

On Becoming Lean

A Study of How Lean Principles Are Applied to Administration

Abstract

The concept of lean, which has its origin in manufacturing, has become a common method to increase process efficiency within several different industries. The aim of this thesis is to investigate a new area to which the concept of lean recently has been applied, namely administration. In particular the study aims to explore how lean production principles are applied to processes within the financial departments of organizations. Due to the fact that limited research has been conducted in the area of lean administration, there is a potential for an increased understanding of how the concept of lean works within administrative processes. A qualitative case study was carried out in order to fulfill these purposes. The financial processes within two companies were studied and an analysis of how lean production principles were applied to fit these processes was conducted. The results show that when applying lean production principles within administration, interpretations have to be made in order to adapt the principles to the nature of administrative tasks.

Key words: Administration, Lean administration, Lean production, Lean thinking, Flow, Standardization, Improvement, Waste, Financial department.

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1. Background

This introductory chapter will commence by presenting the background of the chosen research area, followed by a motivation to why the area was chosen to study. The purpose of the study as well as the research question will be presented, followed by a short description of the companies that the study has been based on. Finally, the expected contribution to the research area is discussed.

1.1 The Origin of Lean

The ideas behind lean originate from the Toyota Production System. For many years during the last century the Japanese car manufacturer outperformed all its competitors in the car manufacturing business around the world. People began to question what had made Toyota's production so successful. The answer was lean, a method characterized by eliminating waste, making the employees more involved in the production process, and constantly working with improvements.

The Toyota Production System was developed by Taiichi Ohno, an engineer at the Toyota Motor Corporation. Taiichi Ohno had studied how Ford worked with mass production within their manufacturing processes and tried to apply similar methods to the production at Toyota's site in Japan. He soon realized that the methods of Ford were not perfectly applicable there, an insight that encouraged him to develop his own production system. That was the beginning of what would later be called the Toyota Production System. The success of the system quickly became a fact; Toyota managed to produce more cars, with higher quality and to a lower cost than anyone of their competitors.

A lot has happened since then. Lean production has been spread worldwide and a lot of researchers within operations management have been fascinated by the ideas behind the concept and the positive effects it has brought to the manufacturing industry.

1.2 The Rise and Spread of Lean

Lean production became known through the bestseller "The Machine That Changed the World" written by Womack et al. in 1990. The term had been introduced a couple of years before when Krafcik, a researcher at MIT, first mentioned the expression in his research. During the two past decades, the lean production concept has been modified and developed several times. In 1996 the book "Lean Thinking: Banish Waste and Create Wealth in Your Corporation" was published, in which Womack and Jones presented new ideas about how lean can be implemented on a more strategic business level. Even though the concept of lean has changed over the years, and the definition of the concept has come to vary somewhat depending on the source, it is still based on the ideas originally described by Womack et al.

Lean has become a commonly used approach in several different industries, and the concept has been spread to processes outside the typical manufacturing environment for which it was

originally developed. Services, healthcare and recently administration are areas that have introduced and begun to incorporate the lean concept into their processes.

1.3 The Choice of Research Area

The concept of lean is ever so popular, making it an interesting area to research. Due to its evolvement from the origins in the manufacturing industry, it is currently being applied by an increasing number of organizations, in various different industries. Administration is a relatively new area for the application of the lean concept. Consequently, as is often the case when new methods are developed in practical settings, a research gap has emerged, motivating further research on this new aspect of the concept.

The current economic downturn is a factor that creates further incentive to develop the lean theories outside the traditional production environment. Lean has a potential to make processes more efficient and less resource consuming, and at this moment companies are looking for opportunities to make their organizations more slim and their processes more effective. Lean administration can hence be a good way for organizations to cut costs without lowering quality.

1.4 Purpose

This study aims to make a contribution to filling the existing research gap in the area of lean administration, and to increase the understanding of how the concept of lean is applied within administrative departments. The purpose of the thesis is to investigate how lean production principles, traditionally used as means of improving manufacturing processes, can be applied to processes within the financial departments of organizations. The intention is to use existing theory on the concept of lean, with a focus on theories of lean production, and through a qualitative case study investigate how it can be applied to the area of lean administration.

1.5 Research question

In order to fulfill the purpose of the thesis, the study will be designed to answer the following research question:

How are lean production principles applied within administrative departments?

1.6 The Companies Studied

The study will be based on two companies that have successfully implemented the concept of lean into their production and have recently started to transfer the concept to other parts of their organizations. An administrative department where the initiative of implementing lean has commenced is the financial department in the respective companies, and that will be the department in focus for the study.

1.6.1 AstraZeneca

AstraZeneca PLC (henceforth referred to as AstraZeneca) is a British-Swedish pharmaceutical company. The company is focused on discovery, development, manufacturing and marketing of prescription pharmaceuticals and biological products for a number of areas of healthcare including cardiovascular, oncology, infection and neuroscience among others. AstraZeneca is currently active in over 100 countries and has more than 65,000 employees spread in Europe, the Americas, Asia, Africa and Oceania. The headquarters are located in London but the main research and development activities and production sites are situated in Sweden, the United States of America and the United Kingdom. Major shareholders are Capital Research and Management Company (4.92 percent), Axa SA (4.90 percent), Investor AB (4.38 percent) and Barclays PLC (4.26 percent). In 2008, AstraZeneca's sales increased by 3 percent and the core operating profit increased by 9 percent to MUS\$ 10,958. (AstraZeneca, 2009a)

1.6.2 Scania

Scania CV AB (henceforth referred to as Scania) is a global industry leader within the production of heavy transport vehicles, buses, as well as industry and marine motors. Altogether Scania has over 35,000 employees and is represented in about 100 countries through more than 1,000 local sales facilities and over 1,500 service points. The company has production facilities in Sweden, France, Poland, the Czech Republic, Russia, the Netherlands and Brazil. The central purchasing unit and corporate headquarters are located in Södertälje, Sweden and are complemented with local purchasing offices in Poland, the Czech Republic, the United States of America and China. In 2008 Scania showed the strongest earnings in the company's history with a net income of MSEK 8,890 and a return on capital employed of 43.1 percent. In the meantime the company's order bookings fell by 46 percent, with a sharp drop during the last quarter, which led Scania to decrease its production rate. Since March 2008, Volkswagen AG has been the majority owner of Scania. (Scania, 2009a)

1.7 Expected Contribution

Up to this point in time, the area of lean administration has been relatively undeveloped in theory and literature, and only limited research has been conducted in the field. The thesis aims to increase the understanding of how the concept of lean can be applied within administrative departments. The study is not expected to generate a complete framework for how the concept of lean can be applied to administrative departments in general, but rather it aims to create a foundation for future research within the area, and to develop a starting point for the generation of future knowledge and theories.

2. Methodology

In this chapter the research method, strategy, and approach that have been used to conduct the study will be explained and motivated. The selection of case subjects will be discussed, together with a description of how the data collection was carried out. The chapter will conclude with a critical review of the reliability and validity of the results.

2.1 Research Method

There are two types of research methods in the field of social science: qualitative methods and quantitative methods. The methods aim to achieve the same goal, which is to develop a better understanding of society, and how individual actors in society behave and interact with each other (Holme & Solvang, 1997). The *qualitative* method is characterized by an ambition to gain further understanding within the problem area that is studied, and to describe the context in which the problem area exists, by different means of data collection. The methods used to collect data ensure a close relationship between the researcher and the source of information. The method enables a deeper understanding of processes' contexts, by focusing on the overall picture. The *quantitative* method is characterized by a greater distance between the researcher and the information source, and a high possibility for the researcher to control the study. These are prerequisites in order to perform a more formalized and structured analysis, usually by using statistical methods. (Holme & Solvang, 1997)

A qualitative research method was most suitable, and seemed a natural choice, for the explorative type of study to be conducted. Rather than striving to prove the validity of predefined hypotheses, the aim was to investigate a phenomenon, in order to obtain a general understanding of the area of research. The method enables the research to be conducted from within the entity of interest, rather than obtaining information from a distance, which was believed to be a necessity in order to gain a deep enough understanding to be able to answer the research question.

2.2 Research Approach

Holme and Solvang (1997) state that it may be difficult to fully grasp relationships and interactions within societies by using basic theories, and hence there is a need for a systematic approach in order to be able to theoretically understand such relationships. One approach is the *inductive* research approach, which has its starting point in empirical findings. When using an inductive approach, several cases are considered, after which it is argued that an observed common trend can be considered generally valid. The second approach is the *deductive* research approach, which has its starting point in theory. For this approach, a general idea is the basis, and it is argued that the idea explains an individual case that is of interest to the researcher. (Alvesson & Sköldbberg, 1994)

Alvesson and Sköldbberg (1994) state that the two approaches usually are perceived as being exclusive. However, in reality, the *abductive* research approach seems to be the most common

one in investigations based on case studies. The abductive approach combines empirical findings and theory, and in comparison to induction and deduction, it also contains an element of understanding and reflection. It allows the empirical area to evolve and the theory to be adjusted throughout the time of the study. (Alvesson & Sköldbberg, 1994)

The approach that was used for conducting the study was the abductive approach. It permitted the analysis of the empirical findings to be combined with studies of theory and literature concerning the subject area. It seemed essential to use such a combination in order to satisfyingly be able to analyze the chosen subject, which is in a field where limited research has previously been conducted.

2.3 Research Strategy

A case study is a research strategy, rather than a research method. The objective is to study individual entities instead of a broad spectrum, and through such studies be able to draw general conclusions. (Denscombe, 1998) According to Voss et al. (2002), case research has played a consistently important role as a research method in operations management, especially when developing new theory. "In general, case studies are the preferred strategy when "how" or "why" questions are being posed, when the investigator has little control over events, and when the focus is on a contemporary phenomenon within some real-life context." (Yin, 2003 p.1) Researchers conducting empirical studies rarely have the opportunity to operate in an experimental manner, which is why an organization has to be studied in its existing environment, where the researcher has little or no influence over different variables. A case study is characterized by few observed entities, and numerous studied variables. The number of variables is often large in order for the researcher to gain a sufficient understanding of the organization, and hence the number of researched entities often has to be limited, in order to, from a resource perspective, be able to complete the research process, and from a knowledge perspective, to be able to manage the information that is collected. (Andersen, 1998)

A case study strategy seemed to be the obvious alternative in order to be able to answer the posed research question. Several different variables were of interest in order to analyze how lean principles are applied to administration, and to be able to gain a sufficient understanding of as many variables as possible, the number of case subjects was limited to include the financial departments within two companies. The research question, which aims to answer *how* an existing theoretical framework can be applied to a new area, was believed to be most appropriately answered by conducting an explorative study, and for that purpose case studies are a suitable strategy to use.

