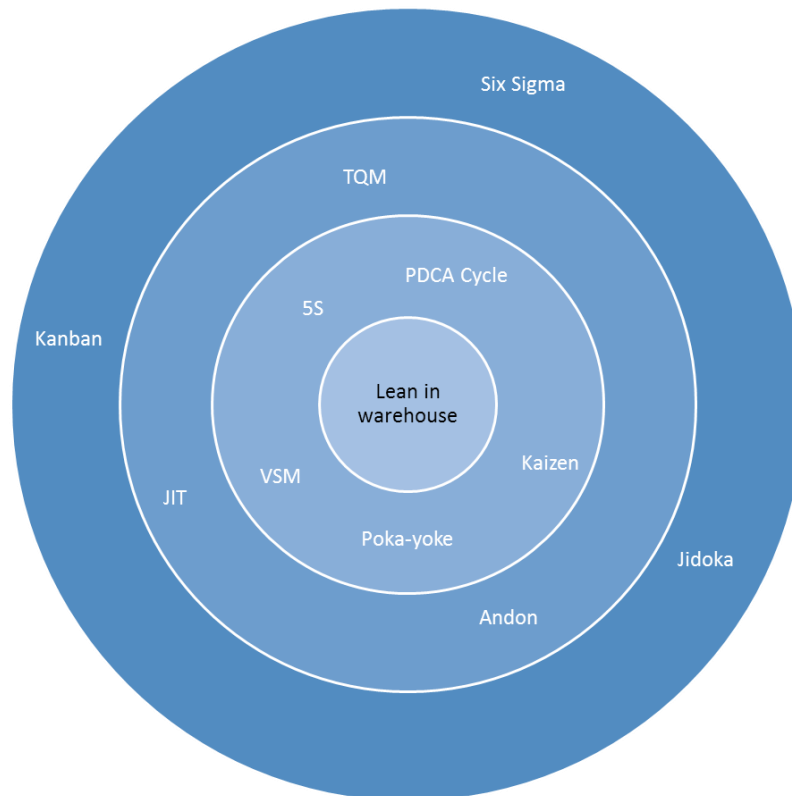
The logistics manager explains that Kjell&Company works with having at least one product of each assortment in every physical store. The central warehouse has the function to make this requirement possible. Whether or not this is justifiable can be argued. The team leader of receipt explained that they have no clear time or schedule to when goods are delivered to the inbound section of the warehouse and this prevents the ability of being efficient during the entire workday. The logistics manager explains that Mondays and Tuesdays are the busiest days of the week and that they do not always manage to fulfil all orders. One way of solving

this could be for Kjell&Company to perform prognoses around these peaks and by that control the situation better. This would lead to improved flow efficiency, a goal that the managers want to achieve.

It can be argued that Kjell&Company to some extent is working with JIT, i.e. to deliver products in small batches and with short lead time, as Liker (2008) explains it. As was stated before, the logistics manager explained the inbound logistics to be a push system, while the outbound logistics to the store act more like a pull system. It is common to have a push system in one end of the chain and a pull system in the other end, as was explained by Harrison et al. (2014). It can be favourable for Kjell&Company to start working more towards the approach of pull than they do today. With regards to the lack of space at peak seasons in the central warehouse, the amount of stock they have chosen to have could be questioned. Perhaps they ought to reduce the amount of goods instead and opt for a pull system throughout the whole supply chain. A full approach to JIT would hence be favourable for Kjell&Company, as it would lead to a decrease in inventories, that act in turn releases more space in the central warehouse, and ultimately it enables for better serving the continuously growing number of stores. They would also be able to create more accurate prognoses of their inbound goods flow. This implementation would take time and is not a suitable option to start off with. The decision is, however, not in the hands of the logistics manager only, since those changes concern activities made earlier in the value chain. But discussion on those decisions are out of the scope for this study.

In the theory section the tools of andon, jidoka, kanban, and poka-yoke are mentioned and referred from Womack and Jones (1996). As most of them focus on manufacturing, the usage of some of these tools could be scarcely suited in a warehouse environment. Since Kjell&Company has elevators in their warehouse, the andon system could be visually used there, whereas jidoka is more specifically suited for machinery. The kanban system is better suited in an upstream department of the organisation, such as the purchasing department to regulate the incoming batches of goods more efficiently. The poka-yoke tool is, however, very well suited in a warehouse since it promotes rigorous visual standardisation at workstations, a procedure the lean manager wants to accomplish through the 5S tool.

Figure 14 below shows a summary of the different tools and their different levels of suitability for the company. Regardless whether the tools have been used already or not. Those tools that are closer to the centre in the figure are not only easier to implement but also more suitable for Kjell&Company's warehouse.



*Figure 14:* Lean tools suitability for Kjell&Company (from figure 2); the closer to centre a method is, the easier and more suitable it is to implement it.

