Lean implementation problems in the healthcare system

A Case study conducted at Torsby Hospital

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Abstract

The main principle of the lean concept is to reduce service waste. The aim of this study is to examine the concept and its implementation in the service sector, specifically the healthcare system in Sweden and identify the challenges and the problems that may surface during the implementation process.

The literature survey revealed that similarities and differences have been found between the manufacturing and the service sectors. The similarities were in the seven wastes areas such as overproduction, waiting, transport, over processing, inventory, motion, and defects. The difference was the difficulties in identifying some of these wastes areas in the service sector such as the non-added value activities that creates waste. Previous research has also presented some tools, techniques, critical success factors, challenges and problems of the lean implementation.

This thesis is a case study conducted at the Torsby hospital, medicine department in Torsby, Sweden. The hospital has some financial, communication, and process standardizing problems and was aiming to solve them by implementing lean strategies. The data for this study were collected through structured interviews and observations in the hospital. A thorough discussion of the information gathered from the interviews and the observations made are presented related to the theoretical frame of the study.

The findings of this study showed that the lean concept is actually applicable to the healthcare system except for some problems that may affect the success of the lean implementation process in the hospital. By removing or fixing these problems, the hospital can reap the benefits of the implementation process. This study presents and discusses problems in question and suggests some relevant solutions.

Keywords: Lean, Lean Definition, Lean Tools and Techniques, Lean Challenges, Lean Implementation, Lean in the Service Sectors, Lean in the Healthcare System, Lean Implementation Success Factors.
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CHAPTER 1: INTRODUCTION

1.1 Background of the Study

The global environment has become a highly competitive and rapidly developing factors all companies (Delgado et al. 2010). Manufacturing is considered an important part of the economic development in the world, even though the world is still facing a big business pressure that has a direct effect on its competitiveness (Wang et al. 2011). Nowadays, organisations are struggling to enhance their capabilities and to maintain a sustainable performance in order to meet the customers’ high expectation (Delgado et al. 2010).

In order to meet customer expectation companies and practitioners have developed many methods and processes. Lean theory is one of these theories that have proved its effectiveness in both the manufacturing and service sectors. Many publications have been spreading the concept of lean, as it is currently understood (Delgado et al. 2010). The Toyota car production company was the first to introduce and implement the lean concept and created the so called the Toyota Production System. The Toyota Production System (TPS) has some objectives such as creating a low cost improvement by setting a number of management principles in order to reduce the wastes in the production system (Manuel, et al. 2009).

In this highly developed international economic world, service has always been important and significant. The quality of the delivered service is as important as the service itself, and the satisfied customers is always the goal (Zeithaml et al., 1990; Zeithaml and Bitner, 2003; Hill, 2005, cited in Piercy & Rich, 2009). This shared problem in both manufacturing and service sectors led to idea the applying the same methods that proved effective in the manufacturing sector to the service sector (Quinn and Gagnon, 1986; Zeithaml et al., 1990, cited in Piercy & Rich 2009).

Healthcare systems are a service provider’s organisation. Healthcare organisations became interested in the industrial improvement tools because the same problems have occurred (Godfrey cited in Patwardhan, 2008). Despite the success of has been proved by the theory and the increasing awareness of the need to implement lean strategies in the service sector and the healthcare system, there is very little work done on successful lean practises in the service sector (Sarkar, 2009).

This study aims to provide an understanding of the lean implementation process in the service sector and specifically in the healthcare sector. The thesis provides some tools, technique, benefits, challenges, and critical success factors that can be used in the implementation phase of the concept. Based on the literature review in the second chapter of this thesis, the research continues as a qualitative case study conducted at the Torsby hospital in Torsby, Sweden.
The gathered information is the basis of the discussion in Chapter 4 and the last chapter summarises the study and provides the conclusion of this study.

1.2 Research Question

The lean concept is usually studied in the production sector. Research focuses on lean management and its impact on the company and its process enhancement. This thesis centres on lean implementation in the service sector with the focus on the following question:

"Can the lean concept be applied to the healthcare sector, and if so, what are the problems and critical success factors of such a process?"

The study of the lean implementation process at Torsby hospital and the problems involved are analysed and discussed in this thesis in terms of the conceptual understanding of the concept displayed in the literature review.

1.3 The Study Objectives

This research conducted at Torsby hospital and has the following objectives:

• To understand if the lean concept can be applied to a healthcare system or not.
• To introduce and identify the problems and the critical success factors that occurred when implementing Lean at the hospital.

1.4 Main Concepts Definitions

There are several terms and concept that have been used in this study. Therefore this part provides descriptions or definitions of some of these terms and concepts.

• The lean production concept: A concept developed by the Toyota car production corporation. The concepts’ main objective is to create low cost improvements to reduce wastes. (Manuel, et al. 2009).

• Lean in the service sector: Eliminate waste and improve the efficiency of the service process. Lean concept is a method to find the non value-added activities in the service process, eliminate the waste, and create value-added activities to meet the customer expectations. (Womack & Jones, 1994, cited in Piercy & Rich, 2009).

• Waste: Waste is an action that exists in any organisations’ process but adds no value for the customers. However, customers are not willing to pay for these actions (Taylor & Brunt, 2001). There are different types of wastes such as overproduction, waiting, transport, over processing, inventory, motion, and defects (Dennis, 2002).
• **Value added activity:** These are activities that convert or enhance a raw material to an almost finished product. These activities add value to the product with the help of the employees and the customers are willing to pay for them (Dennis, 2002).

• **Non-value added activity:** These are some operations that do not add any value for the end customer. Therefore these operations should be eliminated from the working process (Dennis, 2002).

1.5 Significance of the Study

This thesis aims to investigate the lean concepts’ implementation at the Swedish health care. The second reason is to study the concepts’ ability to change the outcome of any health care organisation.

1.6 Delimitations of the Study

The first delimitation of this thesis is the number of interviews done by the researcher due to the time limitation. The second delimitation is that the study is done on one hospital so it was not easy to generalise the findings and results of this study.

1.7 The Thesis’s Structure

Several books related to lean concept strategies were used as information source. The Karlstad University’s on line database library provided this thesis with different scientific articles within the lean implementation. Different websites were also used as well. The practical methods of this thesis, the data were collected from a number of structured interviews with employees at the hospital. The interview respondents were the hospital manager, the hospital head of the economy department, and a number of staff that works in the medicine department at the hospital.
CHAPTER 2: LITERATURE REVIEW

2.1 Background of Lean

2.1.1 The Lean concept History

The Toyota car production company introduced the lean concept back in 1934, the production system of the company called the Toyota Production System (TPS) can be considered as the first system to introduce the lean thinking concept. TPS objective was to create low cost improvements, by setting a number of management principles to reduce the wastes in the production system (Manuel, et al. 2009). According to Hasle, et al. 2012, in 1988 Krafcik introduced lean in an article to the American market; the article aimed to turn the American auto industry market to a competitor to the Japanese auto market. The lean thinking was the typical method for automotive industries at that time.

There were two persons who mastermind this method; the first one was Kiichiro Toyoda, the founder of Toyota Motors who was influenced by Henry Ford and the mass production strategy in the United States of America. Toyoda faced low demand on vehicles in Japan so he could not adapt the mass production theory in Japan, and was looking for solutions. The second person was: Taiichi Ohno who was also inspired by the Ford theory, but he drew a completely different conclusion from what Ford did. Toyoda and Ohno worked together to increase the output tenfold. This corporation led to developing the Toyota Production System (TPS), which was based on minimising the cost and shortening the lead time (Bergman & Klefsjö, 2010). This developed method has the solution to Toyoda problems, and it was the beginning of a series of lean practices and development (Dennis, 2002).

