Bachelor thesis

Knowledge Management within a Lean Organization

A Case study at Volvo Cars

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Summary

The purpose of this thesis was to explore how knowledge management occurs in practice in a Lean organization and the problems associated with improving the knowledge management processes. In addition, how knowledge can be utilized and disseminated more effectively to the whole organization as well as the cultural affects of the dissemination of knowledge within a Lean organization.

Volvo Cars has been assigned as the case company for this report because they are in the process of becoming a learning organization and an essential part of this is the focus on knowledge management. This is especially true today in an ever changeable and globalized world with new economic and global competitors competing for the same customers and resources, is increasing the pressure on organizations' competitiveness. In addition, organizations face additional challenges due to an ever-growing amount of data and the ever-bigger challenge of analyzing that data and keeping the data secure. A contributing factor on the focus of knowledge management is the desire from organizations to keep their competitive advantage and reduce the risk of litigation. Many companies have realized that if they managed human and intellectual capital better most issues could be avoided. Successful companies are characterized by exploiting their intellectual capital in an efficient manner. Thus, the most valuable asset an organization has today has become its employees' knowledge. To enable this, there is a tool that supports easier handling and optimize the use of knowledge, which is knowledge management.

Through observations and interviews in parallel with literature review a representation of the current situation was generated. Based on the theoretical framework and careful review as well as analysis of interviews and observations it resulted in six essential areas: structure, management, compensation, communication, trust and motivation.

The analysis showed that the scientific articles and literature have different perspectives, different definitions and are based on different theories but the essence is that they all finally seems to arrive at the same result and conclusion, although with different viewpoints and perspectives. This is regardless of whether the focus is on management style, rewards or communication they all focus on the individual.

1 Jennex, 2007
2 Ichijo & Nonaka, 2007
3 Tohidinia & Mosakhani, 2010
4 Wallach, 1983, p.35
The conclusion is that organizational culture affects knowledge management and dissemination of information, because of its direct impact on the individual. The largest and most important underlying factor why we choose to participate in improvement work or share knowledge is our motivation. Motivation is the reason for and the reason behind our actions.

The recommendation is therefore a continued effort to provide employees with tools to better communicate and share knowledge. In addition, to further strengthen the motivation of employees an increased presence of management at the shop floor is recommended.
Abstract

In an ever changeable and globalized world with new economic and global competitors competing for the same customers and resources, is increasing the pressure on organizations' competitiveness. In addition, organizations faces additional challenges due to an ever-growing amount of data and the ever-bigger challenge of analyzing that data and keeping the data secure. Successful companies are characterized by exploiting their intellectual capital in an efficient manner.\textsuperscript{5, 6} Thus, the most valuable asset an organization has today has become its employees' knowledge. To enable this, there is a tool that supports easier handling and optimize the use of knowledge, which is knowledge management.\textsuperscript{7}

Based on the theoretical framework and careful review as well as analysis of interviews and observations resulted in six essential areas: structure, management, compensation, communication, trust and motivation.

The analysis showed that the scientific articles and literature have different perspectives, different definitions and are based on different theories but the essence is that they all finally seems to arrive at the same result and conclusion, although with different viewpoints and perspectives. This is regardless of whether the focus is on management style, rewards or communication they all focus on the individual.

The conclusion is that organizational culture affects knowledge management and dissemination of information, because of its direct impact on the individual. The largest and most important underlying factor why we choose to participate in improvement work or share knowledge is our motivation. Motivation is the reason for and the reason behind our actions.

The recommendation is therefore a continued effort to provide employees with tools to better communicate and share knowledge. In addition, to further strengthen the motivation of employees an increased presence of management at the shop floor is recommended.

\textsuperscript{5} Ichijo & Nonaka, 2007
\textsuperscript{6} Tohidinia & Mosakhani, 2010
\textsuperscript{7} Wallach, 1983, p.35
Acknowledgements

As part of the end of each program, I have written an thesis of 22.5 points in the subject of knowledge management within a Lean organization. The paper has given me a better critical thinking and thesis writing, but also a better understanding of knowledge management and how Lean principles works within industrialized company and how it is adapted to current needs.

I want to start by expressing my gratitude to my supervisor Dr. Anders Ingwald, which has been invaluable in terms of feedback, guidance and comments on my work and how I could develop it further.

I also want to extend a huge thanks to the people who have helped and supported me during this work. I sincerely thank Antje Critelli and Jamie Critelli for your insights and comments in this work. I also want to express my thanks to Christer Nord, Peter Jensen, Leif Wångblad and Dr. Tobias Schauerte for your participation in this work. Also, a huge thanks to all of you who participated in interviews or who otherwise have provided answers to my questions.

Linnaeus University, Växjö, 2014

Martin Skogmal
Concepts and tools in Lean and Knowledge Management

Below are some core concepts of Lean philosophy presented such as Kaizen, PDCA-cycle and A3-report that are used in Lean philosophy and knowledge management.