It is important to remember what Anvari et al. (2014) mention about the lean tool selection, that it is a multi-criteria decision-making that involves subjective value judgements. The presented tools are thus analysed through the limited knowledge of Kjell&Company's future goals and strategy as well as the unavoidable subjective judgements made. Ultimately the managers of the company must unitedly choose forthcoming tools to adopt.

## 5.2 Cultural aspects in a growing company

Kjell&Company is and should be labelled a large company, according to Statistics Sweden (2010), but even so both the lean manager and the warehouse manager explain that they act as an SME. Rymaszewska (2014) argues that SMEs lack sufficient knowledge and especially the ones who are family owned and run. Kjell&Company has for a long time been family owned, and still is, to some extent. They are however family run and this could be a contributing factor to why the company is acting as being 15 years old rather than 25, which is the correct number of years they have been in business. This is probably one of the reasons to why changes and implementations such as this one with lean has not been done earlier. The work they have done before has obviously shown to be successful since they keep growing with 10-15 % per year. But these kinds of strategic decisions could have been made by the management earlier, as Eggers et al. (2013) explain, which could have led to the fact that the daily operations were standardised years ago and the lean implementation could earlier have been moved to the

next step and phases in the process towards being a lean company. As it is now the lean manager has to start from the very beginning.

Important to consider is that Kjell&Company is not an SME anymore. Egels-Zandén (2015) explained advantages of being an SME instead of a large company and these advantages Kjell&Company has used to some degree, but since they are considered to be large the need of structure and having one way of doing things is needed in order not to backfire and risk losing partners and customers. This is important for every worker to realise and a good way of coping with this can be to have a positive attitude towards the implementation of lean.

Implementation of improvement initiatives are challenging with both advantages and disadvantages as potential outcome. Dora, Kumar and Gellynck (2016) mention several advantages and disadvantages and one advantage is the increase of cross-functional exchange. One of the team leaders did, during one of the interviews, highlight the desire of working more as one team instead of three separate ones. The exchange between the teams seems almost non-existent and as mentioned before, it seems like this has been their way of working for a long time and when now the resources might need to be more spread out the limitation lies within the workers' desire to share its knowledge to one another. The implementation would therefore contribute to the increased extent of cross-functional exchange in the warehouse, and might also in the long run contribute to cross-functional exchange beyond the borders of the different departments in the organisation, which the logistics manager has as a desired outcome of the implementation. Increase of cross-functional exchange will be time consuming and demand a lot from the workers, but if and when succeeding it will contribute to a positive outcome of the lean implementation.

The disadvantages mentioned by Dora, Kumar and Gellynck (2016) are however not clearly applicable to Kjell&Company. A disadvantage with the implementation could rather be the fact of getting everyone involved and on board on the idea, the potential resistance to cross-functional exchange.

Both the lean manager, the logistics manager and the warehouse manager have realised what Wangwacharakul et al. (2014) stated; implementing and working lean takes time. Sörqvist (2013) discusses engagement and thinking in the longer perspective, and it can be argued that all three managers have realised this and have both a short term plan for the implementation but also a future state and long term perspective of what they want to accomplish in the future. Only the fact that they know and realise this is to their advantage and will hopefully lead to the outcome they desire. The managers demonstrate a good and democratic leadership, which is something both Liker (2009) and Sörqvist (2013) together with Roethlisberger and Dickson (2003) mention as an important success factor. It can therefore be argued that Kjell&Company has great possibility to succeed fully with their lean implementation.

The company culture within Kjell&Company is very strong and the “Kjell way of doing things” is mentioned both by the logistics manager and one of the team leaders. According to them, it mainly depends upon the fact that they are a family business and do things the way they have always done them. These values seem unquestionable. Principles and philosophies within the company could be beneficial to change and this is something Schein (2010) defines as the values in an organisation. H.O.W. (2009) highlights the difficulties in crafting organisational change and therefore it does not come as a surprise that some concerns are raised in the company regarding the implementation and the changes. Start working with a tool like 5S is the simple part of this implementation, while changing peoples’ perceptions is the difficult part.

Arnheiter and Maleyeff (2005) explain the fact that lean is often connected with layoffs, while Samuel (2013) and Conti et al. (2006) mention the stressful impact and big load that is often put on the workers with lean. This has been shown in some of the interviews at Kjell&Company. Concerns regarding the creation of the working manuals have been raised and the fear of being replaced is mentioned. It is reasonable that when creating manuals over the exact work that is being made, concerns about replacement arises. Womack et al. (1991) mention the negative aspect of lean that considers the worker as a machine. With the manuals the employees are forced to create it is understandable that they have concerns that may relate to being replaced or laid off. Both the lean manager and the logistics manager however try to explain that their implementation of lean is not about layoffs. Both managers clearly explained what it is that they want the outcome to be with lean for the workers, but it seems like more information could have been given to all workers from the start. With a change like this, there should be room for everyone to raise questions and get answers to them and this is up to the managers to cope with.