2.4 Choice of Research Question

In the initiation phase of the investigation, several different approaches and research questions were discussed. The preliminary research question was defined as: How can lean principles be transferred from a production process and implemented in an administrative department? The

intention was to study how the companies had adapted the principles when transferring them to administrative tasks, which principles had been discarded in the transfer, and if any new principles had been developed. The interviews that were carried out were based on that idea. However, after the data collection phase, it became evident that the scope for the intended analysis would be very limited. The empirical findings suggested that the principles had been transferred in their entirety from the production to the administrative departments. According to Holme and Solvang (1997), flexibility is a key word in qualitative research methods, and it is necessary to be able to do changes to the investigation throughout its duration. The researcher must be able to adapt in relation to the experiences gained during the research- and information collection phase. If it is evident that research questions have been left out or poorly constructed, it must be corrected. (Holme & Solvang, 1997) Based on the empirical findings from the data collection, and existing theories, a new research question was thus developed, which gave an opportunity to conduct a more interesting analysis. Due to the initial ambition of obtaining a broad scope for analysis, the already collected data was sufficient to answer the new research question.

2.5 Selection

Due to the limitations in resources for conducting research studies, and because of the need to be able to overview the collected information, it is optimal to limit the investigation to a few entities (Holme & Solvang, 1997). Prior to conducting the investigation, three selections were made in order to limit the scope of the study, and to enable a suitable collection of data. First, the type of department to be studied was selected. Thereafter, a company selection was made, from the perspective of the type of department that had been chosen. Finally, a selection of interview subjects within the departments was chosen. The continuation of this section will describe how the selections were done.

2.5.1 Department Selection

The choice to study administrative departments was clear from the beginning. A theory gap exists in the area of lean administration, which offers an opportunity for an interesting investigation. An advantage of studying the financial departments, rather than another administrative function or department, is that the tasks and processes carried out are quite similar between different companies, even when the companies operate in different industries. In the study, the term *administrative department* is defined to represent a department in which tasks of a certain qualified nature are carried out. Such tasks include reporting and costing, and exclude less qualified tasks such as simple filing of documents.

2.5.2 Company Selection

When it was decided to focus the study on financial departments within large organizations, the companies in where to study the departments had to be selected. The choice fell on Scania and AstraZeneca, with the motivation that the two companies have both been very successful in using lean within their manufacturing processes, and had recently begun to implement the concept in their respective financial departments. It may be perceived as a problem that the

two companies operate in different business sectors, however since the study is based on the financial departments which are quite similar between different companies, it is not believed to compromise the quality of the findings. In addition, the study does not aim to compare the findings from the two companies, and thus their activities in different industries are of little relevance. The size and composition of the two companies makes for comparable cases to study, since both the financial departments report to a higher financial department in the organization.

2.5.3 Interview Subject Selection

The interview subject selection is done based on the pre-notions the researcher has before starting the actual study. The subjects are often chosen in order to get the widest possible information scope in the material that is collected. Through a systematic selection, subjects can be chosen based on different criteria set by the researcher. For example, subjects may be chosen in order for the researcher to get a large variation in the selection, or they may be chosen because of the deep knowledge they possess of the phenomenon that is going to be studied. (Holme & Solvang, 1997) In choosing who to interview for this particular study, the aim was to be able to interview a variety of employees within the two financial departments, in order to get a wide range of answers and a good empirical base for further analysis. The subjects that were interviewed are all highly involved in working with the lean concept.

2.6 Conducting the Study

2.6.1 Theoretical Framework

Due to the fact that limited research has been done on the subject of lean administration, the theoretical framework was selected by examining existing prior research and literature within the nearby areas of lean production, lean thinking and lean services. An extensive literature search was conducted in order to find valid theories that would create a basis for the research study, and complement the analysis of the empirical findings. According to Bowen and Youngdahl (1998) back office processes have more similarities to manufacturing processes than front office processes. Since administration is entirely conducted as back-office processes, the existing field of research within lean production was determined to be the most appropriate starting point for developing a theory on lean administration. Consequently, the principles of lean production were chosen as a theoretical stance rather than the principles of lean thinking.

2.6.2 Data Collection

When using qualitative methods, the information is collected in ways and situations that closely resemble the day to day situations of the researched entity (Holme & Solvang, 1997). The main source of information in case research is usually structured interviews, which may

be complemented with other sources of data, such as unstructured interviews, interactions, personal observations, surveys, and review of archival resources (Voss et al., 2002). The data collection for this investigation was conducted by interviewing employees at the financial departments of the two companies. The interviews can be defined as being respondent-interviews rather than informant-interviews, meaning that the information source itself participates in the phenomenon that is studied instead of being an outside observer (Holme & Solvang, 1997). Three employees from the financial department of AstraZeneca were interviewed, and four employees from Scania's financial department were interviewed. The interviews were carried out by following a pre-designed interview guide. They were recorded as well as noted down, and interview transcripts were produced directly following the interviews. In addition to interviewing, direct observations were made around the offices, to gain further insight in to the different methods of lean that were being used. At Scania, a tour was made of the production site, where the lean concept is highly utilized. The reason that the interviews were not complemented with, for example, a survey, is that it was not believed to contribute significantly to our results and findings. Due to the limitations in time and resources available for the study, it was believed to be more beneficial to focus on retrieving useful empirical information from interviews and observations.

2.6.3 Analyzing the Information

Andersen (1998) states that analysis is based on two components: to define the individual parts of an entity and to examine the individual parts' relation to each other. Analysis is about categorizing the collected empirics with the aim of describing the findings (Andersen, 1998). During the initial phase of the empirical analysis, effort was put on keeping the empirical data collected from the interviews as descriptive as possible, as to not miss any fundamental elements or jump to conclusions. As suggested by Andersen (1998), the interview protocols were first analyzed separately from each other. Thereafter cross patterns between the findings were checked for, with an aim of developing a deeper understanding of the data. After the initial data analysis, the empirical findings were connected to the existing theory. Since only limited research exists within lean administration, the data was analyzed from the perspective of the chosen theoretical framework of lean production. Based on an analysis of how lean production principles were used within the case subjects, the research question could be answered, and with help from existing literature, conclusions could be drawn.

2.7 Research Quality

The quality of empirical social research can be determined by using a number of tests, which are also applicable to case study research. The quality of case studies is typically assessed by considering the internal validity, external validity, and reliability of the study. (Yin, 2003) Merriam (1994) states that the nature of the qualitative research method increases the importance of producing valid and reliable results compared to when using a quantitative method where validity and reliability can be established beforehand. A discussion of the validity and reliability of this particular study will follow in the remainder of this section.

2.7.1 Internal Validity

According to Yin (2003, p.34), internal validity is concerned with “establishing a causal relationship, whereby certain conditions are shown to lead to other conditions, as distinguished from spurious relationships.” Internal validity can also be concerned with the extent to which the results of the study correspond to reality (Merriam, 1994). Hence, although the study is not of a causal nature, the degree of internal validity should still be considered.

It is important that the researcher is aware of the fact that the collected information does not speak for itself, but is rather always an individual’s interpretation. It is the researcher’s responsibility to present the way the informants perceive themselves and their experiences in the most truthful way possible. (Merriam, 1994) By recording the interviews, the information collected could be reviewed several times in order to ensure that a representative presentation of the findings could be given. This is believed to increase the internal validity of the results. Merriam (1994) discusses other strategies that can be used to ensure a high degree of internal validity, one of which is triangulation. In the investigation, the information collected from interviews was complemented with direct observations of how the work was actually carried out in the financial departments. This is believed to further enhance the internal validity of the results.

2.7.2 External Validity

External validity is concerned with the extent to which the results from a research study can be generalized, meaning the degree to which the results are applicable to other situations than the situation studied (Merriam, 1994). In case studies, the aim is to be able to generalize a set of results to a broader theory, which is called analytical generalization (Yin, 2003).

Generalization of the results is more easily done when several situations have been studied and similar results have been obtained. This investigation was limited by time and resource constraints, and hence the study was focused on two financial departments. Due to the nature of the processes studied, it is believed that the results to some extent could be generalized to other similar departments carrying out administrative tasks, but it is difficult to establish a high external validity without augmenting the study to include a greater number of researched departments.

2.7.3 Reliability

Reliability is concerned with the extent to which the research study can be repeated and arrive at the same results (Merriam, 1994). It is believed that the reliability of a qualitative study cannot be determined by reproducing the investigation, since it is most likely impossible to conduct such a social study in the exact same way twice. Instead, the reliability can be

determined by gradually developing a better and deeper understanding of the phenomenon that is studied. (Holme & Solvang, 1997) Instead of determining the reliability of the results by replicating the study, the researcher should explain his position and use triangulation in striving for results that are meaningful (Merriam, 1994). In the methodology chapter and in the chapter explaining the theoretical perspectives for this study, the underlying theories, the background of the companies, and the selection processes for the case and interview subjects, are thoroughly explained. Hence, the researchers' positions in regard to the study have been identified, which increases the reliability of the study. In addition, as a complement to conducting interviews, direct observations of the actual work within the departments were made, which also contributes to a higher reliability of the results.

2.8 Criticism

A researcher conducting a case study must keep in mind that the information source may behave differently when the researcher is present (Holme & Solvang, 1997). The information must thus be critically reviewed. In order to prevent misleading answers and behaviors, anonymity was promised to all interviewees. As the research area is not of a sensitive nature, and anonymity was ensured, it is not believed that the employees that were interviewed had any reason to provide misleading or incorrect information.