According to Dennis 2002, the basic image of Lean Production is presented in a Lean figure to simplify the theory (See Figure 2.1). The figure illustrates the basic element of the concept. At the top of the figure there is the goal of lean, which is eliminating wastes, offers quality products, and services to meet the customers expectations. The centre of the figure is the involvement of the employees at the organisation.

On the sides of the figure there is the Just In Time delivery principle and Jidoka, it means the build in quality. The foundation of the figure (house) is the stability and the standardisation of the production process (Dennis, 2002).

As mentioned, the main goal of the lean concept is to produce at low costs, eliminate waste, control and minimise the lead-time from the manufacturer to the suppliers and then to the dealers (Taylor & Brunt, 2001).
2.1.2 The Lean Concept Five Principles

Lean concept development is important and can be obtained by applying the five principles of the concept into an actual manufacturing operation system. Womack et al. (1990) categorised these five principles as follow:

- The value from the customer point of view must be defined and specified. Companies need to focus more on manufacturing products that are valued by the end customer, not products that are convenient for manufacturing (Wang et al., 2011).

The Womack 1990 covered the other four principles:

- Identify the value stream: It deals with the processes of the production as a whole from the supplier to the end customer. These processes have to be organised according to the perspective of the customer not to what the different departments in an organisation crave.

- The creation of the value flow: This means decrease delays of activities that add value to the product and remove or improve the activities that do not add value through the production processes.

- Pull production: It aims to eliminate the extra production and concentrate on the customers’ demand.

- Strive for perfection: This gained by produce with high quality, reach for the customers’ satisfaction, have reasonable prices, eliminate waste, and improve the system continuously.
Whether these five principles are applicable to the health care sector or not is not easy to say, maybe some of these principles need to be adapted and modified to fit the health care sector. However the second principle can be considered as the most important one because it emphasises the identification of the process that creates the value for the customer. The value stream in manufacturing is the patient flow in health care. The other principles can be applied for the healthcare sector without modifying (Westwood, et al. 2007).

2.1.3 Wastes Types

As introduced, eliminate wastes is an important key point for the lean concept. Waste is defined as any action applied on the product (the process) and do not add value for the end customer. Therefore customers are not willing to pay for these activities (Taylor & Brunt, 2001). Manufacturing operations are categorised as follow:

- Non-Value Added operations: These operations are the actions that do not add any value to the final product.

- Necessary but Non-Value Added operations: These operations are important for the functioning process, but do not add any value to the product.

- Value Added operations: These operations convert raw materials to finished products. These activities add value to the product with the help of the employees.

The Lean concept identified many types of wastes in the manufacturing sector such as:

*Overproduction:* This means when companies produce more than the actual product demand. This creates a huge load on the production flow, and increases the storing time of the products (Taylor & Brunt, 2001). This can involve more costs such as have and maintain big inventories, more employees and equipment, more energy, and extra expenses. To overcome this problem companies have to apply the pull method and produce according to the product demand (Dennis, 2002).

*Waiting:* Delay occurs when time does not used effectively. Goods do not delivered on time, employees do not work effectively, it is considered as waste and the manufacturing process is affected by it (Dennis, 2002).

*Transport:* Transport is defined as the logistics transportation from the supplier to the manufacturer or to the end customer. Unnecessary movement inside the factory are also transport waste and need to be eliminated or at least decreased (Taylor & Brunt, 2001).
**Over processing:** This means to complex the easy processes. For example, put 3 employees to work on a machine when one employee is enough (Taylor & Brunt, 2001).

**Inventory:** To have and keep needless raw material, parts, or finished product (result from overproduction) in the stock is a waste and it must be eliminated. Some solution is to plan the material required to the operations so the company will not need to storage needless material. Apply the pull method to avoid overproduction that leads to over stocking in the inventory (Dennis, 2002).

**Motion:** This waste can be both human and mechanic waste. For human motion, the ergonomics of the working plant in the factory is related. While the mechanic motion occurs when tow machines are not placed right inside the plant place (Dennis, 2002).

**Defects:** Any damaged products that will be demolished; this is a direct cost if the damage is not repairable, or the product were stocked for long time and got damaged (Dennis, 2002).

2.2 **Lean in the service sector**

In advanced economies, service is an important source of income. In the United States of America and the United Kingdom, services contribute in about three quarters of the production market. The quality of the delivered service is as important as the service itself, and satisfied customers is always the goal (Zeithaml et al., 1990; Zeithaml and Bitner, 2003; Hill, 2005, cited in Piercy & Rich, 2009).

The increasing cost and low quality of service was noticeable around the world lately. After comparing this problem to the manufacturing sector, similarity was found. Managers in the service sectors started to apply the same methods that proved to be effective for the manufacturing sector (Quinn and Gagnon, 1986; Zeithaml et al., 1990, cited in Piercy & Rich 2009).

Lean concept was one of these methods. Find the value in the service process, eliminate the waste, and create values appreciated by the customers were appealing to the managers (Womack & Jones, 1994, cited in Piercy & Rich, 2009). After the study of the concept, its applicability encourages many organisations to start implement and develop it to fit in the service sector. This concept was not applicable for all the service providing organisations, but it was only applicable to organisations with limited information (George, 2003).

The importance of adding value for the end customer may slow the process flow for some service organisations. This led to poor quality and a service delay. Therefor the concept must be analysed according to the complexity of the service sector (George, 2003).
2.3 Lean in the Healthcare Sectors

Health care system contains a number of service provider organisations. As any organisation, hospitals want to eliminate waste, reduce costs, improve the working processes, reduce the waiting time and have satisfied customers, which in this case patients. This part of the thesis presents lean in the health care system.

In 1987, the Quality Improvement in health care national demonstration project was introduced as an experiment in the United States of America (Godfrey cited in Patwardhan, 2008). The study goal was to find methods that are relevant for the health care system. The study applied some of these methods at 21 health care organisations in the United States of America.

The study results showed that 15 out of 21 organisations made a remarkable improvement in their economic issues and patients’ satisfaction. The experiment continued for 3 more years due to the good findings, this experiment evolved to the Institute for Healthcare Improvement. This institution is a non profit-making organisation with a goal of offering management teams to the health care organisations. Moreover the rising knowledge about the importance of the total quality management and how it focuses on the consumer (patient) rather than to the organisations’ structure, culture and services (Harvey and Millett, 1999, cited in Patwardhan, 2008).

The health care organisation outcome is the patient recovery from its illness. Therefore the major duty in such process relies on the medical professionals. For a long time, clinicians were the traditional leadership for health care organisations. Therefore, the outcome was affected by many different internal and external factors such as pharmacy, pathology, technical support, information technology, teamwork, communications management, time management, political involvement, the increasing costs, bigger demands for quality care, and higher consumer expectation (Shutt, 2003, cited in Patwardhan, 2008).

Since the flow of the process is an important element in the lean concept principles, to analyse the process flow to find the non value-added activities and manage ways to improve or eliminate these activities (Piercy & Rich, 2009).