The resistance to the change does not seem so much about the actual change, all team leaders gave improvement suggestions during the interviews (shown in section 4.2) and all see the benefit of changing. Dent and Goldberg (1999) highlight more the fact that it is the loss of status, comfort and pay that are the things people resist and not the actual change. This is clearly shown in Kjell&Company that the existing resistance is about why all of a sudden they need to document their way of working, while at the same time not having been informed to why these procedures needed to be done. It is further mentioned by both David and Found (2016), and Roethlisberger and Dickson (2003) that employees should be involved and engaged in the changes because without that it will be impossible to change. The logistics manager talks about increased transparency and communication between everyone in the warehouse and the lean manager explains that with involvement from the workers, by for example the creation of the manuals of their daily work, they become involved more in the day-to-day activities and have the ability to affect and contribute to changes. The created Kaizen groups will probably be an intermediary between the managers and the teams and hopefully the outcome will not be the same as it has been with the thinking box. As soon as

this message is delivered to all workers they hopefully will see the benefit of working with 5S and those other tools that will be implemented later on in the future as tools that help improve their daily work. With this involvement the resistance towards change could decrease and the support for change increase.

To successfully change an organisation Phillips (1983) suggests three critical components which are all relevant for Kjell&Company. *The new vision* is clearly stated by the logistics manager and the lean manager as to improve involvement, communication, transparency and in some ways have measures that can show the management that the implementation is positive. *New capabilities* are for example the fact that they have got help from the outside to solve the issue of how to measure the implementation, and the *support from the organisation* can also be found from the already involved but also from the ones that are new to the concept but start to get a picture of what the company wants to accomplish with lean.

Change is always needed (Thomas & Hardy, 2011) and since Kjell&Company has a growing rate of 10-15 % per year, changes are continuously required. It is clearly shown that the lean manager has only started the journey towards being lean and have a long way to go. With this extensive growth comes a need to control and Hu et al. (2015) mention the fact that measures like KPIs are a disadvantage for SMEs, but could therefore be beneficial for Kjell&Company, who no longer is a SME but rather a large company constantly growing larger. This might contribute to the fact that the former company culture, more known as “the Kjell spirit”, can evolve towards being “the lean spirit”.

### **5.3 Performance measurements with principles and strategy**

The lean implementation process must be proven to have been a profitable investment. With the use of Paramenter’s (2010) explanation of performance measurements and specifically those being KPIs, Kjell&Company has the opportunity to focus on those aspects within lean that are the most critical for the current and future success of the organisation. They are furthermore seen as a way of identifying waste, as pointed out by Lindberg et al. (2015). The warehouse manager stated that Kjell&Company wanted to become more flow efficient and such changes have been observed. Modig and Åhlström (2012) explain that the concentration lies within eliminating non-value-added activities and the implementation of having standardisations can be connected to this. The target achievement (Ax, Johansson & Kullvén, 2015) for Kjell&Company is the elimination of unnecessary activities in their daily operations. By setting standards to their work stations will contribute to increased flow efficiency that could be measured with KPIs. That would measure any increase of operations leading to greater sustainable competitive advantage. Kjell&Company can hence, measure any increase in sustainable competitive advantages gained from becoming more efficient, and by that become more competitive in their market and the global economy.



It is more or less a commonality for large companies today to use KPIs and Kjell&Company is no exception. The challenge with these measurements lies within finding the appropriate ones for the right purpose. Bhasin (2008) even says that especially lean is very difficult to quantify and measure. According to Ingelsson and Mårtensson (2014) it is important not only to focus on a company's hard KPIs, those that are directly quantifiable, but also to consider softer measures that focus on e.g. customer and employee satisfaction. Kollberg et al. (2006) mention that to fully capture the advantages of lean the company needs to focus on both hard and soft KPIs and see them as complements to each other. As the logistics manager mentions, they possess many KPIs already but they need to figure out which of them is critical when it comes to measuring the lean implementation process.

According to Bhasin (2008) it is important that the managers in question relate the measurements to their strategy and Paramenter (2010) gives a few characteristics of what KPIs must include such as; being nonfinancial, pushed by management, and tied the responsibility of each teams. This means that the KPIs that Kjell&Company chooses to connect with the lean implementation must relate to the strategy of the lean implementation. See figure 15 for clarification. If their goal is to cut the overall cost, then KPIs connected to that area must be targeted. If their goal is to increase the space utilisation, then those KPIs that focus on that must be followed. Furthermore, the amount of KPIs observed often exceeds one as every vital part of an activity that is connected to their strategy needs an adapted KPI measurement.