It may have been the case that the recording of the interviews had an effect on the responses of the interview subjects. Again, since the field of study is not of a very sensitive nature, it is unlikely that it had any substantial effects on the results, and it is not believed to have compromised the validity of the findings.

Something that must always be considered is that the researcher's approach to the investigation and analysis will be influenced by preconceptions and beliefs about the case subjects and the research area. As a result of such biases, the study will not be completely objective. The researchers were aware of the effects such biases could have on the study and its results, and hence subjectivity was attempted to be kept to a minimum during the data collection phase and the analyzing phase of the study. By analyzing the information together, the researchers could question each others' viewpoints, and in such a way limit the biases that may have existed.

2.9 Delimitations

Due to the limitations in time and resources to conduct the study, it was limited to include two case subjects. This, of course, restricts the ability to generalize the results to a broader level, but because of the fact that the two case studies were from different companies, and the fact that processes and tasks within financial departments of different companies are fairly similar, it is believed that the results can be generalized to similar departments within other companies to a certain extent.

The limited time and resources also restricted the methods of data collection and the number of interviews that could be conducted. It could have added an interesting perspective to the study if for example a more thorough analysis of how the lean concept is used within other departments of the organization had been done. However, such information had to be gathered from the interview subjects in the financial departments. In addition, it could have been interesting to collect information from a broader scope of employees within the two departments that were studied, but this was not possible to achieve within the time frame for the study.

3. Theory

In this chapter the different perspectives on the lean concept, and how the theory has evolved over time, will be presented. In the first section, the concept of lean production will be explained, and the principles that make up the framework for the study will be further developed. The following sections will go through the concepts of lean thinking and lean services, to illustrate the evolvement of the theoretical concept, and the chapter will conclude with a presentation of existing research on lean administration.

3.1 Lean Production

As stated in the first chapter, the concept of lean was originally introduced within manufacturing. Focus was put on improving the ongoing activities in the factories. Karlsson and Åhlström (1996) find that there are several principles that characterize the concept of lean production. In later work by Åhlström, some of the principles were slightly relabeled (Åhlström, 2004). This section will continue with a brief description of each principle. The principles will then make up the framework for the study, but rather than being interpreted literally, they will be considered in light of the evolvement of the lean concept and in the light of administrative tasks.

3.1.1 The Lean Production Principles

Elimination of Waste

Elimination of waste is probably the principle that is most commonly associated with the concept of lean (Hines et al., 2004). Womack and Jones (2007) define waste as any activity that consumes resources but creates no value, and such activities should be eliminated. Potential sources of waste include quality deficiencies and overproduction. Quality deficiencies lead to waste of time and resources for both customers and manufacturers, and they lead to unnecessary costs when they are detected. Overproduction arise when an organization produces too much, unnecessarily early or “just in case”, and is a particularly harmful source of waste since it is a root cause to other types of waste, such as inventory. (Liker, 1997) Inventory in the form of work-in-progress is seen as especially dangerous as it typically hides problems so that they are hindered from being solved (Hayes, 1981). Other common sources of waste include inappropriate processing, waiting, transporting and unnecessary motions. Inappropriate processing exist when parts or products with higher quality than necessary are produced or when the process involves excessive activities. Waiting time increases lead times, and is characterized by a stand-still in the work due to waiting for things such as tools, supply and parts. Transporting, which sometimes also is referred to conveyance, is the wasted effort to move materials, parts or finished goods into or out of storage or between stages in the process. Unnecessary motions are any wasted motions when picking up or stacking parts, which result in increased lead times. (Liker, 1997)

Continuous Improvement

Continuous improvement is seen as the second most fundamental principle of lean production, after the principle of eliminating waste (Karlsson & Åhlström, 1996). Kaizen, which is the Japanese word for improvement, is an important brick in the Toyota Production System (Imai, 1986). Imai (1986, p.16) points out that “[Kaizen] ensures that there will be continuous improvement for improvement’s sake”. The aim is to constantly improve the production system, in order to reach perfection (Karlsson & Åhlström, 1996). For this principle to be successfully applied in a production system it is essential that everyone, including managers as well as employees, is involved and participates in the process (Imai, 1986).

Zero Defects

The principle of zero defects is another vital component of the lean concept. To keep up the speed in the production process, all products have to be fault-free from the start and remain so throughout the entire phase of the process so that the need for correcting defected parts and the confusion it causes is eliminated (Hayes & Clark, 1986). The intention is that errors should be prevented before they occur (Shingo, 1981). A common practice to ensure zero defects is to make all employees responsible for quality assurance as opposed to allocating that task to a certain unit or individual (Krafcik, 1988). The goals are to increase process control and capability by eliminating and preventing defects (Wheelwright & Bowen, 1996).

Pull Instead of Push

The lean concept includes the notion of a pull-based production system (Monden, 1993). The production should start only after an order has been placed by a customer. The customer’s order is pushed backward through the stages in the production process until it reaches the first stage at which the production begins. When a pull-system works optimally the production turns into a just-in-time process, a concept characterized by producing just what is needed, in the exact quantity needed, and just at the time when it is needed. (Monden, 1993) Just-in-time implies that the stock of finished products must be zero, meaning that production must equal but not exceed orders (Shingo, 1981).

Multifunctional Teams

A multifunctional team is a group of employees that can perform many different tasks (Karlsson & Åhlström, 1996), such as maintenance, procurement, regulation, control and quality, and material handling (Wheelwright, 1981; Sexton, 1994). A result of the use of multifunctional teams is that the number of job classifications decreases, since individual employees perform a greater variety of tasks. Tasks can then be rotated between the team members, leading to an increased flexibility and a lower dependency on individual employees, which can decrease the vulnerability of the production system. (Karlsson & Åhlström, 1996)

Decentralized Responsibilities

Within lean work organizations responsibilities are decentralized to the multifunctional teams. There is no supervisory role in the hierarchy, instead the supervisory tasks are conducted by the multifunctional team. In its most advanced form this is done by rotating team leadership among employees especially trained for the task. As opposed to the traditional leadership roles of bosses and disciplinarians, team leaders take on a more supervisory role in the form of advisers, coaches and support providers. As a result of decentralized responsibilities, the hierarchy levels in the organization can be reduced. (Karlsson & Åhlström, 1996)

Vertical Information Systems

The final lean production principle as stated by Karlsson and Åhlström (1996) is the one of vertical information systems. Vertical information systems are essential for the employees' understanding of the organization's goals (Karlsson & Åhlström, 1996). In order to make the employees fully aware of the goals, the information system has to be in real-time and encourage problem-detection and problem-solving (Wheelwright, 1985). Besides ensuring awareness of goals, vertical information systems can increase the speed of feedback and action (Cole, 1985). In addition to having a well-functioning system for information that is passed from higher levels in the organization, there should be a system that allows information to be spread upwards in the hierarchies (Hayes et al., 1988). According to Karlsson and Åhlström (1996) information can be divided into two types: strategic or operational. The strategic type of information concerns the overall performance and intentions of the company while the operational type includes information about the performance of an individual team (Karlsson & Åhlström, 1996).

3.2 Lean Thinking

The concept of lean production has evolved over the years, as researchers began to consider the possibility of applying the concept to other parts of an organization than the manufacturing process. In 1996, Womack and Jones' book "Lean Thinking: Banish Waste and Create Value in Your Corporation" was published. In the book, which was re-published in 2003, the authors describe a new perspective on the lean production principles and take the concept of lean to a more strategic level. The ideas of lean were further developed, and expressed through five different *principles of lean thinking*.

A critical starting point for lean thinking is the *specification of value*. There should always be a connection between what the customers experience as value and what the company delivers. To ensure such a connection, the organization must recognize which activities are value-adding for the customer. If the definition of value is unclear, there is a risk of using resources on non-value adding activities, leading to waste. After specifying value, the next step is to examine and map out the process and determine which parts are value-adding and which parts are wasteful, in other words, it is essential to *identify the value stream*. In order to achieve a lean enterprise, it is necessary to scrutinize the processes of the entire organization as well as those of the supply chain. When value has been specified and the value stream identified,

focus should be put on *creating flow* by finding the most appropriate process design. The aim is to accomplish a rapid flow, which at the same time is synchronized with demand and evenly paced. In order to decrease the need for inventory and reduce the risk of overproduction, the organization needs a *pull-based system*. Pull is about delivering what the customer has ordered, at the right time and in the right quantity. The organization should allow customers to pull the products out from the organization as they are needed, rather than pushing products onto the customers. *Perfection* is the fifth and final principle of lean thinking, and is strongly connected to the production principle of continuous improvement. Only when continuous improvement is a common mindset among employees can hidden waste be discovered and eliminated. Transparency and visibility, as well as quick feedback, play important roles in the striving towards perfection. (Womack & Jones, 2003)

3.3 Lean Services

As the lean concept has undergone an evolution and expansion from its origins in the car manufacturing industry, research has especially been focused on the applicability of lean principles to service processes. Several researchers have found that the concept of lean production can be applied to various areas of the service industry. Karlsson et al. (1995) and Swank (2003) respectively analyzed the healthcare industry and an insurance company, and found that the lean production concept successfully can be implemented on such services. Bowen and Youngdahl (1998) examined a number of processes, including those of the fast food and airline industries, finding that the lean principles are applicable to these types of services. They also found that back office processes are more similar to manufacturing than front office processes, and it is therefore easier to understand a successful implementation of lean principles in back office processes. Åhlström's (2004) findings indicate that some lean principles are more complicated to apply to services while others are even more suitable for services than for manufacturing. Elimination of waste and zero defects must be interpreted differently in service processes. Value-adding activities in a service process might be seen as waste in a manufacturing context and zero defects are difficult to achieve when the customer is a part of the service. The principle of pull instead of push is easy to apply since services cannot be stored and therefore are pull-based by nature. The other production principles are easily applicable to services and do not need any particular adjustment. (Åhlström, 2004) Åhlström (2004) also found that the principle of vertical information systems arguably is even more applicable to services than manufacturing, since service processes often are more geographically dispersed than manufacturing processes, increasing the importance of efficiently being able to distribute information.