2.4 Implementation

Before introducing the implementation process of the lean concept, the term implementation must be defined. Implementation is the realisation of an application by performs a set of actions, to accomplish or practice a strategy or method for producing something (Rouse, 2007).
2.5 Lean Implementation

As shown previously, some organisations realised that Lean is a method that can be used to improve production or service processes, eliminate wastes, and reduce their cost. Since the theory was not designed for the health care processes, it needs to be improved or developed to fit the working environment at hospitals.

Organisations started to implement Lean strategies into their systems on a long-term basis. Organisations started by gaining a general understanding of the concept and relate it to existing problems. Lean implementation process requires commitment, external and internal support, and a continuous progress to be effectively implemented. Therefor companies and organisations should be fully committed to the implementation process even though they should not expect to see results in a short time (Pertersson et al., 2010).

To get an understanding of the importance of Lean Implementation, the tools and techniques, benefits, challenges, critical success factors, and criticism must be presented as follow:

2.5.1 The Tools and Technique of The Lean Implementation

There are many tools and techniques for implementing the Lean strategies, some of them are developed from the manufacturing sectors and others are from the servicing sectors. Below are some present applicable tools and techniques:

2.5.1.1 Process mapping

The traditional flow-charting way of presenting the production process at any organisation did not represent the whole picture of the production line, but missed and excluded the employees’ participants from the process. The process mapping is a tool that shows the complete picture, from the input step to the final output product, and identifies the participants through the process (Okrent & Vokurka, 2004). This tool requires serious work and it costs much, but reducing the mapping level can be helpful to gain the best results (Soliman, 1998).

According to the Scottish government website (2007), the patient flow or the patient pathway in the health care system is a primary strategy that concentrates on providing a sustainable performance. This is achieved by plan a service that benefits the patient in the first place. Another important point according to the website is the reduction of the variety of these pathways to gain what the organisation needs to implement the right team of staff at the right place at the right time through the patient pathway see Figure 2.2.
That means, at any health care organisation the process mapping described in the term of the Patient Flow, which is the treatment journey of patient at the hospital. This process will be introduced in details in chapter 4.

![Patient Flow Example](image)

**Figure 2.2 The Patient Flow Example. (The Scottish Government website, 2007)**

2.5.1.2 **Value Stream Mapping (VSM)**

Value Stream Mapping (VSM) is an important tool in the lean implementation strategies. It helps to increase the organisations awareness about the current condition and to identify opportunities for improvement (Dennis, 2002).

This tool is also used to grasp the process within the organisation and involve the employees in the process of finding problems and searching for solution. The value stream mapping means to map all activities in a process and plan the processes together. Information and material are important requirement to improve the product or service (Taylor & Brunt, 2001).

Involving the employees at any hospital is an important factor, mapping the activities together as one process and analyse the patient flow, (from the moment the patient comes to the hospital until the treatment is completed) find the problems, and participate in offering the suitable solutions (Fillingham, 2007).

2.5.1.3 **Stakeholder mapping**

To understand the tool of stakeholder mapping we need to identify what a stakeholder is? Stakeholder is an individual or a group that have the power to effect or be affected by the success of any company (Freeman, 1984, cited in Hutt, 2010). The stakeholders are crucial to any organisations’ competitive level and profits (Donaldson & Lorsch, 1983, cited in Hutt, 2010). There were different methods that identify the stakeholder before. This method on the other hand helps the organisations to understand in which category their stakeholders are specified. Involve them in the process will result in information. These information or point of view of the
stakeholders is very useful to improve the working process at any organisation (Hutt, 2010).

2.5.1.4 The Lean Implementation 5 S’s

The 5 S’s system is a tool developed to improve the implementation of the Lean strategies in the service sector. This tool creates a non-real working environment that explains, order, and improves itself. The aim of this method is to contribute and create an enhanced working place for the employees. This aim is achieved by reduce the workload for the workers, reduce the amount of errors in the working process, and develop the employees experiences by providing courses and learning workshops (Dennis, 2002).

According to Dennis 2002, the 5S are mainly:

- **Sort**: This principle aims to sort out everything unnecessary at the workplace, any useless parts, furniture, documents, machines, and equipment should be cleaned out to make the motion of the employees easier and faster and eventually effect the work flow. A good way to achieve this goal is to use the red tagging technique. The tagging system is to put a tag on the package that contains information about the package such as the item ID, date, and the work section.

- **Set in order**: This principle is concern with the layout inside the working place. The placement of the staff desks, machines, and the storage of the products may affect the process flow by the possibility of creating needless motion for the employees. To solve the extra motion the organisation, use the rationalise location method, it means to design the work place on a paper first to make sure that there will be no extra motion in it.

- **Shine and inspect**: This principle aims towards having a clean well organises working place. This is an easy achieved principle since it does not need any specific method other than actually clean the working place regularly.

- **Standardised**: It means that the organisation should have a standardised method to measure the Five’s system and make sure it develops to standard routine at the company.

- **Sustain**: Sustain means to guarantee that the system is working as it should be, and develop it continuously to achieve the company’s objectives.
2.5.2 Benefits of Lean Implementation

Implementing Lean may not be easy, but it is worth to try it at any company, this section presents some of the benefits than can result from implementing Lean to a company or an organisation.

Lean most important features are related to waste, lead-time reduction, control the usage of inventory, knowledge, and management improvement, cost saving, and more efficient process flow (David & Brunt, 2001). Improve the employees’ competence is another benefit of Lean implementation, more expertise and knowledge lead to faster work, improve the customer satisfaction, and reduce the cost for the organisation (Pertersson et al., 2010).

Since lean working environment is very connected, it gives organisations the benefit of improving the working environment for the employees (Hasle, et al. 2012). Having the complete picture of the process makes it faster to identify the problems and including the workers gives them opportunities of introducing solution to enhance the working process (Okrent & Vokurka, 2004).

Implementing lean is also financially beneficial. Taner & Sezen 2009 discussed the financial difference in some medical organisation before and after implementing Lean. The study results were impressive where some companies could save about 11% of their expenses in a period of 18 months.

Health care services also benefited from implementing lean into their working processes, identifying the non-added value activities and eliminate or improve these activities is important and beneficial (Piercy & Rich, 2009). Improve the medical staff’s competences, focus on the patient, improve the flow of the process in this case, the patient pathway the hospital will gain a delay reduction, shortened the queue line is a gain for every hospital (Chadha et al., 2012)

2.5.3 Challenges of Lean Implementation

There are some challenges that any company faces while implementing Lean strategies into their systems, the next section presents some of these challenges in 3 parts: the physical layout, the process flow, and the employees’ collaboration.

Implementing Lean can face a challenge in the organisation layout. When applying the five S’s role to any organisation, the layout of the working place is an important and a challenging part. Changing the physical layout is costly, time consuming, and require more workers (Dennis, 2002). Soriano-Meier et al. 2011 discussed the role of the physical layout at hospitals in the lean implementation process and introduced some layout ideas for hospitals. First, to reduce the walking distance for the employees, this means to place the staff station close to the care unit where the patients are, because doctors and nurses are not supposed to walk long distances
inside the hospital to reach the patients, this is a waste of time. Second to adjust the hospital layout so that it would be more practical for all the workers and the patients, such as make separate ways to the patients, staff, and the material movement. These changes in reality are a huge challenge to any organisation, nearly impossible to implement after the building of the hospital is finished. For many reasons, firstly many hospitals were built 100 years ago. This means to redesign such an old building requires much effort, cost, and time. A more important reason is the difficulty of closing a care unit at a hospital. It brings a negative impact on the hospital process and load on the remaining units. That is why the physical layout should be designed right before the actual building of the hospital (Soriano-Meier et al. 2011).