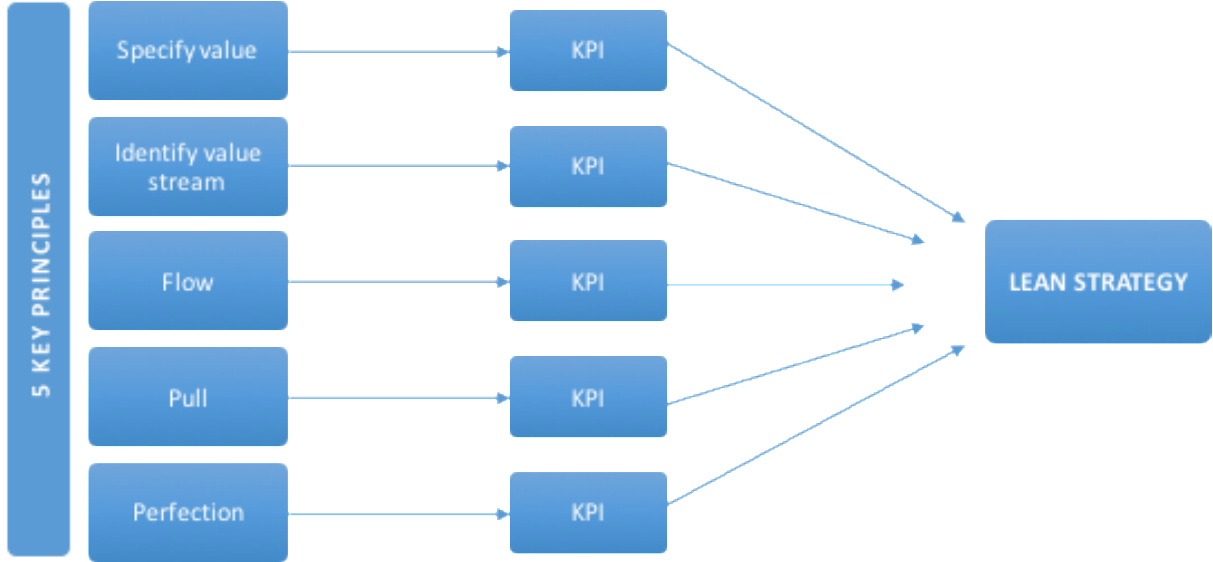


Figure 15: Lean KPI mapping; own creation of how to connect performance measures with the 5 key principles and the lean strategy.

Each of the interviewed participants mentioned what they usually looked at when trying to measure how well they performed at the moment. These KPIs were used before the implementation of lean and are not deliberately linked to that activity in particular. For

example, the warehouse manager mentioned that stock at hand was one of many important KPIs looked upon; the receipt team leader checked the inventory turnover rate and vacancy rate, where the latter was also looked upon by the team leader of optimisation; and the team leader of the picking used rows covered by the employees to keep track at the pace.

What Kjell&Company ought to do is what Bhasin (2008) suggests; to track the lean progress through a total product cycle time, starting at the gate as shown in area A1 to the off-loading area shown in area D2, and log the activities using a suited scorecard. That would give an overview of what the most important KPIs are when measuring the lean changes. It would also involve the whole management team to work with similar goals, as was some of the characteristics of KPIs, according to Paramenter (2010).

After considerations concerning the observations and interviews an alternative way of conducting and analysing the data was notified. As mentioned above, tracking of the process from area A1 to D2 would be very beneficial to conduct since this would give the opportunity to really find the activities in the product cycle that are clearly in relation to the strategy and therefore highly relevant to study deeper. This would give the lean manager the opportunity to find the activities where the KPIs, which are already used by the company, could be connected to specific activities which in turn could be directly connected to the strategy of the lean implementation. With this method relevant measures to measure lean could be identified that are specifically suited for Kjell&Company's warehouse. However, since Kjell&Company is only in the initiation process of the lean implementation, and the observations and interviews were conducted at an early stage, it would not have been possible to conduct a research connected to their lean strategy. This could have been possible to accomplish if 5S were already implemented entirely and they would have been in a different phase of the implementation with a fully developed lean strategy. Even so, it is important to have relevant measures to follow the development even if the strategy is not fully developed and this can be made with the help of common recommended KPIs, currently used by others when implementing lean into a warehouse.

Chiarini (2013) argues that there are some KPIs that can be considered within lean and specifically when implementing 5S, and for a full view on the KPIs mentioned an overview is shown in appendix 1. From the theoretical framework there were a collection of KPIs found being used by theorists and other companies. In table 8 below a summary of the KPIs used is sorted into different categories. The different categories are based on the five key principles of lean that were presented by Womack and Jones (1996). Those include: specify value, identify value streams, flow, pull, and perfection and can all be found in figure 1 (Harrison, van Hoek & Skipworth, 2014). Apart from the category of perfection, blank cells show that there was no KPI found to connected with a category. By categorising KPIs according to these principles, Kjell&Company will, together with the suggestions above, be able to find KPIs that are directly connected to the lean principles. Those KPIs can be found in table 9.

**Table 8:** Summary of the KPIs used from each source in the theory chapter sorted into the five key principles of lean.