3.4 Lean Administration

To date, limited research has been done about the applicability of lean to administration. However, lean administration share similarities with both services and production which indicate that some of the results found in previous research also are valid for administration (Keyte & Locher, 2004). Keyte and Locher (2004) state that all the methods used within lean

production can be applied to non-manufacturing and administrative processes. Nevertheless, they find that within certain contexts, there are difficulties in directly transferring the methods used in production to non-manufacturing processes. In those settings, deeper understanding and creative thinking are necessary in order to find the best solution to how the principles can be applied. (Keyte & Locker, 2004) In addition, Larsson (2008) states that there are no significant differences between lean administration, lean production and lean services, but that the concept has to be interpreted from a different viewpoint, keeping the nature of administrative processes in mind, in order for a useful application to administration.

4. Empirical Findings

In this section, the empirical findings from the interviews will be presented, divided in to one section for each case subject. Each section will begin with a general description of the company and case subject, and how they work with the lean concept. Thereafter, information about how the different lean production principles are used by the case subjects will be presented.

4.1 AstraZeneca - Case Subject Description

4.1.1 The Case Subject

Sweden Operations is a part of AstraZeneca Sverige AB, which is the Swedish division of the global organization AstraZeneca PLC. There are currently about 3,400 employees working within the division. Their core activities are mainly located in Södertälje and consist of the production of the active substance in their pharmaceuticals, the production, formulation and packaging of end products and quality control. Sweden Operations is divided into several units that are respectively responsible for production, technical support, supply of articles and distribution. Other important units are the ones responsible for internal services, quality control, communication, personnel, finance and safety, and health and environment. (AstraZeneca, 2009b)

The case subject for this study has been the financial department, complemented with information on processes related to financing within internal services, a unit that has recently begun to implement lean. The financial department has been working with lean for about two years, and the concept has recently started to spread to processes involving similar tasks. Two processes that have come far in the application of the lean concept are the process of Full Manufacturing Cost (henceforth referred to as FMC) and the monthly closing of books, which have thus been central in this study.

4.1.2 Lean within the Case Subject

The implementation of lean was initiated by the management group. Within Sweden Operations, lean principles were first introduced in the production about five years ago. When implementing lean on administration, employees have been influenced by the working methods used in the production site and it has always been an intention to utilize the internal knowledge that has been accumulated in production over the years. As one interviewee states, “there is no point to reinvent the wheel”, emphasizing the idea of sharing knowledge between departments.

During the implementation phase, an initial step was to create a common lean language base, making communication easier. Employees could participate in a two and a half day long course, where the basics of lean and the notion of the principles were taught in a practical manner. It is seen as important that these courses include examples from the financial department’s own processes, so that the employees understand how lean can be linked to the work that they are familiar with. The next step was to examine the processes in detail and to

question if they were functioning optimally, and to map out the parts that could be improved, such as where lead times could be reduced.

The work within Sweden Operations is to a large extent carried out in project teams. The idea is to have team leaders that can guide the work with continuous improvement and capture ideas for change and development. Within internal services teams often work globally, meaning that employees from different parts of the global organization form the project teams. When team members are spread out in different countries, more time and effort will be needed in order to succeed with the implementation of lean.

A slight adjustment is usually needed when ideas are taken from the production and the employees experiment to make them fit with the nature of administrative tasks. A difference between production and administration identified by the interviewees is the definition of the customer. In production it is easier to have the customer in mind during the process, and to focus on what he or she sees as being value-adding. As one of the interviewees at the financial department put it, “of course, it is hard to think of our customer as a patient”. The customer is instead seen as the department or manager who has requested the financial reports. Another challenge is to follow the process flow when there are no physical products, except for the end product. To deal with that, the financial department has introduced visualization boards, making it easier for the employees to see each step performed in the process. The whiteboards that are used were inspired from the production. Another inspiration from the production is the idea of having improvement meetings. The concept of the meetings was adjusted to the flow in the financial department, and instead of having daily meetings as in the production, meetings within the FMC process are held once a week.

The financial department has had a positive experience of the lean concept. Since the concept was implemented both the process of the monthly closing of books and the FMC process have become more efficient. One employee states that the monthly closing of books now is carried out in fewer days, with improved accuracy and with fewer employees involved in the process. The FMC process is also more efficient than before. The effects of applying the lean concept to processes within internal services are still to be shown, as the implementation is at an initial stage.

4.2 AstraZeneca - Empirical Findings from Interviews

Elimination of Waste

One of the central aspects of introducing the lean concept within the units has been to decrease the unnecessary use of resources. To reduce lead times has been especially important, and the potential outcome is a reduction in the use of resources, alternatively a reallocation of resources to tasks where they create more value. One of the interviewees states that, “[with shorter lead times] more time can be concentrated on the customer and its needs

rather than making the financial numbers flow through a process”. There is a consensus among the interviewees that it is essential to map out the process flow in order to define where value for the customer is created, and where lead times can be reduced. The aim is to make the process flow as efficient as possible to be able to improve the use of resources. In order to create a streamlined process and reduce lead times, variations and discrepancies must be eliminated. It is, however, believed in the department that it is in some ways impossible to completely eliminate the variation, since the nature of financial tasks is unpredictable and unexpected events may occur. Even a streamlined process will always be somewhat resource consuming because of the variation. One interviewee believes that discrepancies in the production process can be eliminated by physically changing the production environment to an extent that will never be reached in the financial department.

In order to reduce lead times, the time it takes to perform each individual task has to be measured. Lead times are constantly measured within the production process, but this has not seemed to be a relevant measure for a financial department. However, employees have now realized that in order to streamline the flow and make processes more efficient, lead times must be measured to determine where they can be reduced. This is especially important in very precise processes, such as the monthly closing of books.

Continuous Improvement

Within the units, it is seen as important to regularly work with improving processes and making them more efficient. The interviewees agree that lean is not something that can be finished or completed, but it is rather about implementing a way of working to be able to continuously improve processes.

A team leader is ultimately responsible for continuously improving the process, however for improvement to actually happen, it is essential that all employees are involved in detecting errors and are determined to find better and more efficient ways of working. In order to continuously be able to improve processes, a thorough understanding of the process flow is needed. When a process flow is determined and mapped out, it is important to not only look at improvements that are taking place at the moment, but to look at how the process can be developed and improved in a long term, continuous, perspective. Improvements are constantly being made by the smaller teams on a local level, with the aim of spreading the ideas throughout the global organization. There are different areas for potential improvements. According to one interviewee, since two units were merged about a year ago, there are things that are not yet functioning as they should. These areas have potential for pure quality improvements. On the other hand, many processes are functioning well, but there is always a potential to reduce the wasteful use of resources. Improvements must also be made in the actual mapping of the processes, to improve the quality of the visualizing, in order to further clarify the process and its flow.

One employee believes that the biggest gain from implementing lean has been the increased understanding of the process, due to the involvement of everyone in trying to improve it. Such increased understanding is especially important in processes that are short in time, for example the monthly closing of books. By having short meetings to establish what is working well and what needs to be given more attention, the process flows more efficiently. The idea is to be able to allocate resources depending on the current situation, and not according to a plan that has been used for several years.

One of the main processes, the monthly closing of books, is carried out during four days each month. During this process, the team has a follow-up meeting by the whiteboard on the fifth day where they discuss and note down the problems and difficulties that they experienced during the previous days. The problems are then ranked, and the five most crucial problems will be worked on until the next month. One day before the process starts over again, the team has a meeting to discuss what they have accomplished in order to solve the problems. This way of continuously trying to improve the process as a team, is seen as advantageous compared to assigning the problem solving to one individual, in which way it can easily be forgotten or put aside.

Another interviewee describes a different way of continuously improving a process. The FMC process is carried on from May until September, when the pricing is decided for everything that is produced. The rest of the year, from October until April the following year, the team is focused on improving the process. They use an improvement-board where all activities are noted down, as well as issues that need to be addressed. Once every week a meeting is held to ensure that all members of the team are following the activities on the board and a discussion of how the work is progressing is held. This makes it easier to help each other within the group. They use an evaluating system, where each member visually states if their activities and tasks are advancing according to plan (green) or if they are lagging behind (yellow or red).

Zero Defects

It is seen as essential that the teams are able to deliver correct reports to the customer or user. One small mistake in an individual department can have severe effects on the reports for the entire organization. Although it may be discovered in time to do something about it, extra resources will be needed in order to make corrections and changes. Since the lean concept has been implemented within the financial department, and lead times have been reduced, the unit believes that tasks can be carried out with a higher degree of precision, making it easier to spot mistakes. It is now easier to determine if the right tasks are carried out in the right manner.

Pull Instead of Push

Within the units, the work is always connected to the demand of the customers. There is no point in producing reports that are not ordered or scheduled since they will be of no use.

Among the processes studied, the process of the monthly closing of books is done once every month, while the FMC process is carried out once every year over a longer time period.

Multifunctional Teams

Within the department, it is believed that an important factor in working with the lean concept is that employees can perform different tasks, and when needed fill in for each other. The multifunctional environment is created by increased standardization and a clearer structure of tasks. Among the interviewees, lean is associated with a higher degree of standardization. This is seen as something positive, as it gives a clearer structure to many processes, and increases the flexibility of the process since employees can step in and carry out each other's tasks. It is believed to create a greater understanding for processes that employees themselves are not involved in. One form of standardization has been to develop a model for calculating different scenarios, which means that all calculations will follow the same pattern. The team worked together to develop the model, and feels that it is a lean application that is used in their every day work. One interviewee feels that it is a security to know that the routine tasks that have to be carried out each month are performed in a standardized manner, which simplifies the work. If one employee runs out of time to complete certain tasks, someone else can step in and complete it. As well as creating a secure feeling, it also leads to more interaction between employees. The increased standardization and multifunctional working environment is especially important in processes such as the monthly closing of books, when the shortage of time can lead to high stress levels and a lot of extra work if a team member is absent.