Another challenge organisations may face during the lean implementation phase is to standardise the process. Sarkar (2009) defined the service processes by its features, which are:

- **The process is not visible:** Observation is enough to identify wastes in the manufacturing organisation due to their visibility. However, in the service organisations the customer judges the activities’ execution.

- **The process is large and complex:** Improvements are always seen at the end-to-end processes. Service organisations are large and complex, therefor is difficult to see and control the improvement along the process.

- **The process is technology dependent:** Technology is an important utility for companies. Communication would be the first and most important feature the company gains when using advanced technology. The challenge here is when the system do not work correctly, it impacts the whole implementation process negatively.

- **The process cuts through vendors:** Vendors are suppliers or customers in the company’s supply chain. Implementing lean requires including these vendors in the system and to see the supply chain as a whole. The communication level must be high between these vendors. This is the challenge for many organisations lack of the willingness to share information with other companies is difficult to overcome.

The last and third challenge for the lean implementation process can be the employee’s involvement. Sarkar (2009) also discussed that lean is a process that dependent on people, employee’s involvement is important and challenging tool at the same time during the implementation phase. Engage, empower, and persuade the employees to change their thinking towards the customer value and waste identification are challenging for any organisation.
2.5.4 Critical Success Factors of the Lean Implementation

For a long time, Lean implementation process was difficult, costly, and time consuming. Many articles have identified problems that may accrue during the process and how make this process a successful one.

There are many factors that have a positive effect on the implementation process such as leadership and management commitment, skills and expertise, employee’s involvement, financial abilities, and culture of the recipient organisation (Achanga et al., 2006).

Leadership and management commitment and support: It is an important factor in the Lean implementation process. Management has the ability to influence, reorganise, and encourage the employees to help provides quality work (Delgado et al., 2010).

Skills and the expertise of the employees and the management team: The importance of this factor is in the difference that more skilled employees make on the process flow. With skills, workers innovate and add a differentiated advantage to the process. Moreover, no skills or a low level of workers skill is a threat to the process (Achanga et al., 2006).

Employee involvement and recognition: These are two important factors to the lean implementation process. Improve the communication level among employees, involve them in the process, and empower them with rewards and recognition are different ways to improve the working environment at any organisation (Delgado et al., 2010).

Financial ability: This is a crucial factor that controls every project success. Funding is important to cover expenses such as material resources, human resources, technical utilities, consulting, and employee training (Achanga et al., 2006).

Organisation culture: The organisation culture is an important platform of implementation process. Achanga et al. (2006) discussed the importance of having and specifying culture in an organisation, whether it is a sustainable continuous improvement or high communication level, organisations have to choose one and commit to it. In order to have a successful lean implementation experience in any organisation, a high communication level within the staff is a favourable cultural model.
2.6 Lean concept critics:

As the concept is recommended in many articles, it has also been criticised for some issues. The following part presents some of these critics:

*The Human aspects:* This point elevated many criticisms for the lean concept. According to the concept the employees would experience high pressure, especially those who work on the production line. The concept was described as a dehumanising concept. Many articles discussed Lean as an important factor for long-term sustainability in any organisation, but some also argued that the concept should consider the human resources as another dimension and do not use a holistic view of the organisation as a set of a hard mechanical tools and techniques (Hines *et al.* 2004).

*Lack of strategic perspective:* The lack of the strategic level thinking discussion is another point that is considered as a critic to the lean concept. The isolated thinking of strategic objectives may cause a gap that lead to non-successful change for many organisations (Hines *et al.* 2004).

*Coping with variability:* The concept was developed in an automotive industry with stable level of demand. Many were always questioning Lean ability to handle the variability. Develop and improve the existing assets of the organisation, manage the variability, and create more volume to reach the customer needs are important aspects for the lean concept. However, demand variability is a hinder to implement the lean thinking, these sectors chose to implement the agile thinking for the several solution offered to control cope with the customer demand variability (Hines *et al.* 2004).

2.7 Proposed research model

This study is conducted at Torsby Hospital. The management at the hospital have already started the lean implementation into their system. This research model is based on collecting data by making structured qualitative interviews at the hospital. Then find problems at the hospital process, analyse these problems, and try to suggest some solutions to enhance the process and eliminate the problems.
CHAPTER 3: RESEARCH METHODOLOGY

This chapter presents the practical methodology of this study. Different kinds of resources were used to gather information about the topic. The researcher used several books related to lean concept and lean implementation. The Karlstad university’s online database library provided this study with many scientific articles within the lean implementation in the healthcare system. Websites have also been used due to the limited amount of scientific publications in some specific subjects.

Choosing the hospital to conduct the study at was not difficult. Investigating the lean implementation process needs a hospital that already started to implement it. For Torsby hospital, the implementation process is going for ten years now, and some problems were emerged during this time. The method used to gather data for this study is doing a number of structured interviews with the hospital staff. The researcher tends to choose employees from different categories to get information with a wider view. These interviews were addressed to the hospital top manager, the head of the economic department, doctors, and nurses. The researcher was able to record the interviews.

The researcher did 5 interviews at the hospital. All the interviews started with introductory questions about the respondents’ background and experience. The second could steer the conversation between the interviewer and the interviewee, this part starts with process and practices questions at the hospital. The third part was about understanding the patient journey at the hospital, and finally questions about possible process improvements and some recommendations from the employee. The interviews guides are found in appendixes 2-6.

- The manager of the hospital: C. L. is a 60 years old woman, originally an internal medicine doctor, worked at the hospital for a long time. 1997 she became medicine department manager and 3 years later she became the hospital manager. The manager still works as a doctor in the hospital part time. She believes that with her medical background, she is more qualified to the job than other administrative employees.

- The head of the economic department: E. B. is a 63 years old man, originally a mechanic engineer who has been working at the hospital for more than 15 years. When lean implementation process started in the hospital he was one of the first employees to work on the project, he will be retired in about two years.

- A medicine specialist doctor: F. H. is a 56 years old man. He is an Iraqi medicine doctor comes to Sweden in 2007. Started to work in the hospital 3 years ago, with his different background from his colleagues it was difficult to grasp the Swedish health care system and learning the Swedish language at first.
• A surgeon registered doctor: M. A. is a 38 years old man, came also from Iraq in 2007. Started working in the hospital in 2009 he is going to be a specialist in a few months. Did not have difficulties working in the Swedish health care system or learning the Swedish language.

• A medicine department nurse: E. A. is a 30 years old woman, worked at the hospital for almost two years.

• An employee in the administrative department: U. H. is a 40 years old women, worked at the hospital for a long time.

The researcher did 6 interviews only due to time limitations and to the hectic schedule of the hospital employees that it took a while to do these interviews.

3.1 Ethical consideration

For all researchers there are some ethical principles have to be followed while conducting a research. These principles should not be taken for granted, the researchers must be well aware of them. Ethical problems can be raised in 4 areas such as harm the participation, lack of informed agreement, invasion of privacy, and deception (Bryman & Bell, 2007). The researcher made sure to meet these principles and the information gathered from the interviewees was used without any manipulation.
CHAPTER 4: FINDINGS

4.1 Background of Torsby Hospital

In Sweden, the healthcare system is organised in 21 county councils and regions. Each county is independently responsible for providing health care facilities to a large geographic area (Folkutbildning, 2012). All the councils are connected to and monitored by the Swedish National Board of Health and Welfare.