Category \ Source	Chiarini (2013)*	Chiarini (2013)**	Bartholomew (2008)	Chen et al. (2013)	Myerson (2012)	Cantone (2012)
<b>Specify value</b>	On-time delivery Customer satisfaction	Defects Accidents and injuries	Picking error reduction Safety (lost-time accidents reduced)		Shipment accuracy	
<b>Identify value streams</b>	OEE (Overall Equipment Effectiveness)	Productivity	Productivity improvement	Waiting time	Order fill rates	
<b>Flow</b>	Warehouse rotation		Inventory accuracy		Inventory accuracy	
<b>Pull</b>	WIP Dock-to-dock time	WIP / Lead time Amount of space gained	Warehouse space saved	Unnecessary operator moving time		Lead time reduction WIP reduction Space reduction
<b>Perfection</b>						

\* found in appendix 3 \*\* for 5S specifically

Within the category of specifying value, KPIs concerning overall quality and customer satisfaction were of importance since the goal with lean often is in conjunction with trying to improve overall value to their customers. Receiving whole and accurate goods and at the appointed time are all important steps to satisfy the customer, and thus activities that fall into this category. Another strive within lean is to improve and sustain employee satisfaction since they are crucial for creating increased customer satisfaction. Therefore, a goal to reduce accidents and injuries in the daily operations and to overall increase safety are important components in specifying value. Taken from the internal documents (2016), KPIs that could be within this category for Kjell&Company are measures connected to quality and service level.

The next category, which is to identify the value streams, has been observed to be in line with measuring productivity. This is a way to measure efficiency. Because Kjell&Company strives to be more flow efficient as the warehouse manager mentioned, KPIs that fall into this category would be beneficial to use. Minimising waiting time and controlling order fill rates were used KPIs. Such measurements can be used for Kjell&Company as well. They could use KPIs that concern comparison between their row count. As they seem to be highly interested in the measuring of row, this type of measurement could be connected to this category. They are already today very familiar with this KPI and its use would be easy to comprehend.

KPIs connected to inventory are used by many and these measurements can be connected to the flow within the warehouse since inventory and its flow is the main activity within a central warehouse. Therefore, KPIs such as warehouse rotation and inventory accuracy are well suited to identify in the third key principle mentioned by Womack and Jones (1996). Here, Kjell&Company could use KPIs that reflect the daily average of number of rows made or their inventory turnover. The logistics manager mentions their growth rate of 10-15 % per year and that their inventory fill rate is too high a few months of the year, it could be good for them to

use a KPI that directly addresses their inventory levels and acts as a complement to aid the managers.

The category of pull has been identified to reflect processes. Most theorists use some sort of WIP KPI. By tracking this, increased efficiency could be accomplished. The amount of waiting time between the different work stations could be tracked and reduced. This type of measurement is considered highly relevant for Kjell&Company as they need to be more flow efficient.

As seen in figure 1, by Harrison et al. (2014), the last category of perfection is the wanted outcome of all the other categories. By monitoring each step and continuously adjusting the work companies will be able to little by little eliminate waste and get closer to a state of perfection. The intention with the last category is thus to continuously follow and improve all the chosen KPIs above. Kjell&Company will have to do exactly this in the last section in order to access sustainable competitive advantage in the longer perspective.

Table 9: Summary of the KPIs that can be used by Kjell&Company.

Category \ Company	Kjell&Company
<b>Specify value</b>	Quality Service level
<b>Identify value streams</b>	Rows in / out
<b>Flow</b>	Rows out / avg. day Inventory turnover
<b>Pull</b>	WIP
<b>Perfection</b>	Follow-up on KPIs Continuous improvement

The logistics manager mentioned the desire of having both hard and soft measurements in regards to lean. This opinion goes well in hand with what Ingelsson and Mårtensson (2014), Marr (2013) and Kollberg et al. (2006) are discussing regarding measures for lean. Ingelsson and Mårtensson (2014) mentioned the connection between a successful lean implementation in an organisation with its cultural change made during the process. Measuring the cultural changes and aspects must be made with the help of softer KPIs, such as employee satisfaction. This is a measure that both Marr (2013) and Kollberg et al. (2006) also mention as important KPIs to consider while implementing lean. To measure cultural satisfaction levels, indicates how well employees feel included and needed in a company and that in term reflects how productive they are at their workstations. Ultimately it leads to increased customer satisfaction, which is a goal when you specify your value with even having and implementing lean.

It can be argued that the first category by Womack and Jones (1996) of specifying value can include both hard and soft KPIs. This has been seen by some of the theorists observed. It is a matter of preferences and softer KPIs like for example employee satisfaction and customer satisfaction is a way of specifying the value, while at the same time others choose financial performances as the most important indicators when specifying value.

Since Kjell&Company is in the initiation phase of their lean implementation and unable to measure KPIs related to their strategy, the above mentioned KPIs can act as guidelines in this stage of the process and when the tools used have been fully incorporated into the warehouse the work with identifying KPIs for their strategy can begin.