Decentralization of Responsibilities

In order to successfully use the lean concept within the units, it is believed to be essential that all employees are educated in the basics of lean. One interviewee is convinced that the lean concept will be successful when adapted by small teams, of up to 12 people. When working in small teams, and having one person who is responsible for each process, it is easier to involve everyone, and make everyone more willing to contribute and take responsibility. In larger teams, when for example taking the concept to a global level or higher up in the organization, it becomes difficult to maintain the involvement and participation of all team members. Decentralizing the responsibility by dividing processes into smaller parts makes it easier to involve everyone in working with the lean concept, rather than having one large process that covers all the tasks. The smaller, local teams can then learn from each other, and a best-practice way of working can be developed on a broader level.

Vertical Information Systems

It is important that information is shared and easily accessible for all employees. An important aspect within the department is that everyone is aware of the different tasks and processes that are going on. One interviewee states that it is essential to get everyone involved and to visualize the process, making it more structured and creating an understanding of the nature of the process, including critical moments and deadlines. Several teams within the financial

department work with whiteboards and visual planning. Whiteboards are hung in the corridor of the department, illustrating the current state of the different processes, who is involved, and different problems that have been encountered. The boards give employees an overview of everything that is going on in the department. Before the introduction of the visual instruments, employees were aware of what their colleagues were doing, but it was hard to grasp and get a deeper understanding of the process flow and the way information was shared and used in different processes. By visualizing the information, everyone gets an overview of all the activities going on in the department, which deepens each employees understanding of how everything is connected and carried out. As well as creating a better overview and understanding within the financial department, other departments, as well as management, have a greater possibility of observing the current processes. It creates a security and employees feel calmer, because of the enhanced overview that they have. They can clearly see the process map with all the activities in the right order. That was something that did not exist before, creating confusion about what had been done, and in what order things should be done. Since everyone has availability to the same information, fewer questions and uncertainties arise.

4.3 Scania - Case Subject Description

4.3.1 The Case Subject

Scania's European production of driver's cabs is concentrated in Oskarshamn, Sweden. There are about 1,800 employees who contribute to a yearly production of approximately 60,000 cabs. The production site consists of five top-modern manufacturing workshops: press, body, basic painting, cover lacquer painting and complete assembly. When the cabs are finalized they are transported to Scania's chassis factories in Södertälje, Angers (France) and Zwolle (the Netherlands) for final assembly. (Scania, 2009b)

The case subject for this study has been the financial department in Oskarshamn. There are about ten employees working in the department. The central tasks include the monthly closing of books, accounts payable and accounts receivable, and financial monitoring as well as costing.

4.3.2 Lean within the Case Subject

Scania has developed a system of lean called the Scania Production System (henceforth referred to as SPS). The company started to develop SPS in their production in the 1990s. The system is built upon three core values: the customer first, respect for the individual and elimination of waste. Important aspects to work with and constantly improve are safety, quality, delivery and economy. When lean was implemented at the financial department the SPS principles were used as guidelines. In fact, SPS at the financial department includes all the same aspects as SPS in the production.

Lean was first introduced in the financial department about a year prior to this study. The monthly closing of books was chosen to be the first process on which to implement the concept, the reason being that almost all employees in the department are involved in that process. The idea was to teach and involve as many employees as possible from the start, making it easier to implement the concept to other processes later on. The aim is to apply the lean principles to other processes within the department, such as accounts payable and accounts receivable, in the near future.

The goals of the implementation of lean were to get a clearer structure of the process, to increase the knowledge of SPS, to decrease overtime and stress as well as to free time for other activities. Shortly after the decision to implement lean in the financial department had been made, Volkswagen, who had become the majority owner of Scania, expressed a demand for faster processes.

To successfully implement lean within the financial department it has been necessary to devote a lot of time and effort during the introduction phase. The implementation process started with a three month period of discussions and planning. From the start it was seen as crucial that every employee understood why the concept was to be implemented, and knew the basics of the lean principles, before continuing with the actual implementation. In order for that to happen, a one day long lean administration course was held for the employees. Thereafter every activity in the process of the monthly closing of books was analyzed in detail, and every part was evaluated in terms of time consumption. The next step was to develop a standardized plan for the tasks of each employee. Visualization tools were developed, and it was seen as essential that these were kept as simple and visual as possible. Daily control was then introduced during the four days of the closing of the books process, with reconciliation meetings of five to fifteen minutes every morning. Finally a test trial was conducted.

Standardization and change of work routines can be met with suspicion among employees, something that was considered before the implementation of lean. To make the employees comfortable with the new working methods, education and coaching have been important factors. A good source of support has been the company's SPS team, which has been involved in the implementation process from the start and supported the employees in their learning process, making them more willing to actively participate. As one interviewee states, "everybody has to be onboard" for the lean concept to work. Evaluation and feedback for the employees is another tool that has been important during the implementation.

The department has experienced several improvements since they started to work with lean. First of all, the employees have become more involved in the entire process. As a consequence a greater understanding of all steps has emerged. One employee states that "it has become easier to see the big picture" since they started to work with lean. Problems are now dealt with in real time, and as soon as they occur they are noted down on an improvement board. That way the employees are working with improvements on a more

regular basis. Since the lean concept was implemented in the department, the time consumed for the process of the monthly closing of books has decreased from four to three days. Significant reductions in overtime have been seen and the employees feel less stressed than before the implementation.

4.4 Scania - Empirical Findings from Interviews

Elimination of Waste

One of the aims of implementing lean in the financial department was to improve the efficiency of the process of the monthly closing of books. The days during which the process took place were earlier characterized by high levels of stress and overtime, as well as little time to spend on analytical tasks. Mistakes were corrected at a later stage, rather than dealing with them as they occurred. Even though the quality of the work was relatively high, the team felt that it could be even better. Employees also wished to be able to devote more time to other processes during these days, something that was impossible to do because of the way the process was carried out. By mapping out the process, and visualizing it for everyone involved, a clearer structure was formed. They could identify where reductions in lead times were possible, and problems and deviations could be dealt with.

The members of the team in the financial department believe that the focus is somewhat different in an administrative department such as the financial department, in comparison to the production. The processes carried out in the administrative departments as well as in the production are repetitive processes, however while the production teams carry out a process several times an hour, the main process in the financial department, the monthly closing of books, is carried out once every month. Because of this, the way lead times are measured is different. In the production, time is measured in seconds, whereas in the financial department, intervals of 15 minutes are used. Another difference is that in the production, meetings are held every day in order to efficiently be able to reduce waste, but in the financial department, such meetings are only held during the days of the closing of books. These differences are not something that create difficulties in the way of working with lean, but are rather adjustments that have to be made because of the fundamental differences in the processes. An aspect that does create difficulties in reducing lead times is that an administrative process is more susceptible to the effects of external events than a line production process. Disruptions in the financial departments include things such as unexpected phone calls, and the efficiency of a day of work largely depends on the state of the mailbox at the beginning of the day. Such deviations from the main process cannot be eliminated to the same extent as they can in the production processes.

It is essential that the team considers what reports, and in what degree of detail, the headquarters in Södertälje need. Both over-specification, as well as under-specification lead to an inefficient use of resources. If the reports are more detailed than what is needed, it is likely

that more resources than necessary have been put in to making those reports. However, if the reports do not contain enough information, it will lead to a waste of resources in the process of completing or redoing them.

The team uses a whiteboard to illustrate the flow, the standard, the pace and the balancing of the work over the days, for the process of the monthly closing of books. By visualizing the process in such a way, deviations are easy to spot, and create an incentive to improve. The main focus is put on the actual reports and the deviations that occur in them. In order to reduce the waste due to the deviations, they are marked out on the board with red dots, to be brought up and discussed during the improvement meetings. The interviewees agree that before these instruments were introduced, a lot of time was wasted, and there was confusion as to in which order tasks were to be performed. Now, everyone finds that the work is more structured. The way the process is carried out is better adapted, and there is a greater balance in how the work is divided over the days, which was possible to achieve by reducing waste and overtime. Deviations are emphasized, and the more standardized work results in a well-structured environment. Being able to clearly follow the process has led to an increased feeling of control among the employees. The intensity of the process has not decreased, but the stress levels are reduced.

When having determined the process flow, and mapped it out to create a visual understanding for all members of the team, a normal state can be established. By following the normal state, considering safety, quality and delivery, the expected result should be reached. If something is not normal, the expected result will probably not be reached, indicating that there is a deviation somewhere, which creates an incentive to improve. When the process flow is mapped out, a procedure of daily controlling can be put into practice. By looking at what has worked well and what has not, the deviations can be addressed on a daily basis. Earlier, when the team waited until the end of the closing of the books, many of the problems and deviations were forgotten. By being able to address deviations in real time, time has been freed during the closing of the books process. Employees feel that by reducing the unnecessary or wasteful activities and time spent on them, they now have more time to spend on other tasks.

Continuous Improvement

Before implementing lean in the financial department, the quality of the work and the reports being produced was high, however, there was a shared belief that it could be even higher. One of the main goals was to be able to get more time to spend on other tasks during the process of the monthly closing of books. In order to accomplish this, a procedure to continually improve the process was put in place. By establishing a normal state, it becomes easier to detect deviations and problems that can be reduced, eliminated or solved. By having visual boards, problems and deviations can constantly be observed and improved. A deviation creates an incentive to improve. By having daily controlling meetings of 5-15 minutes every morning during the closing of books process, there is very little risk that something will go unresolved. However, these meetings do not have the purpose of solving any problems, but rather just to

make everyone aware of them. Instead, separate meetings are held that are solely focused on solving the problems. The meetings within the department ensure that working with improvements is not only a paper product, but rather an actual task that is taking place on a daily basis. Through the use of the different methods to continuously improve the process, the department is striving towards its ultimate goal of becoming a lean department. It is what they eventually want to reach, by working with improvements and daily controlling.

Zero Defects

The SPS principle, Right from me¹, is believed to ensure that mistakes in the process and in the reports are reduced to a minimum. A mistake by someone at the financial department in Oskarshamn can go unnoticed and hence be passed on in the reports that are sent to the headquarters in Södertälje. This may lead to mistakes in the reports for the entire organization. However, if everyone produces faultless work to be passed on and consolidated into a final report, the report is less likely to contain any form of mistake. In order to minimize the mistakes, employees are encouraged to report mistakes as soon as they are discovered. It is important to measure the number of mistakes that are made to be able to minimize them. For each employee, the number of delivered mistakes is measured, as well as the number of mistakes that they have discovered themselves. For this measuring system to work, it is essential that there is no prestige among the employees, and that everyone instead is determined to improve.