This board is governmental and a part of the Ministry of Health and Social Affairs. Its responsibility is to ensure that county councils provide health care according to the recommended standard of health service on equal terms for the Swedish population (the Swedish Board of Health Welfare webpage, 2012).

Torsby is situated in mid-Sweden (population of 12, 414), in the värmland region (Torsby Municipality webpage, 2012). In 1867, a decision was made to build a hospital in Torsby by the värmland county council. The Torsby hospital or mini hospital was built in 1876 with a nursing department that contains 15 beds only.

Soon the county council recognized the increasing demand on the hospital, so in 1916 they decided to build a complete hospital to meet the needs of the local population. In March 1924, Torsby hospital was inaugurated and started to provide health treatment under the supervision of the Swedish National Board of Health and Welfare and the regional county council.

Now Torsby hospital is one of three hospitals in the Wermland county council with a 24-hours health care provision. The hospital houses clinics, service centers, and administrative units. It has about 85 beds and six-bed Intensive Care Unit (ICU) spread over three wards and ICU/CCU Cardiac Care Unit. These units provide health care in medicine, surgery, orthopaedics, urology, gynaecology, anaesthesia, operations, radiology, laboratory, physical therapy, and palliative care.

The hospital organization is flat in order to ensure speed, flexibility, efficiency and a good work environment. The county council provides a webpage called LIV (Landstinget i Värmland) to bring all the divisions together to ensure a consistently high quality of care for wermlander. (The Landstinget i Värmland, 2012)

The medicine department was in operation right from the beginning. Currently the department has seven specialist doctors, two of whom work full-time and the rest have a part-time work schedule, about forty nurses, a physical therapist and other staff. There are a total of about 48 beds in two wards (ward 60 has about 26 beds, ward 61 has about 16 beds) and a six-bed ICU/CCU unit (Interview 4, 2013).
4.2 Findings

In this part of the research, an introduction to the problems and the critical success factors found in the process flow that affect the success of the Lean implementation process are presented.

4.2.1 Problems

The lean implementation process at Torsby hospital started about ten years ago. Still, the hospital has problems that affect the process success negatively. Employees from different categories were interviewed to get a wider view of the process flow in the hospital and eventually to identify the problems in the process. These problems are presented in this section of the chapter.

*Budget and Financial decisions:* Politicians in any county council controls most of the financial decisions. The politicians then monitor and ensure that the decisions are implemented correctly. The hospital has little say in matters of budget decision. The politicians make these decisions, but there has been a change in the last few years as the decision maker of the Torsby hospital budget was the division manager in the county council. Many times the hospital management team rearranged the annual financial plan around the given budget. Here there is definitely a communication problem between the decision maker and the hospital management team. The hospital has tried to improve communication with the decision makers every year but without success.

*Wastes:* As previously presented in the literature review an organization can have about seven types of wastes. This study identifies some of the wastes factors in the hospital. Usually, the wastes entail increased cost. In Torsby hospital the schedule system for the doctors is organised in to a four-months-period schedule. Each doctor can apply for leave of absence any day. Any short-notice change in the schedule will cost the hospital time and money. For example, if the doctor is working at the operations room that day, then being off-duty means cancelling and rescheduling all the prescheduled operations. Moreover, the reserved operating room will be empty that day so it is a huge waste of money. Doctors do not totally agree, sometimes there is a colleague that can fit into the schedule when needed. On the contrary, they identified a different waste that they think is a real waste in the hospital. For example, the doctor thinks that the daily routine has some defects in it. For instance, the day starts at 07:30 am with a daily meeting with the department manager to discuss some patients’ cases in order to make sure that they get the right treatment. After that the doctors have to go to the X-Ray department for other consultations. So usually the doctors start working at 09:00 am and sometimes not all the staff is ready for work then, and besides there are too many coffee break.
**Organisation culture:** The culture of any organization is an important platform for the success of implementation process. Achanga *et al.* (2006) discuss the importance of having and specifying the culture in the organization. Whether being a sustainable, continuous improvement, or high communication level, choosing one and committing to it is important. In order to have a successful lean implementation experience in any organization, a high communication level among the staff is a favourable cultural model. There is nothing wrong with a multicultural organization, but it sometimes comes with problems.

*"We a multicultural organization and we are proud of that, but it can be that different employees work in their special way because of their different backgrounds and not according to the requirement of the Swedish system"* (Interview 2, 2012)

Participant number six disagrees and thinks that, people with different cultural background do not just act differently but there is the language barrier as well. Sometime it can be difficult to communicate with other employees because of that. It takes time for all the employees who come from other countries to understand and integrate into the Swedish workplace culture and system. Moreover, this problem differs from person to person depending on factors such as age.

**Patient Flow:** Process mapping in the healthcare sector is the patient flow, which is defined as the time and stages the patients undergo from the moment they come to the hospital until treatment is provided (The Scottish Government website, 2007). For example, to understand the patient flow (process flow) in the medicine department at Torsby Hospital, a construct process mapping was developed from the data collected from the interviews. The process flow (PF) or the patient flow (PF) in the medicine ward for a patient referred by the town primary health care centre doctor, can be represented by the following activities:

- PF1: Patient is referred to the medicine clinic
- PF2: Patient contacts by the nurse for an appointment.
- PF3: Patient arrives at the clinic and contacts the nurse
- PF4: Patient waits at the waiting area
- PF5: The specialist examines the patient
- PF6: The specialist doctor requires some laboratory tests
- PF7: The specialist doctor diagnoses the problem and informs the patient about the treatment plan
- PF8 I: Patient goes home and follows the treatment plan
Or:

· PF8 II: Patient needs hospital care and is referred to the medicine ward.

· PF9: Patient registered by a nurse in the medicine ward with a treatment plan

· PF10: Patient meets a specialist doctor every day in the department according to the treatment plan

· PF11 I: Patient treatment is completed and patient dose not need further home care services and is discharged.

· PF11 II: Patient treatment is completed but there is a need of further home care services.

· PF12: The municipal services are contacted and ready to help the patient at home, the patient is discharged.

The patient flow (PF1-PF10) can be in a different scenario, look like the following:

· PF1: Patient comes to the hospital for an emergency treatment

· PF2: Nurse meets the patient and runs some tests

· PF3: Patient waits to be examined by the on-call doctor

· PF4: On-call doctor examines the Patient

· PF5: Patient can go home and follow the treatment plan and is discharged

· PF6: Patient needs hospital care and is admitted to the medicine ward.

The PF step after PF7 would be the same as the previous (PF8 II-PF13). In this process flow of the medicine ward, many problems have been found. The first problem is the waiting time for the patient (the long queue to the hospital) to get an appointment, which is around three months. The second problem is that there is no specialist in the hospital that works in the clinic for a whole day, due to the shortage of specialist doctors in the hospital. The third problem, linked to the second, is the stress the doctors face every day being on-call and working at the clinic at the same time.