Kaizen

The Japanese concept Kaizen means a deliberate systematic approach to achieve continuous improvement.\(^8\) The entire organization should strive to solve problems, document and improve processes. Decision-making is decentralized and thereby transferred down to the working level and open discussion within the team is required before a decision is realized.\(^9\)

PDCA-cycle

PDCA stands for:\(^10\)

- **Plan** / means that the cause of the problem is determined
- **Do** / means that the issue is addressed
- **Check** / involves monitoring and measuring to see if the expected outcome is reached
- **Act** / means that the achieved improvements are documented and standardized so the problem will not occur again. If problems are not solved one has to go through the improvement cycle once more.

PDCA is a systematic approach to solving problems and includes four steps: planning, implementation, standardization and improvement. This systematic problem solving approach is carried out on a daily basis at Toyota and is an important building block in TPS. Only when all these phases are fully satisfactory will the improvement be standardized. The standardized work does not end after one iteration, it is part of a continuous improvement cycle. The improvement work is often associated with a wheel that moves up a hill, also called the Deming’s wheels. During the improvement work Toyota requests that its employees ask themselves the following questions to make sure that the work is not in vain: **1.** What is to be achieved? **2.** What changes can be accomplished that will result in improvement? **3.** How does one know that the change is an improvement?\(^11\)

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8 Bergman & Klefsjö, 2007  
9 Liker, 2009  
10 Bergman & Klefsjö, 2007  
11 Liker, 2009
An A3-report contains all the necessary information needed before making a complicated decision, the A3-report is in the form of a sheet of paper in A3 format. The sheet is divided into squares and consists of two columns. It is read from top to bottom starting with the first column. It is one of Toyota's primary tools for communication. Only the most important information should be included and it should be presented in a visually clear way. The A3-report can also serve as a template of how proposed changes can be implemented. The proposed change shall include a description of the problem, an analysis of the situation, an explanation of what should be achieved, and how to reach the goal. If the proposed amendment does not fit on the A3-report, it is too broad and should instead be divided into smaller sub-projects.  

**DMAIC**

DMAIC (Define, Measure, Analyze, Improve, Control) is a methodology for improvement projects, which usually is used in Six Sigma. This methodology can be compared to the PDCA-cycle, which is common for minor improvement projects. DMAIC means a structured way to visualize the root causes of a problem. Systematic improvement is an important part of modern production industry.  

**Go to GEMBA**

Gemba means *the real place*. To do a Gemba therefore means to *go where it is happening*. In Lean, the notion of go to Gemba is that problems are visible and the greatest improvement ideas will come from doing a Gemba. The go to Gemba resembles Management by Walking Around (MBWA), an activity for management to look for waste and opportunities to practice Gemba kaizen. It is also an opportunity for staff to take a step back from their everyday work and walk around their workplace to identify waste. It allows leaders to identify safety hazards, watch equipment and machinery condition and build on the relationship with employees. The aim is to grasp the situation, go and see, ask why, and show respect.

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12 Liker, 2009  
13 Magnusson, Kroslid & Bergman, 2003  
14 Womack, 2011
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1. INTRODUCTION

The introductory chapter intends to provide a background description of the chosen object of study to give the reader an understanding for the subject. Background along with problem discussion defines the purpose of the study. Restrictions and organization of the thesis is also presented here.

1.1. BACKGROUND

During the past century, the production industry has experienced primarily two major evolutions. The first was in early 1900s in the United States when Henry Ford introduced the assembly line for production of the Model T car. The second came much later, but it did so with a great influence on the market, the evolution came to be known as Lean.\(^{15}\)

Lean originated at the Japanese car company Toyota, and is the management philosophy derived mainly from the Toyota Production System (TPS). This philosophy is part of what is called The Toyota Way. The origin of The Toyota Way dates back as far as Frederick Taylor and his Scientific Management in the early 1900s. The western version of TPS came to be known as Lean production.\(^{16}\) John Krafcik first formed Lean as a concept in the article “Triumph of the Lean Production System” from 1988. But it was not until James P. Womack, Daniel T. Jones and Daniel Roos published the international best-selling book “The Machine That Changed the World” in 1990 that the world really became aware of Lean. Herein the authors describe how companies radically could improve their processes and thereby their results by implementing Toyota's Lean production. The described performance improvements could be achieved by the following measures:\(^{17}\)

- Adoption of processes to a continuous flow
- Eliminate unnecessary steps
- Workforce would have to be transformed into cross-functional teams that are dedicated to a particular process
- All must strive to constantly question the status quo and work with continuous improvement (Kaizen).

\(^{15}\) Oppenheim, 2004; Womack, Jones, & Roos, 2007
\(^{16}\) Olhager, 2000
\(^{17}\) Womack, Jones, & Roos, 2007; Womack & Jones, 1994
Lean contains methods and tools for achieving this and as a management method Lean will contribute to:

- Decrease costs by eliminating waste
- Increase revenue by satisfying customers
- Build for the future by developing people.

The concept of Lean has undergone a radical change over the past 30 years as it has evolved and been redefined by both industry and academia.\textsuperscript{18} Previous research indicates that a prerequisite for success when implementing Lean is to address the problem at the process level, that is where one starts with a single process.\textsuperscript{19} One such could be the process of knowledge management in a company.