## 6. CONCLUSION

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*This chapter provides the concluded answers to the research questions for this study. Recommendations for Kjell&Company to their continuous work with lean and suggestions for further research within the subject of this study are then presented in this chapter.*

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This study gives insight to how a central warehouse, Kjell&Company's central warehouse in this case, operates on a daily basis and what challenges can occur during the initiation of a lean implementation as well as how to cope with these issues.

The purpose of this study was to investigate the initiation process of a lean implementation into a central warehouse and to find suitable tools and measures to achieve sustainable competitive advantages, together with investigating the cultural challenges that arose. This was done with the help of the Swedish electronic peripherals company Kjell&Company. Found below are the conclusions that can be drawn of each one of the three research questions, and thus, fulfil the purpose of this study. Afterwards, a few recommendations to Kjell&Company are given and lastly suggestions for further research are discussed.

### 6.1 The research questions

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***From a central warehouse perspective, what commonly used lean tools are viable for an initiation?***

With lack of standardisation and documentation of their working procedures the first and foremost important task for Kjell&Company in the initiation process is to construct Reference Sheets, i.e. documents showing the procedures required at each working station. This task can be achieved with the lean tool of 5S. The main reason for its usage is to decide one way of operating the logistics department. Otherwise it would complicate the possibility to continue with the lean implementation as there would be no place to start off from finding those areas where waste can be eliminated. By having chosen the tool of 5S, standardisations are being created and the continuous work with lean can begin.

Together with continuously working on the 5S during the initiation it is highly important for Kjell&Company to have a broader picture of the entire central warehouse. A viable method to get hold of this aim is through a VSM. The VSM gives Kjell&Company the ability to identify operations in the warehouse that can be considered as bottlenecks. Focus can therefore be placed on problematic areas to eliminate waste. A third viable tool for the initiation is the PDCA cycle, which can be seen as a complement to both 5S and VSM since it aims at always reworking, redoing and identifying the possibilities for improvements. These three tools will

continuously help in the work of finding waste and can be seen as a good starting package for Kjell&Company's initiation process of their lean implementation into their central warehouse.

Many of the lean tools are specifically suited for the manufacturing sector and will not be implementable in other sectors, such as warehousing. A non-viable tool to implement during the initiation process into a central warehouse is for example the fundamentals of Six Sigma, where measuring defects of millions of outputs becomes inconvenient, extensive and difficult compared to the manufacturing sector.

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***What cultural challenges might arise during the initiation  
process of a lean implementation?***

Several challenges arise during a lean initiation process and one particular challenge is the overall resistance to change. As companies become larger and larger, the employees' daily operations change and that transformation is often connected with concerns regarding the connection between lean and lay-offs from their perspective. Kjell&Company has, since they were an SME, established a strong culture based on family values and their daily operations are reflected by these values. With their expansion and current definition of being a large company, they have been forced to adapt their company culture to their size and new approach of becoming lean. That include changes to how they operate on a day-to-day basis. As documentation to every step of the employees working procedures has suddenly been made, the fear of being replaced is understandable. Without proper information regarding the lean implementation, together with not having the ability to work as before, naturally create fear or worry, resistance and counter questions. Therefore, changing values and daily operations are some of the main cultural challenges for Kjell&Company as they have a strong company culture.

An important note is that lean is time consuming and having a suitable leader that understands the concept, therefore has a significant impact. The manager must be democratic and transparent, i.e. to share information regarding the lean implementation with all people involved, regardless of where they are in the hierarchy. This will reduce both the insecurity about the concept of lean and much of the resistance to change, and instead increase the willingness to partake in the implementation. Transparency also gives employees the opportunity to raise questions that might occur at the start already, so that underlying doubts get eliminated. This notion has been one of Kjell&Company's major challenges. Since they never properly informed the whole logistics department at the start of the implementation, they have had to cope with many questions and concerns later on.

Another cultural challenge noted is how to get all employees to work towards the same goal. Working in different teams, as Kjell&Company has been doing, can be efficient on a resource level but it is also essential to cooperate between teams to increase the flow efficiency. By changing operational activities between teams and working towards having increased cross-functional exchange will result in improved workflow overall. In a short term perspective, cross-functional exchange will increase the flow efficiency within the central warehouse, and in a long term perspective, cross-functional exchange should be incorporated onto departments so that the whole company work unitedly.

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***How is it possible to ensure that an implementation of lean into  
a central warehouse has contributed to a sustainable  
competitive advantage?***

The first notions for Kjell&Company of seeing that the implementation of lean is a sustainable competitive advantage today and the days to come is by implementing and use the tool of 5S correctly. When 5S is adapted and used on a daily basis, this will be a first notion of ensuring that the implementation is of value since the different ways of working will be narrowed down to one per workstation only. That alone will show that waste has already been eliminated and that they are becoming more efficient, both regarding resources and flow. This is the first acknowledgement towards lean contributing to a sustainable competitive advantage for Kjell&Company. The next step in the measuring process can be to study the VSM, in order to find the critical operations for the company's lean strategy. With a clear strategy of lean, those critical operations that have been found must then be connected to a KPI. Kjell&Company will then be able to do measurements and in time, compare old and new measurements side by side to monitor any progress.