The fourth problem relates to the handover of the patients treated in the hospital but in need of further help from the home care service centre in Torsby. This process does not work as effectively as it should. There are many patients who stay in the hospital ward for many days without any medical needs. These patients can cost the hospital a great deal. The fifth problem occurs in the emergency room. The patient waits in pain for long hours because there are not enough doctors on duty at night, and unnecessary blood tests are run by nurses that at times.
**Standardized treatment procedures:** According to Dennis, 2002 standardization means that the organization should have a standardized method to measure the Five’s system and make sure it is standard routine for the company. This is another problem for the medicine ward at Torsby hospital. The problem is that not all the doctors write a treatment report, and then when another doctor wants to follow up on the patient’s health improvement, it is hard for him because the written report is missing. This problem can definitely affect the lean implementation process since the process is not standardized.

**Patient Discharge with Further Help needs:** As already mentioned, patients to be discharged are ready to leave but are not get discharged because they need further help from the home care service. These patients can be disabled or very old so the home care service centre offers them help at home. When the nurse informs the centre about the patient, the home care service has seven days maximum to come and take care of the patient. After the seven days the municipality has to pay about 4,000 SEK per day.

As is obvious from the diagram the home care service takes full advantage of the seven-day agreement with the hospital. However, these patients do cost the hospital 4,000 SEK per day. It is a cost that can be eliminated or at least minimized. It dose not only cost the hospital money but also time, and an occupied bed that could be used more effectively for other patients (Interview 3, 2012).

### 4.2.2 The Critical Success Factors

As presented in Chapter 2, there are many factors that can affect the improvement of the lean implementation process. These factors can be different from one organization to the other but below the most important factors found from the data collected at Torsby hospital are presented.

- **Management Involvement:** This is an important factor for the Lean implementation process. As mentioned in Chapter 2, the management has the power and the ability to influence the organization and encourage employees to help as individuals by providing quality work in the implementation process. Almost all the participants in the interviews done in the medicine department, identified management involvement as a critical success factor for the implementation process. It is clear that this is a very important factor for the respondents. Process improvement is not possible without management involvement and support through the process. This can be achieved having a better communication with the employees to identify solve the problems more effectively and on a faster track, and then the management needs to be more involved in the economical decision-making process as well.

- **Employees Involvement and Skills:** The importance of this factor lies in the difference that more skilled employees can make to the process. Workers can be
creative and more innovative with higher level of skills. The last success factor according to the author is the culture of the organization. Sustainable improvement, high communication level, and long-term strategies are very important factors for any company. At Torsby hospital there is disagreement between management and the physicians regarding the need for specialised expertise. The manager of the hospital said:

“*This is a big problem for Sweden health care right now; all the doctors want to be a sub specialist. I think it would be very expensive for the health care if the system is going to have one doctor per organ*”

The doctor disagree, however, and one of the respondents put it like this

“*Subspecialty is very important for me; I am going to be one. Because I think the doctor will be very skilled in his job, this will definitely help the patient in an optimal way*”

This disagreement is another critical factor for Torsby hospital.

- **Effective Communication:** Communication is crucial factor. The hospital has an effective computer system for information on all the patients. It is easy to follow the patient flow in the medicine department or any other department. Everything concerning improvement, tests, doctor’s or nurse’s notes must be registered in the computer system. But the problem is that the employee does not professionally communicates with anyone else on regular bases. As mentioned earlier in this thesis, another communication problem revealed in the data is the lack of communication between the hospital management team and the budget decision makers in the county council.

- **Effective Documentation:** This is a very important factor for success in any organization. The availability of required and relevant information is a critical factor. However, the interviews also indicate that the doctors think that they spend too much time at their desks instead of being with their patients helping them. This suggests another waste type in the hospital, namely too much documentation. Doctors and nurses think that it is a waste of time for them to just sit and write information (sometimes irrelevant and scientific information).

The members of the management, on the other hand, think that all information related to the patient. Such as previous illness and social circumstances should be documented.
CHAPTER 5: ANALYSIS

The problems of the implementation process at Torsby hospital revealed in the interviews and presented earlier in this thesis, such as the insufficient budget allocation, wastes, communication and the standardizing of the process flow, will be analysed in the following.

According to Chapter 2, the lean concept identifies value added operations in the process flow of any organisation. In the case of Torsby hospital, there are some non-value added operations in the process flow (patient flow) such as patients waiting, unnecessary laboratory tests in the emergency room, and patients waiting for home care service at the hospital after receiving the required treatment. The hospital must develop new methods to solve these situations.

Some of the seven types of wastes associated with the lean management concept were found within the Torsby hospital process flow.

*Waiting* is easily recognised due to delays occurring in the booking of patients for a doctor’s appointment. Sometimes it takes three months for the patient to see a specialist. This situation (dealing with human lives) can be hazardous for some patients. Working effectively and efficiently at the hospital and increasing the working hours of the specialists at the outpatient clinic can cut the waiting time for the patients in the future.

*Over processing* is another waste that has been identified within the Torsby hospital organisation. There is too much time spent on documentation than interacting with patients, and nurses have to fill in documents several times during the day with information that might not be needed in the treatment process of the patients. The hospital management team needs to specify the information that that must be documented, so that less time is spent in vain.

*Inventory* waste was identified as keeping needless raw material, parts or finished product in stock. Due to the limitation of time, I was not able to study the inventory circumstances, but the waste can be linked to other similar situation. Keeping patients that have received their treatment at the hospital but are in need of further help at home from the home care service can be identified as a waste of place (beds in this case). The hospital management is working on a new plan to solve this problem.

One of the lean concept principles is to eliminate wastes, and the existence of these types of wastes in an organisation that has been implementing lean management for ten years is not acceptable. The hospital manager and management team need to work more effectively on finding fast and effective solutions.
When it comes to the tools and techniques of lean implementation, the management is using some of them such as process mapping or value stream mapping, which in the case of a hospital organisation is identified as the Patient Flow.

The Patient Flow, as already mentioned, is the process mapping for any hospital. At Torsby hospital it was found that the patient goes through many non-value added activities that can be eliminated or shortened to achieve an effective process. Improving the referral procedure from the primary health care centres to the medicine clinic can reduce waiting time. This procedure should be more effective and the doctors at the primary healthcare centers should refer the patients in a more effective way.

In order to shorten the three-months waiting period for appointments, the specialist at the clinic should not have other duties at the same time such as being on-call (backup specialist doctor at the emergency room) or be on duty, at the medicine ward. To shorten the waiting time for the patients at the emergency room, a suggestion for the improvement is to have two doctors on-call at the same time. But this is not easy to achieve because there are not enough doctors to schedule that way. Although standardizing the treatment procedures can be the solution for this problem. Finally, the nurses should consult with the doctors before running a blood test for any patient. Such a small measures would increase efficiency.

Standardized treatment procedures are another lean tool, which is known as the process standardization. This is an important factor for the success of the lean implementation process. In Torsby all the doctors must follow the procedures, thus standardizing the process. Standard procedure can make the work more fluent and the work would be done correctly from the beginning according to the procedure.

Patient discharge with further help is a problem that arises when the patients are ready to be discharged and do not get discharged, because they need further help from the home care services. These patients may be disabled or very old and in need of the home care services provided to them by the municipality in their homes. When the nurse informs the centre about the patient, the home care service centre has seven days maximum to tackle care of the patient. After the seven days the municipality has to pay about 4,000 SEK per day.