Pull Instead of Push

The process of the monthly closing of books is controlled by the demand for the information that is produced. The reports that are requested by the headquarters can only be produced when all the needed information is available, which is close to the date when they have to be delivered. In addition, there is no need for a monthly report except for at the end of the month. Within the actual process of the monthly closing of books, the employees would often spend a lot of time, and work overtime, in order to avoid the risk of running in to problems at a later stage. Now, if mistakes occur, they are instead dealt with when they happen.

Multifunctional Teams

An increased standardization within the department has created a structure in the processes that was lacking earlier. Before introducing the lean concept, if someone was absent from work, the entire process could fall apart since no one else would be able to perform the tasks of that person. However, with more standardization and structure in the process, it is easier to perform tasks for each other.

Decentralization of Responsibilities

A success factor at Scania, and in other Nordic companies, is that contribution from each individual is welcomed. The organization is not so hierarchical, and it is seen as essential that

¹ Translated from Scania's Swedish expression "Rätt från mig".

everyone in the team contributes to finding the best solutions to reach the goals. The department does not follow a top-down decision making process. It is important that everyone understands what creates value, and that all employees have creative space to contribute in making changes. Following the concept of Right from me, increases the individual responsibility for the employees, as they have to take their own responsibility and correct mistakes when things go wrong.

Vertical Information Systems

The visualizing of the closing of the books process, and the fact that the team members are working geographically close together, enables an easy and efficient way of sharing information. Another factor that simplifies the work is the close proximity to the production and the employees that work there, where all the numbers originally come from. If a mistake is suspected, or if something is missing, it is quickly solved by just walking to the production site.

5. Analysis

This chapter will contain an analysis of how principles of lean production are applied within an administrative department, based on the empirical findings from the two case subjects. The structure will follow the theoretical framework of the lean production principles,

5.1 Application of Lean Production Principles to Administrative Processes

Elimination of Waste

The empirical findings show that the principle of eliminating waste is of great significance in order to become a lean administrative department. However, the procedure of determining what is wasteful may be difficult. In order to apply the principle of eliminating waste to an administrative department, the sources of waste must be identified. This process is likely to take time and effort, and in order to succeed it is essential to be aware of the investments, in terms of time, effort and resources, that are needed in the initiation phase of working with lean. Thorough planning and scrutiny of processes, as well as education of employees in the basics of lean, are needed.

In locating the sources of waste, the identity of the customer must first be determined in order to specify the value-adding activities. For a manufacturing company, the financial department's customer is rarely the same as the organization's paying end-customer, and hence must be identified separately. The customer can be defined as a user of the information and reports that are produced within the department, and is likely to include other departments and units within the organization, as well as management. Once the identity of the customer is known, the value-adding activities can be specified. The next step is to identify the value stream. This may be a challenge within an administrative department, due to the intangible flows of information. The value stream is therefore best identified by through a methodological approach visually mapping out the flow of the process. Once this is completed, the procedure of finding potential areas of waste reduction can begin by carefully scrutinizing the process and measuring the time it takes to complete tasks, so that lead times eventually can be reduced. Considering the types of waste that exist in manufacturing, inappropriate processing and defective products are the main sources of waste within administration. They cause unnecessarily long lead times, which result in an excessive use of resources in terms of time and capital.

Inappropriate processing occurs in a financial department when reports are over-specified, and produced to contain more information than is requested by the customer. Over-specification and over-worked reports tie up resources that could be put to better use in another process. In order to reduce or eliminate this form of waste, more attention should be paid to the actual needs of the customer. In addition, clearer job descriptions may help employees to stay focused on what is actually demanded.

Defects resulting from an administrative process can be expressed in the form of faulty reports or underspecified reports. Whereas in a manufacturing process, defective products may have harmful effects for the end consumer in terms of health and safety, defects in the financial department might instead have repercussions for various other departments and units within the entire organization, if they go unnoticed. The end-customer of the organization's products is not likely to be affected, however other departments that base their decisions and strategies on the information in the reports produced by the financial departments, may be misled by the mistakes. Extensive resources may be needed to correct errors from the financial department, a use of resources that does not create any value for other departments nor the end-customer. By encouraging all employees to seek and find mistakes, defects will be reduced. This is simplified by visualizing the process, having regular meetings to improve the process, and encouraging every individual to feel a greater responsibility for their own tasks.

Other common sources of waste that are typical in manufacturing were not observed in the financial departments, due to the predictable recurrence of the processes and the intangible nature of the product. Within manufacturing, waste of overproduction arises when an organization produces too much, unnecessarily early or "just in case". This type of waste will never occur within administration since there is no use in producing reports that have not been scheduled or requested. In a production setting, waiting is a waste when a line has to stand still while waiting for a part to arrive from a previous stage. The predictable recurrence of the financial processes limits the risk of unexpectedly having to wait for needed information, since it is known by everyone beforehand what information is needed and when, for example the monthly closing of the books recurs once every month. Since the process is not designed or structured as a line, it will never stand still because of waiting. Due to the more independent nature of the tasks, a delay in one task will not severely affect the continuance of other tasks, as long as all tasks are completed and put together before the deadline. Since there is no physical motion of products through an administrative process, waste caused by transportation of products and parts will not occur. Due to the intangibility of the product it cannot physically be seen as inventory. Although it is possible to store information, it does not involve the costs and problems that arise from storing tangible products. The need for some inventory, which is often seen in manufacturing processes, does not exist in administrative processes because of the need for current information. Unnecessary motions do not lead to waste in an administrative department, since the processes do not involve physical effort from the employees.

In addition to inappropriate processing and defects, another type of waste can be seen within administration, which is not emphasized within manufacturing. From the empirical findings it is evident that there is a great significance in the processes being carried out in an efficient and structured way. Unstructured processing causes high levels of stress and lead to overtime. If the processing lacks a clear structure, tasks will be carried out in an inefficient manner, which will be more time consuming than is necessary. It does not necessarily mean that the quality of the finished reports will be affected, but it will put an increased pressure on the

employees. The process of the monthly closing of books is especially intensive and has a clear deadline, meaning that the employees are particularly exposed to the pressures of stress and overtime. By clearly mapping out and visualizing the different stages of the process, a common strategy for employees to rely on is created. Everyone can easily see when things should be done, how it should be done, and how long it will take. Job-descriptions that clearly describe how and in what order tasks should be carried out can be developed to serve as guidance for employees. If the process strategy is followed, only unexpected events can lead to increased levels of stress, and possibly cause need for overtime. These types of unexpected events are a natural part of administrative tasks, since the tasks are of a qualified nature and are affected by external factors. Even though these unexpected events seldom directly add value for the customer, they cannot be reduced or eliminated by changing the structure of the process, but have to be seen as a natural degree of variation that is part of the processes.

Continuous Improvement

The empirical findings suggest that working with continuously improving processes is one of the most important aspects when applying lean principles to administrative departments. It is evident that in order to fully reap the benefits from continuously improving processes, it is crucial that all employees are involved in the work. This is something that both case subjects have realized which has encouraged them to educate employees in the basics of lean, to increase the awareness within the departments. Companies that already work with lean in their manufacturing are likely to benefit from the internal knowledge and familiarity with the concept when introducing it to other departments. In the study it was apparent that the implementation of lean within the financial departments has intensively benefited from the accumulated knowledge and the mentality towards lean that is incorporated into the company cultures. As well as being able to provide help and guidance, a successful lean production system within manufacturing serves as evidence that lean is a well-functioning concept, and not just a fashionable idea, which can simplify the otherwise possibly difficult task of encouraging all employees to get involved. Another way to encourage the involvement of everyone in continuously improving the processes is to carry out the implementation of lean step by step, applying the concept to one process at a time. A good process to start with is one that involves the activity of many employees. The more involved employees are from the start, the easier it will be to apply the concept to other processes,

In administrative processes, as well as in other processes, the principle of continuous improvement involves the reduction of lead times. Hence, a prerequisite to continuously improve processes is to be able to obtain reliable and accurate measures for lead times. Due to the nature of qualified administrative tasks, measuring the time of separate tasks has been proven to be difficult. In order to successfully utilize the concept, the department has to rely on individual employees and their engagement, rather than having assigned individuals to be in charge of measuring and determining where lead times can be reduced. Employees' commitment to finding problems, and ways in which to solve them, is thus the foundation of a well working strategy to for continuous improvement.

Common methods that have been considered as successful in order to continuously improve processes include regular improvement meetings and follow-up meetings. Tools, such as improvement boards can be a good way to increase the awareness of problems that arise, and make them more visible for all employees, who can then participate in the problem solving. In order to continuously improve administrative processes focus should not only lie on problems occurring within the department, but also on the problems experienced by the customer, making communication with the customer essential. Since improvements should be done regularly with the intention of in the long run creating a greater value for the customer, regular follow-ups should be made in order to establish possible areas of improvement. What must be kept in mind is that the continuous improvements should not be done with the sole mission of making processes more efficient, but rather with the ultimate goal of creating a greater value for the customer.

Zero Defects

The principle of zero defects is of great importance within administrative departments, as it is a key factor to eliminating waste, as well as an important element in ensuring a lean process flow with minimum disruptions. An explanation of how defects cause waste in an administrative department was given in the section analyzing elimination of waste.

In order to ensure zero defects within processes, mistakes and faults must be resolved before they occur. Such a preventative approach will make sure, to the extent that it is possible in processes where human beings are actively involved, that defects are avoided, and it will reduce the time and resources spent on solving problems and correcting errors that have occurred. Simply preventing defects from being passed on to other departments, through for example the reports produced by a financial department, may ensure a faultless end result but defects will still be present within the process. By encouraging employees to report mistakes detected and made, and to have regular meetings for problem solving and improvements, the risk of passing on defects will diminish. However, these measures take place when errors have already arisen. Rather than controlling what is produced to find errors to be corrected at a later stage, the processes themselves have to be checked and controlled. By increasing the individual responsibility of employees, and encourage a constant quality control of the process, rather than focusing on finding errors that have occurred, the department will be one step closer to achieving zero defects and pursue a leaner process.