Finding one KPI to measure lean for the entire chain of operations is difficult and inefficient. Several KPIs are preferable to connect with critical activities in the chain. Those will be found with the help of the five key principles of lean. One or more KPI for each principle will ensure that the focus of measuring lean in particular is done. These KPIs have been found to be hard measures, but those do not depict the broader picture and thus the usage of soft KPIs are needed as well to fully measure lean. Kjell&Company can monitor the different KPIs in each category and use both hard and soft KPIs to make sure that they are in line with their lean strategy.

Hence, it is possible for Kjell&Company to ensure that the lean implementation has contributed to a sustainable competitive advantages both short term and long term by measuring the KPIs in each category and see the differences for each time they are evaluated.



## **6.2 Recommendations to Kjell&Company**

After implementing 5S, Kjell&Company needs to focus on finishing their VSM that they have started on. Since many theorists mention the importance of having that tool to find critical activities and improvement areas that could lead to increased efficiency, they need to complete that map. The specific strategy for lean needs to be developed if there is none, clearly stating what they want to accomplish and mediate this to the organisation.

Adapting TQM would be a complement to 5S and help with reaching their goal of having a bottom-up approach and is therefore a recommended tool for the future. Since this research is limited to the central warehouse only, recommendations for implementing JIT to the inbound logistics, cannot be judged. A look into that is, however, interesting as it would affect inventory levels. Another extension to the 5S is Poka-Yoke as it tries to create visual standardisations.

With the continuous improvement work the lean manager would improve the implementation vastly with handing out clear information of what is to come at all times, and to include the workers in the pursue of eliminating waste alongside. That would create active participation. The option to put together the three teams into one big team and to see the warehouse as one department when it comes to lean activities would facilitate a streamlined goal for the purpose of lean. Keep working with the Kaizen-groups (5S groups) since it contributes to the bottom-up approach and that people get more involved.

Table 9 shows usable KPIs for measuring lean, and gives an indication on what measurements can be used initially. Over time, suited measurements must be found that are connected to both the key principles and their lean strategy. Would their strategy change; they would also need to look at their KPIs again. If there is a will to use one KPI only, the KPIs used could be summarised and converted to a single value but that would also hide the underlying factors.

## **6.3 Further research**

Lean is a concept that takes years to implement. Conducting a study on the matter with the given time limit is far from optimal and with that said, it would be interesting to do a follow up on Kjell&Company's progress with lean a year from now and beyond. This would deepen the understanding of the implementation process for Kjell&Company but also give valuable insight to other companies that might decide to opt for lean.

During this study it was realised that the cultural aspect of the lean implementation was far more sensitive than anticipated and it would therefore be highly interesting to conduct a study that focuses only on the cultural aspects of a lean implementation. There are plenty of

opportunities to dig deeper into the area and look into companies of different sizes. The most interesting aspect would be to measure or evaluate how big of an impact the cultural aspects have for a lean implementation.

When it comes to measuring the lean implementation, questions were raised to whether it was possible to use one KPI that looked on the whole company. It was found that the DuPont formula could possibly be of gain to connect a lean implementation and all departments that were in on the lean concept. A study that focuses on this area together with a lean angle would definitely bring about attention. For example, by the lean implementation at a warehouse and a store, the warehouse could decrease its inventory level and the store could increase their turnover because efficiency gains have been made. The head office could keep track of these changes and find out that lower costs have been made, that in turn would affect the return on investment positively. Every step could possibly be derived from a lean action and be considered successful.

The study was limited to the logistics department and an extension of the scope to also include other departments would be of value for further research. The purchasing department, for example, is closely connected with an implementation of JIT and adding that department could give another view of certain aspects. Questions to what could be changed and affected there, in order to ease the work for the central warehouse, and how lean would be implemented in that part of the value chain, could be raised. These are a few of the many options to do research upon.

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### **Interviews**

Logistics manager

Lean manager

Warehouse manager

Team leader of receipt

Team leader of optimisation

Team leader of picking

# APPENDICES

## Appendix 1

The most used Lean KPIs, their purpose and recipient.