With the help of the county council the hospital has thought through this problem, and at a meeting on the 7 of December, 2012 (appendix 7) they discussed that the home care services should be informed when the treatment is finished at the hospital. If the procedure and the information flow between the medicine department, Torsby hospital and the municipality care services are linear, the process will be more effective. Since every patient is unique in terms of how they respond to treatment, it is very difficult to judge the situation and decide whether the patient will need help after the treatment. At this meeting they came decided that the county council will employ
a person as an assistance analyst to serve as a link and pass on information between the two departments to shorten the time needed before.

The challenges that faced the organisation while implementing lean strategies were not easy to overcome or solve. Even ten years later the hospital organisation still has some challenges. One of these challenges has been introduced earlier in Chapter 2, namely the size and complexity of the process. Improvement can always be seen at the end-to-end processes, but when a process involves dealing with patients and different departments and treatments, it is difficult to see improvements. Some researchers describe this kind of process as invisible and hard to improve in a short time.

Another challenge is that the process is technology-dependent. At the Torsby hospital all the information, patient charts, and referral documents, treatment plans, and even the patient’s recipes are digitally documented. This dependence on technology can be problematic. Recently, the hospital changed their computer software for a more developed one, but this change required more than it offered. All the hospital employees have to take lessons to learn it during their regular working hours at the hospital, but once the instruction was done, the staff had difficulties using it and now it often takes twice as long for them to complete their tasks. Even though the hospital managers cannot take the risk of changing the system, they have to either develop it or provide more lessons to the staff to make it easier to use.

The fact that the process cuts through vendors is another challenge for the Torsby hospital. Managing the whole supply chain is not that easy at a hospital, where vendors mean different departments, patients flow, plans, and treatments. Some patients have more than one illness and need to be transferred to other words in the hospital. A lack of willingness to share information or explain the treatment decisions among the staff can be a huge problem for the hospital and the patients. The solution is easy: Effective communication between hospital staff is needed. The hospital staffs needs to improve this process as well as their willingness to share information effectively.

Implementing lean management in any organisation requires that some factors be followed successfully to gain the benefits of the implementation process. One of the success factors is the financial ability of the organisation. Torsby hospital has a budget and financial decisions problem. This problem, introduced in Chapter 4, is caused by the hospital managers’ failure to get the resource allocation they apply for every year. The solution is to improve the process of budget decision-making to a more effective communication between the hospital management and the county council financial department. Even though it is difficult to effect this decision due to the differences in roles. Politicians who have different priorities, goals, and benefits take these decisions. Therefore it is hard for the manager to influence the decision.
Eliminating waste is one of the lean concept’s most important principles, so having wastes after almost 10 years of lean implementation in Torsby hospital is a problem. The health care system is very complex and improving it takes time, but these wastes have to be eliminated. To eliminate the waste caused by doctors changing their schedule with little notice, the hospital management is working on a new schedule system for the doctors in order to control schedule changes more effectively. And the doctors have to be more cooperative in notifying the appropriate persons about changes well in advance to prevent the cancelling of any patient appointments. To eliminate the time waste in the doctors’ daily routine, all the meetings in the morning must be more effective so that the doctors can start working earlier and be more optimal.

Organizational culture is another factor of importance for implementing lean management successfully. This study shows that this problem is hard to solve. The reason is the location and size of Torsby. Since it a small town located in a less attractive area of Sweden, it is hard to convince Swedish doctors to work there at a far distance from their families. Doctors from other countries do not have any problem working in a small town for many reasons. For instance, they could not find work in another place and sometimes it is much easier for them to travel because their families do not live in Sweden. For all the above reasons, the hospital has employed many foreign doctors who sometimes have difficulty in understanding the Swedish language. The hospital invests so much time and money to prepare these doctors for work, but since the hospital does not need to recruit more staff at present, the management can raise the bar a little bit and try to hire doctors that are more ready and qualified to the job.

Leadership and management commitment and support are a crucial factors for a successful lean implementing process because of the power and the ability the managers have to influence, develop, and empower the employees within the organisation. Any organisation manager has to be fully committed to the process in order for it to succeed. In the case of this study, the manager is committed to the process of implementing lean, but lets the financial obstacles stand in her way. The management team needs to think beyond the financial difficulties and find new solutions to their problems.

Having skilled employees is another important factor for any organisation. Skilful employees can innovate, be creative, and help the management to develop the organisation. Torsby hospital has this category of employees, but their wish to improve and develop their expertise conflicts with the management need to cut costs. As mentioned in Chapter 4, the doctors want to be specialists in one medical branch for the benefit of themselves and the patients, while the manager disagrees on the grounds that it would be expensive for the hospital and society to have too specialised doctors. This problem has to be solved.
To answer this thesis question, the second part was answered earlier with the problem critical success factors found from the collected data. The first part, whether this concept fits the health care sector (especially for our case study) or not will be answered as follow. As mentioned in Chapter 2, the lean management principles proved its affectivity in the health care sector in other countries such as the United States of America. For the Swedish health care system it is a new concept. The answer for our case study is **yes it fits**.

The hospital system has improved during the implementation process. There is a continuous search for problem in the hospital process flow and solve them. Many process are now standardized and followed correctly. As the interviews respondents almost identified the same problems and the critical factors, it gives the information that the employees are involved in the process and well a wear of the problems. The hospital needs to make this process a success. Therefore the management team must have a plan for improvements and follow it. The hospital management must work more effectively with their staff and start to study and implements some of the suggestions given by the employees.

Finding solutions and implementing them is time consuming, even though the management team have to enhance the economical decision-making process with the politicians at the county council. This can be achieved by improving the communication level between the two parties, if possible increase the number of meetings with the decision maker to deliver the economical details and the improvements right. At the same time the manager needs to cut unnecessary expenses such as improve the doctors scheduling process, develop the new computer software used at the hospital to shorten the documentation time, and reduce the number of documentations for doctors and nurses.

The hospital process flow (the patient flow) has many unnecessary steps that needs to be eliminated or at least improved such as improve the communication between the specialist doctors and the primary health care centre’s doctors to improve the referral process, shorten the waiting time for patients at the clinic, and last, eliminate the unnecessary laboratory tests. Moreover, the management team needs to be more involved with the employees by improving their communication level. The last point the management needs to improve is the patient discharge process. The hospital has a new plan for this problem it needs to be followed correctly.
CHAPTER SIX: CONCLUSION

Lean concept strategies are to help organizations eliminate wastes from their systems, and remove the non-added value activities to enable the value added activities to run effectively. This concept was used for a long time in both manufacturing and service sectors. However, the concept has not been fully utilized to achieve the maximum benefits in the service sector.

Previous articles showed that implementing lean is easier in the manufacturing sector than the service sector, due to different circumstances in the working systems. This study presents the findings collected from the interviews done at Torsby hospital. The hospital started lean management implementation process about ten years ago. Despite that, the hospital still faces challenges. Therefore, the main research objectives were to find out whether a theory that was developed for a car industry could be applied to a health care system or not? And if yes what are the problems and the critical success factors that can be faced when implementing lean?

This thesis shows that when translating car production management strategies into the health care sector, organizations should not expect the same problems or challenges as in the manufacturing sector due to complex circumstances of the process. Conducting this study at a hospital that has worked with lean for ten years, made it easier to understand the applicability of the concept in health care sector.

The answer of the first part of the research question is yes, implementing lean works for the Torsby hospital for many reasons such as, the hospital system has improved during the implementation process, there is a continuous search for problems in the hospital process flow and solutions, and many process are now standardized and followed correctly.