Pull Instead of Push

Administrative processes within financial departments are pull-based by nature. Due to the predictable, and often scheduled, recurrence of the processes, a financial department does not produce to meet demand created by an order system of the type that is used when products or services are sold to external customers. Instead of waiting for an order to pull information through the process, processes are typically scheduled to be conducted at specific times. A push-based system cannot be sustained in an administrative environment because early

delivered reports are not useful. When a report is needed, it is requested and therefore pulled from the department. Since it is important that the information is up to date, there is no possibility of storing the reports, and hence there is no use in producing reports that are not requested. The result is a just-in-time production system, where reports and information are produced as they are requested, or for when they are scheduled.

Multifunctional Teams

Within administration, the principle of multifunctional teams is rather seen in the form of multifunctional team members. The reason is that tasks carried out by teams in an administrative department are relatively independent from each other. A process within administration is often carried out by a single team, while a production process involves several teams that all participate in the production of one part or product. In production, problems arise when a team lags behind. The same is true in administration, however with regard to individual team members.

In order to decrease the dependence on an individual employee, specified job-descriptions can be introduced. Within lean administration, this form of standardization does not have to be incorporated at the expense of creativity, since the latter is always encouraged to find new ways for improvement. Consequently, standardization in this form should not be seen as restrictive, but instead be welcomed as it enables employees to perform a greater diversity of tasks and ensures a steady flow throughout the processes. Within the cases studied, as an effect of the introduction of job-descriptions with clear explanations of tasks and the time they should take, lead times and overtime have been reduced. Employees feel relieved with having descriptions as a means of guidance and stress levels have been reduced. Through the increased standardization of regular tasks, employees have gained a better overview of processes and developed a deeper understanding of other team members' tasks. As a consequence it is now easier for employees to step in for each other when someone is absent or needs assistance.

Decentralization of Responsibilities

Decentralization of responsibilities is crucial in order to follow a lean approach within an administrative department. Everyone involved in a process needs to be given the authority and responsibility to make changes and improvements, so that tasks can be carried out in the most efficient way.

Due to the nature of qualified administrative activities, such as tasks within a financial department, it is natural that individuals within a team have a greater responsibility of the tasks that they perform, in comparison to workers on a manufacturing line. In that sense, responsibility has to be decentralized among individuals, rather than among team leaders. It is difficult to have a team leader who is responsible for the tasks carried out by individual members of a team, because of the qualified nature of those tasks. Administrative tasks are not as easily controlled as tasks within manufacturing.

Decentralized responsibilities require a high involvement and contribution from all employees. It is therefore easier to utilize the idea when processes and its tasks are performed in smaller teams. In larger groups, it is more difficult to involve everyone. If responsibilities are decentralized, and individuals feel more in charge of their own tasks, they are also likely to be more inspired to find potential areas for improvement.

Vertical Information Systems

To have a well-functioning vertical information system within administration is necessary, however it is equally or perhaps even more important to have a well-functioning horizontal information system. Besides being able to effectively pass information between hierarchies in the organization, it is particularly important that information can be efficiently passed *between employees*. When information is quickly and easily passed between employees, decisions can be made faster, ensuring that actions and improvements can start sooner. In administrative processes, where there is no visible flow of parts or products, a good display of information can help to increase the understanding of how processes are advancing and how tasks are connected to each other. In addition, by visualizing and displaying the processes, management groups will be able to get a better overview of the organization and their understanding of how different processes are carried out will increase.

It is important that the information system is adapted to the geographical dispersion of the team or the department. Teams may consist of employees from geographically disconnected parts of the organization, making it a harder challenge to encourage the team members to engage in the lean concept. In such cases, it is not possible to use tools such as whiteboards in corridors, and hence new tools must be developed. A solution could be to introduce high-quality IT systems so that information instantly can be spread among team members and to develop a web-based tool for display of how the processes are progressing and what problems are encountered. The challenge becomes to keep the simplicity of accessing and visualizing the information.

6. Synthesis

In this chapter, the main findings from the analysis will be summarized with the intention of providing a clear answer to the research question. Thereafter, some general conclusions about applying lean principles in administrative departments will be drawn. The chapter will conclude with a critical discussion of the findings, and suggestions for further research.

6.1 Answering the Research Question

The research question that the study has been aiming to answer is:

How are lean production principles applied within administrative departments?

In order to give a clear and structured answer to the question, the findings from the research study will be presented by going through the seven principles of lean production that have been used as a theoretical framework for the study. The way the production principles should be interpreted to be successfully applied to qualified administrative tasks will make up part of the answer, and will then be followed by some concrete methods that can be used to apply each individual principle. The findings will then be concluded in light of some relevant theoretical concepts.

Elimination of Waste

The principle of eliminating waste can be interpreted in its original meaning when it is applied to administrative processes. Anything that does not create value should be considered as waste, and therefore be eliminated. Due to the predictable recurrence of the processes and the intangible flow of information, only two sources of waste from the original wastes of production are evident in administrative processes. Inappropriate processing and defects lead to over-specification, under-specification and faulty reports, which in turn result in unnecessarily long lead times and an inefficient allocation of resources. A third source of waste that is not as evident in production, but has to be considered when applying this principle to administrative departments is unstructured processing, which leads to waste in the form of stress and overtime for employees.

Several concrete measures can be taken to minimize or eliminate waste in administration. Firstly, the customer has to be identified, in order to define the non-value adding activities that need to be eliminated. Thereafter, by clearly mapping out the process flow and visualizing it for everyone involved in the process, areas for waste reduction can be identified, and lead times can be measured and reduced. Clearer job descriptions will, if followed, ensure more structured processes, which make it easier to identify areas of waste. An essential approach to take when eliminating waste in administration is to involve all employees in the process, something that can be done by having regular meetings to improve the process and encourage everyone to feel a greater responsibility for their individual tasks.

Continuous Improvement

The principle of continuous improvement is an essential part of a lean administrative department and, similarly to production, a focus should be put on reducing lead times in order to continuously improve the efficiency of processes. It is crucial that all employees are involved in the improvement process, since the qualified administrative tasks are difficult to control, analyze and measure by someone who does not himself carry out the tasks. The application of the principle to administrative departments is characterized by the department having to rely on individual employees and their engagement in order to obtain reliable measures of lead times, making employee commitment a foundation for successful application of the principle.

In order to continuously improve the process, it is recommended to use whiteboards, where all possible improvement areas, as well as all suggestions for improvement are noted, in combination with a visual explanation of the improvements that are taking place in real time. Regular meetings should be held to go through the information on the improvement boards. Another measure that should be taken to continuously improve the process is to communicate with the customer on a regular basis, in order to find areas of improvement that may not be visible by just examining the internal process.

Zero Defects

Within administration, the principle of zero defects should be seen as a preventative approach to ensure faultless reports by eliminating mistakes within the process. Errors should be prevented before they occur, or more realistically, they should never be passed on to the next stage in the process.

To achieve zero defects, employees must be encouraged to report mistakes that are made so that the root cause of the problem can be found and eliminated, ensuring that new mistakes will not be made. Achieving zero defects can also be helped by having regular meetings. It is crucial that individual responsibility is increased for individual employees in order to ensure constant quality control of the process.

Pull Instead of Push

Administrative processes are pull-based by nature. Efforts do not have to be directed to interpret and successfully apply the principle to an administrative department, since it already operates in a just-in-time manner, producing reports and information as they are requested or for when they are scheduled.

Multifunctional Teams

The principle of multifunctional teams is better interpreted in administration as a principle of multifunctional team members, because of the relatively independent nature of the administrative tasks in relation to each other. Standardization, enabling employees to perform a greater diversity of tasks, must be encouraged in order to decrease the processes'

dependency on individual employees. The standardization should not be seen as restrictive, since it does not exclude opportunities for creative work.

For a successful implementation of the principle, standardized job descriptions should be developed for recurring and important tasks, which will benefit the employees in their daily work.

Decentralization of Responsibilities

Decentralization of responsibilities is a very important principle within administration, due to the qualified nature of the tasks that makes them difficult to control from above. The principle should thus be interpreted by highlighting the importance of not only decentralizing responsibility among team leaders, but also making individual employees responsible for managing their tasks and reporting errors. By decentralizing and giving each employee a greater responsibility for their own tasks, a department can achieve a more efficient approach to improving the processes.

Decentralization of responsibilities is facilitated by clearly structured processes and defined tasks so that employees know what they are in charge of and feel a responsibility to perform well.

Vertical Information Systems

The principle of vertical information systems plays an important role in administrative departments. However, when applying the principle it is important to not only focus on the information being passed between the department and other hierarchies, but to also consider systems for passing information between employees within the department. A well-functioning information system, that passes information vertically and horizontally, allows employees to get access to relevant information in real time, ensuring quick action, and it increases the understanding of how processes are advancing and how tasks are connected to each other.

Simplicity and visibility are key words for the information systems, and the best method to use for depicting information is whiteboards, or other types of information boards, that are easily accessible to all employees. Geographically dispersed teams should instead implement web-based systems, keeping in mind that simplicity and accessibility are important factors.

A theoretical viewpoint on the findings

By using the principles of lean production, as presented by Karlsson and Åhlström (1996), as a theoretical framework to determine how lean production principles are applied within administrative departments, it has become clear that administrative tasks are more similar to production than what may be generally believed. Some principles have shown to be a bit of a challenge to adapt and successfully apply to administrative processes, whereas others have turned out to be a natural part of such processes even before the introduction of the lean

concept. In light of Bowen and Youngdahl's (1996) findings on the applicability of lean production principles to services, and in comparison to other research that has shown that a greater degree of adaptation is needed when implementing lean to service operations (Åhlström, 2004), it can be concluded that administrative tasks, being of a back-office nature, are very suitable for the introduction of the lean concept. Some of the lean principles have to be interpreted slightly differently when they are applied to administrative tasks. However, it is not seen as an obstacle to a successful implementation of the concept. This conclusion corresponds to the findings of Larsson (2008) and Keyte and Locher (2004), who also have examined how the concept of lean works within administration.