Purpose	Recipient	Examples of indicators
Measuring strategic goals	Senior manager	<ul style="list-style-type: none"> <li>- Turnover</li> <li>- EBIT - EBITDA</li> <li>- On-time delivery</li> <li>- Customer satisfaction</li> <li>- Warehouse rotation</li> <li>- Cost of poor quality / Turnover</li> <li>- Etc...</li> </ul>
Improving processes and the product/service Value Stream	Value Stream manager, supervisor	<ul style="list-style-type: none"> <li>- Lead time / WIP</li> <li>- Process cycle efficiency</li> <li>- On-time delivery</li> <li>- Dock-to-dock time</li> <li>- First time through</li> <li>- OEE (Overall Equipment Effectiveness)</li> <li>- Cost of warranty work</li> <li>- Waste ppm (parts-per-million)</li> <li>- Supplier cost of poor quality</li> <li>- On-time delivery supply code</li> <li>- Reprocessing hours / Processing hours</li> <li>- Average cost per minute</li> <li>- Etc...</li> </ul>
Cell / process performance	Value Stream manager, supervisor, operators	<ul style="list-style-type: none"> <li>- Day-by-the hour production</li> <li>- Waste ppm</li> <li>- WIP to SWIP (Standard-work-in-progress)</li> <li>- First time through</li> <li>- OEE</li> <li>- Etc...</li> </ul>

A copy of figure 7.1 found in Chiarini (2013).

## Appendix 2

Definitions of the KPIs used by theorists and other companies.

**Budget performance** – keeping track of the company’s planned spending’s (Myerson, 2012).

**Headcount reduction** – is the number of people working with the specific operation (Bragg, 2002).

*People in the operation after change – People in the operation before change*

**Inventory accuracy** – whether or not the level of inventory is correct every time (Jacobs & Chase, 2014). Calculate this by evaluate the different percentage of accuracy between the physical inventory count and the database inventory count (Legacy Supply Chain Services, 2016).

$$\frac{\text{Number of accurate test items}}{\text{Total number of items sampled}}$$

Source: Bragg, 2002

**Lead time reduction** - the time needed to respond to a customer order. The time between the order and the delivery to the customer (Jacobs & Chase, 2014). Comparing this over time will probably lead to a reduction.

**Order cycle time** – the time between one order comes off the process and the next order comes off (Jacobs & Chase, 2014).

**Order fill rate** – is when you compare orders that are shipped with orders ordered from the customer. This is not only about warehouse performance but also if the order is in stock and available. Can be considered as the service level from a customer’s perspective. (Allais, 2010)

**Picking error reduction** – the difference between the first measure of picking error and the second when improvements have been made. A reduction should be shown.

$$\frac{\text{Number of error when order picking}}{\text{Number of total order picking}}$$

Source: Legacy Supply Chain Services, 2016

**Productivity improvement** – the difference between the productivity from one time to another.

$$\text{Productivity} = \frac{\text{Number of unites completed}}{\text{Number of hours spent on them}}$$

Source: Johnston, 2016.

**Safety (lost-time accidents reduced)** – the amount of time that is lost in the operation due to an accident, the desire is to reduce this number.

$$\frac{\text{Lost time (in hours) due to accidents}}{\text{Number of hours worked}}$$

Source: Jamini, 2014

**Shipment accuracy** – if the order transported to the right place and in the right time.

$$\text{Actual arrival time} - \text{Requested arrival time}$$

Source: Bragg, 2002

**Space reduction** – see warehouse space saved

**Unnecessary operator moving time** – calculated time it takes to move products from one place to another in the warehouse, that is considered unnecessary since it could have been put in the right place from the beginning. (Chen et al., 2013)

$$\text{Unnecessary moving time before} - \text{Unnecessary moving time after}$$

**Waiting time** – the amount of time a product must wait to move into next step of the chain, how long the end-customer is waiting (Jacobs & Chase, 2014).

**Warehouse space saved** – this can be seen as how much the space is utilised. Therefore, the measure is better the smaller it is and should be compared over time to see improvement.

$$\frac{\text{Amount of space used}}{\text{Total space}}$$

Source: Bragg, 2002

**WIP reduction** – can be considered both as work-in-process and work-in-progress. Is the products and goods that is moving in the warehouse, between the purchase and the deliver (Jones, Hines & Rich, 1997).

## LIST OF REFERENCES to appendix 2

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## Appendix 3

Interview guide for first meeting with the logistics manager and the lean manager.

- What is lean to you?
- What are the reasons for deciding to implement lean?
- What do you want to achieve with lean?
- Is it economic, due to time, quality or other aspects?
- What guidelines have you been using?
- Is it the human capital or the finances making the implementation possible?
- What tools will you be using?
- Do you have a strategy for the implementation?
- How many people are involved in this process?
- How will you operate to teach everyone involved about lean?
- Do you have a plan for potential disruptions?
- In what way will you follow up the process?

## Appendix 4

Interview guide for team leaders.

- What is your position within the warehouse?
- How long have you been working in the company?
- How many people are working in the group you are responsible for?
  
- How does a regular working day look like in your team?
- How does your working station operate?
- What can be improved in your operations?
  
- How is the atmosphere in the group?
- How is the communication between your team and the other teams in the warehouse?
  
- What type of measurements do you use today, in order to make sure that you are above the minimum level?