As the interviews respondents almost identified the same problems and the critical factors, it gives the information that the employees are involved in the process and well a wear of the problems. The hospital management must work more effectively with their staff and start to study and implements some of the suggestions given by the employees.

Finding solutions and implementing them is time consuming, even though the management team must commit to the implementation process. The manager have to cut unnecessary expenses to overcome the financial difficulties of the hospital such as improve the doctors scheduling process, develop the new computer software used at the hospital to shorten the documentation time, and reduce the number of documentations for doctors and nurses.

Reduce the number of documentations for doctors and nurses. The hospital’s process flow (the patient flow) at Torsby hospital has many unnecessary steps that needs to be
eliminated or at least improved, such as improve the communication between the specialist doctors at the hospital and the primary health care centre’s doctors about the referral process to shorten the waiting time for patients at the clinic. Eliminate the unnecessary laboratory tests at the hospital emergency room. The last point the management needs to enhance is the patient discharge process by employing a person as an assistance analyst to serve as a link and pass on information between the two departments to shorten the time needed before.

6.2 Limitation of the Study

This study faces some limitations during the research time. This part presents those limitations as follow:

- Limitations in the quantity and the quality of the university library articles, because Lean implementations in the health care system are a relatively new area of research in Sweden.

- This research was conducted at a hospital, for a business student it was difficult to understand the working process at the beginning. This is why it took more time to understand the medical working environment before starting the actual research to ask the right questions.

- The research time was not enough, and the interviews were done in two languages, Swedish and Arabic. It took longer time to translate the interviews to English.

6.3 Further Research

With the knowledge of the limitations that faced the researcher during this study, opportunities can be created for future researches. Suggested future research areas can be on conducting comparative study. Compare between two hospitals (already started to implement lean) in the same county council or different ones in Sweden, to understand whether the finding is different (or not) because it is two hospitals or two county councils policies.

The researchers encourage further research for implementation of Lean tools and techniques in service sector in Sweden to increase the knowledge within this area. There is need for more studies related to Lean practices in service, which may lead to real implementation and improvement of services.
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APPENDIXES
Appendix 1: Request for conducting interviews in the hospital

From: Fadjer Muhi

To: The Medicine Department, Torsby Hospital, and Rural hospital in Torsby town, Sweden.

Date: 11th December 2012

Subject: “Requesting Interviews about the Lean Implementation Problems in the Torsby Hospital”

Dear Sir or madam,

My name is Fadjer Muhi; I am in the final semester of my Masters study in Industrial Economics, Karlstad’s University, Sweden. I am working on a graduation project that is about implementing the Lean concept in hospitals and what problems that can be faced during the implementation process.

Since Torsby hospital has already started the implementation process and it would be a relative to my study. I am eager to conduct this thesis in your hospital. It would be great if you contacted me back with a suggestion for time and date for the interviews.

Thank you very much
Sincerely
Fadjer Muhi
Appendix 2: Interview guide for the manager of the hospital interview

1. Can you please share something about yourself?
2. Can you please tell me about your experience working at the Torsby hospital?
3. You are a doctor and a manager at the same time, how do you experience that?
   Are you stressed at work?
4. How much time are you still working as a doctor?
5. Do you have a specific strategy to manage both jobs at the same time?
6. Are you a tuff manager?
7. Can you please describe for me, how the hospital is organized?
8. How many employees does the hospital have?
9. Is this number enough for the hospital or do you have lack of employees?
10. What do you think that your employees think of you?
11. How do you describe your communication level with your employees?
12. How often do you meet with your employees?
13. How do you deliver information to your employees?
14. What do you think about the hospital employee’s competence?
15. Do you think that the employees work efficiently?
16. Do you know about the lean concept?
17. What do you think of the implementation progress?
18. Do you think there are some problems that sabotage the success of the progress? If yes can you please name some of them?
19. How do you as the hospital’s manager prioritise your problem? And how do you solve them?
20. Do you think that the hospital has a financial problem?
Appendix 3: Interview guide for the head of the Economic Department interview

1. Can you please share something about yourself?
2. How long have you been working at the Torsby hospital?
3. Can you please describe the hospital structure for me?
4. I want to ask you about the hospital yearly budget, who decide over that?
5. Do you have any connection to the decision maker? How do you communicate?
6. Was it you how start the lean implementation process at the hospital? If yes why did you chose this one specifically?
7. How can you judge the financial situation for the hospital?
8. What do you this about the lean implementation progress until now?
9. Are there any problems that can sabotage the implementation progress?
10. Which clinic within the hospital has more problems do you think?
11. How do you prioritise your problem at the hospital? And how do you find solutions?
12. What do you think about the patient flow in the Torsby hospital or in the Swedish healthcare system in general?
13. How can this process improved, do you think?
14. How often do you keep yourself updated about this process?
15. Does the hospital have a standard treatment procedure or plan?
Appendix 4: Interview with a doctor’s assistant in Torsby hospital

1. Can you please share something about yourself?
2. How long have you been working at Torsby hospital?
3. Can you please describe the patient flow at the medicine department, Torsby hospital?
4. Do you think that there are some problems in this flow? If yes can you please name some?
5. Which changes that can be done to improve this process?
Appendix 5: Interview guide for the Doctors Interviews

1. Can you please share something about yourself?
2. When did you come to Sweden?
3. How long did you wait before you got hired?
4. How long have you been working at Torsby hospital?
5. How do you experience working in a different environment than what you are used to?
6. Can you please describe how the medicine department is organized?
7. Can you please tell me how the patient flow is structured at the medicine department?
8. Do you have a specific procedure that you have to follow?
9. Do you always write a treatment procedure?
10. Do you have some problems at work? If yes can you please name some?
11. What are the best ways to improve this process do you think?
Appendix 6: Interview Guide for the Medicine Department Nurse

1. Can you please share something about yourself?
2. How long have you been working as medicine ward nurse in Torsby hospital?
3. Can you please share with me some of your daily routine and duties?
4. How do you describe your working environment at the hospital?
5. Do you have some problem at work? If yes can you please name some?
6. How do you communicate with the ward responsible doctor?
7. Why do you think it is hard to communicate with the doctor?
8. Do you have all the things that you need at work near you?
9. Can you please describe the process flow for the patient at the medicine ward?
10. Who can the hospital improve this process do you think?
**Appendix 7: the agreement paper about hiring assistant analysts in Torsby Hospital**

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<th>Plats</th>
<th>Sjukhuset Torsby Linnean</th>
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<td>Närvärande</td>
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<td>Inger Sjöström</td>
<td>Munkfors</td>
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<td>Ulla Hens</td>
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**För minnet**

Tillsammans diskuteras samverkan när det gäller ”Patientens bästa väg genom vården”.

Gemensamma mål inför 2013:

- Bättre och tidigare kommunikation, vilket skall märkas genom fler vårdagar för utskrivningsskäla patienter. Vårdplaner, mer information på inskrivningsmeddelandet, använda Meddis mer, etc.
- ”Social planering” på sjukhuset, arbeta för att få till en finansiering för det projektet. Ann-Katrin tar den frågan vidare.
- Gemensamma forum för personal på sjukhuset och i kommunerna. Ulla är kontaktperson för det.

Övrig information:
Karin Öjeskog är ”tjänstledig” som vårdplaneringssjukskötterska. Corina de Wijs kommer att arbeta som det och började i måndags, 3/12.

Nästa möte: fredagen 26/4 kl.10.00–12.00 i Linnean

Vid datorn
Ulla