6.2 General Conclusions on the Application of Lean

There are some important conclusions that can be drawn from the study, that are not directly related to specific principles in the theoretical framework, but rather general ideas and aspects that need to be kept in mind in order to successfully apply the lean concept to an administrative department. A brief discussion of such ideas and aspects will follow in this section.

It is evident that the way in which the implementation of the lean concept is done has a big impact on how successful the actual application of the lean concept will be. It is important to be aware of the fact that large investments of time, effort, and resources will have to be made in order to successfully be able to introduce and apply the lean concept. A lot of time and effort will have to be devoted to planning and education for the implementation to succeed, but the gains from a successful application of the concept are likely to eventually outweigh the initial investments that had to be made.

A factor that has emerged as being one of the most crucial for a successful application of the lean concept to administration is to make sure that all employees are engaged and involved in the processes. The involvement of everyone has consistently showed to be a critical factor in order to implement the other principles of lean, and could reasonably be seen as a principle on its own. A good way to ensure that everyone is involved and determined to adjust their way of working according to the concept of lean can be to start to implement lean step by step. By implementing lean to one process at a time, it is easier to monitor the progress and to see the definite results. This increases motivation among employees to continue and spread the application of lean to other processes within the department. An appropriate process to start with is one that involves the activity of many employees. The more employees that are involved from the start, the easier it will be to make lean a natural part of the department's culture. Later on, when implementing lean to other processes, the implementation will benefit from the high involvement of employees and the acceptance of the concept.

To conclude this section, it can be established that a willingness to invest in order to successfully implement the concept of lean, and an ability to encourage all employees to get

involved in the process, are two success factors that will facilitate the introduction of the lean concept to administration.

6.3 Discussion

The purpose of this thesis has been to investigate how lean production principles, traditionally used as means for improving manufacturing processes, are applied to processes within the financial departments of organizations. Due to the fact that limited research has been done in the area of lean administration, an aim of the thesis has been to increase the understanding of how the concept of lean works within administrative departments. In order to fulfill the purpose, a qualitative case study was carried out. The financial processes within two companies were studied and an analysis of how lean production principles were used there was made. The results show that to be able to apply the lean production principles within administration, some interpretations of the principles have to be adapted to fit the nature of administrative tasks.

To ensure as high levels of validity and reliability as possible, a methodological approach has been undertaken throughout the conduct of the study. The internal validity of the thesis has been ensured by interviewing employees with different positions, and by constantly being determined to present a true and representative picture of the case subjects. Additionally, in order to further increase the internal validity, observations of how the work was carried out within the departments were made. The external validity has been more difficult to ensure, because of the limited time and scope for this thesis. Since only a limited number of cases were studied, the results that have been found cannot be generally applied to all types of administration within every business area. However, due to the regular nature of the processes studied, it is believed that the results to some extent can be generalized to similar departments carrying out administrative tasks. The reliability of the findings has been ensured by clearly describing the theoretical framework of the lean production principles that were used as a baseline for the analysis, the selection process of the cases and interviewees as well as describing the case subjects and the processes. This approach to ensure reliability was chosen because of the difficulty in replicating a study of this nature. Additionally, as a complement to conducting interviews, direct observations of the actual work within the departments were made, which also contribute to a higher reliability of the results.

6.4 Suggestions for Further Research

An aim of this study has been to create a foundation for other researchers to further examine the applicability of the lean concept to administration. To really understand how the concept works on a broader level, more cases have to be studied. Since the processes that were studied in this thesis were of a financial nature, it would be interesting to study other types of processes as well. It would be especially interesting to see a development of how lean principles are used within administration in future research, and eventually be able to form

specific principles of lean administration that can be generalized to the entirety of administrative processes.

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7.3 Interviews

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Employee 3, Financial Department, Oskarshamn, Scania, 7 April 2009.

Employee 4, Financial Department, Oskarshamn, Scania, 7 April 2009.

Employee 5, Financial Department, Södertälje, AstraZeneca, 9 April 2009.

Employee 6, Financial Department, Södertälje, AstraZeneca, 9 April 2009.

Employee 7, Financial Department, Södertälje, AstraZeneca, 9 April 2009.

8. Appendices

Appendix 1 – Company Background AstraZeneca

Astra AB was founded in 1913 and had its head quarters in Södertälje, Sweden. Astra was an international company focused on research, production and sales of pharmaceuticals and medical equipment. Operations were focused on producing pharmaceuticals to cure cardiovascular, gastrointestinal and respiratory diseases and analgesics. Astra also devoted research to diseases in the central nervous system. (AstraZeneca, 2009c)

Zeneca Group PLC was founded in 1993. The company consisted of three parts: Pharmaceuticals, Agrochemicals and Specialties, which had all previously been part of Imperial Chemical Industries. Zeneca was an international biotechnology company, with head quarters in London, that engaged in research, development, production and marketing of pharmaceuticals. Their main areas were cancer, cardiology, the central nervous system, respiratory ways, anesthesia and agrochemicals. (AstraZeneca, 2009c)

When the companies merged in 1999, Astra had 22,000 employees and sales of 57 billion SEK. Their key products were Losec (treatment for gastrointestinal diseases), Seloken, Plendil, Ramace and Atacand (treatments for cardiovascular diseases), Pulmicort, Bricanyl, Rhinocort and Turbuhaler (treatments for respiratory diseases), and Xylocaine (local anesthetic). At the same time Zeneca had 34,000 employees and sales of 5.5 billion GBP. Their key products were Zoladex, Nolvadex and Arimidex (cancer treatments), Zestril and Tenormin (treatments for cardiovascular diseases), Accolate (respiratory disease treatment), Zomig (for diseases in the central nervous system), Diprivan (anesthetic) and Gramoxone, Fusilade, Touchdown and Surpass (agrochemicals). (AstraZeneca, 2009c)

Since April 1999, following the merger, the principal markets for trading the shares of AstraZeneca are the London, Stockholm and New York stock exchanges (AstraZeneca, 2009c).

AstraZeneca's mission is to make the most meaningful difference to patient health through great medicines, and to create enduring value for their shareholders and society through industry-leading R&D productivity, commercial excellence and operational efficiency. The company's vision is to be an innovation-driven, research-based pharmaceutical company focused on human health and capable of delivering a consistent flow of innovative and differentiated products to patients in markets around the world. (AstraZeneca, 2009c)

Appendix 2 – Company Background Scania

The history of Scania starts off at the end of the 19th century when Philip Wersen and Surahammars bruk, the leading producer of wheels and spare parts for railroad carriages, agreed to start a business together. As a consequence, VABIS, Vagnfabriksaktiebolaget I Södertälge was born in 1891, where a railroad carriage factory was the core business idea. In 1911, a new company was established when VABIS merged with Maskinfabriksbolaget Scania i Malmö, which had a main business consisting of bicycle production. The new company name became Scania-Vabis, and the company shifted focus to the production of trucks, busses and cars. The 1920s became a tough decade for the company. Two important decisions were made: To relocate the production from Malmö to Södertälje and to quit the production of cars. These decisions, together with the financial support by Stockholms Enskilda Bank owned by the Wallenberg family, changed the company's growth perspective and have meant a lot for the company's development into a global industry leader within its business. In 1969, Scania-Vabis became Saab-Scania, when the company merged with Saab. The union lasted for about 25 years, until the companies chose to take different paths again in 1995. In 1996 Scania, which has been the company's name since the demerger, was listed at the Stockholm and New York stock exchanges. (Scania, 2009c)

Today the company is one of the world's leading manufacturers of heavy trucks and buses and up until now they have delivered over 1,000,000 vehicles. Scania develops, produces and sells trucks with a weight of more than 16 tonnes (Class 8 trucks), which are intended for long-distance transport, regional and local distribution of goods, as well as construction haulage. Scania's bus production is focused on bus chassis, intended to serve as tourist coaches, and as transport vehicles in urban and intercity traffic. The company also produces industrial and marine engines for generator sets and engines intended for use in earthmoving and agricultural machinery, as well as on board ships and pleasure crafts. Other business areas include delivering a broad range of service-related products (for example spare parts and workshop services in the form of maintenance and repairs), and financial support services (including leases and hire/purchase contracts). (Scania, 2009c)

Scania's mission is to supply its customers with high-quality heavy vehicles and services related to the transport of goods and passengers by road. By focusing on customers' needs, high quality products and services, as well as respect for the individual, Scania shall create added value for the customer and grow with sustained profitability, while contributing to a sustainable society. The company's vision is to be the leading company in its industry by creating lasting value for its customers, employees, shareholders and the societies in which they operate. (Scania, 2009c)

Appendix 3 – Interview guide

- **Lean production**
 - When did you start to work with lean in the production processes?
 - What instruments do you use when working with lean?
 - Which lean principles have been most influential in the work?
 - How does the lean concept show in the daily work?
 - Which principles/instruments can be transferred, respectively not transferred, from the production processes to an administrative department?

- **Lean in the financial department**
 - When did you start to work with lean in the financial department?
 - Has lean been implemented throughout the entire financial department, or just in certain processes?
 - How has the work changed after the implementation of lean?
 - Which instruments are used in working with the lean concept?
 - How does the lean concept show in the daily work?

- **The transfer of lean from the production to the financial department**
 - From where, and why, came the initiative to transfer lean to administrative departments?
 - Who has been responsible for the implementation?
 - How has the knowledge of lean been transferred from the production to the administrative department?
 - How has the implementation been carried out?
 - How long has the implementation taken, or how long will it take?
 - To what extent was the implementation based on principles already used within the production processes?
 - In what ways have principles from the production been adjusted/adapted to fit in on the financial departments work?
 - Have instruments/tools been developed for administrative processes that are not used within the production? If so, which ones?

- Are there principles that are used within the production that cannot be used within the financial department?
- What difficulties have arisen when transferring lean from production to administration?
- How has the principles been communicated and taught to all employees within the department?

- **Results from the implementation of lean in the financial department**
 - How has the work changed within the financial department?
 - What are the positive/negative aspects of the implementation of lean?
 - What concrete results can be seen from the implementation?