Knowledge management is an important part in the management of an organization’s intellectual capital and is today an area in which companies can create competitive advantage. This area has been of a growing importance in today's organizations since the world is changing at an accelerating pace. The economy changes and new global competitors are competing for the same customers and resources. In todays market knowledge management faces additional challenges due to an ever-growing amount of data and the ever-bigger challenge of analyzing that data and keeping the data secure. Successful companies are characterized by exploiting their intellectual capital in an efficient manner.\textsuperscript{20}

The intellectual capital (knowledge) obtained in today’s organizations largely subsides with individuals. There is thus a risk that the total knowledge capital within the company is not explored and taken advantage of. When an organization fails to take advantage of lessons learned, mistakes can be repeated which is not cost effective in the long run. If knowledge and lessons learnt were internalized in the organization, there would be no reason to reinvent the wheel, and employees can work proactively instead to avoid past mistakes.\textsuperscript{21}

Through effective knowledge management, companies take advantage of employees' individual skills, which in turn benefits the company. Applying knowledge management means changing ones organizational structure and thereby its culture, and the culture of the company affects employees. It has also been shown that corporate culture can affect knowledge management, and this is why it is interesting to examine these two terminologies,

\textsuperscript{18} Ritchie & Angelis, 2010
\textsuperscript{19} Portioli-Staudacher, 2010
\textsuperscript{20} Ichijo & Nonaka, 2007; Tohidinia & Mosakhani, 2010
\textsuperscript{21} Ibid
as well as, how corporate culture and technology in collaboration affects businesses and the management of knowledge.\textsuperscript{22}

1.2. PROBLEM DISCUSSION

Knowledge management processes are complex because accountability, management and the flow of knowledge is not always obvious. And when the business complexity increases so does the complexity of knowledge management process, resulting in that the process becomes even more difficult to manage. For a process of this type to run as smooth as possible, clear guidelines and support from management is essential, which in turn demands a specific organizational culture. When working in a Lean organization, one has to remember, that Lean demands interdisciplinary work and various professional groups to cooperate. For knowledge management to be successful within a Lean organization it requires strong commitment from management and stable structures that enable the organization to deal with changes that occur in its environment.\textsuperscript{23}

Hence there is a need to analyze how knowledge is created, disseminated and stored within a Lean organization. There is also a need to analyze the organizational culture and how it can be shaped to promote knowledge transfer and a learning organization.

1.3. PURPOSE

The purpose of this thesis is to explore how knowledge management occurs in practice in a Lean organization and the problems that may arise in order to improve the knowledge management processes. The work will also investigate how knowledge acquired by individuals can be utilized and disseminated more effectively to the whole organization. Furthermore, this paper will outline how culture affects the way knowledge is managed and transferred within a Lean organization. Finally, this thesis will discuss how knowledge management can and should be implemented so that it ultimately leads to increased competitiveness for the company.

\textsuperscript{22} Mason & Pauleen, 2003
\textsuperscript{23} Ichijo & Nonaka, 2007; Tohidinia & Mosakhani, 2010; Mason & Pauleen, 2003
1.4. **Research Questions**

These questions summarize the above discussion:

1. What issues are there to knowledge transfer within a Lean organization?
   - What benefit can improved knowledge management generate for an organization.
2. How does a company's organizational culture influence knowledge management within a Lean organization?

1.5. **Boundary**

The main focus of this paper is knowledge management, but within a Lean organization. Hence how and why implementation and anchoring of Lean has been made in the organization will not be analyzed, rather parallels from a Lean perspective will be highlighted. The author believes that it is important to have a theoretical background to Lean, as the work with knowledge management within a Lean organization is different compared to other types of organizations.

Furthermore, the organization chosen for this study is a large multinational company with many divisions and departments. To determine the depth of the report, the work must be defined and focused. Therefore, will this report focus primarily on the section Purchasing & Manufacturing within the chosen organization, Volvo Cars. And for further references Purchasing & Manufacturing at Volvo Cars will be referred to as Volvo Cars in this report.
INTRODUCTION

1.6. Disposition

• The chapter contains a background and a discussion regarding the problem. Problem discussion concludes the research questions and the purpose for which the study intends to answer. It also details the study's definition.

• It outlines the research approach and the scientific approach that is the basis for the study. I describe the selection of the study and data collection. Furthermore, a critical discussion of the method chosen is discussed.

• It outlines the history of Lean and knowledge management. Thereafter, in depth theories on knowledge management and theory of change in organizations are presented. Finally, some key elements to implantation of Lean are presented as comparative information to knowledge management and theory of change.

• The chapter begins with a short description of Volvo Cars. Thereafter, the empirical data is presented in accordance to previous structure.

• In the analysis chapter the collected empirical data is compared against the thesis theoretical framework.

• Here are the conclusions presented that emerged from the study based on the analysis.
2. Method

The purpose of this chapter is to present the study's methodology. It describes and analyzes the methods used for this study. Initially, the concepts of research approach, followed by research methodology and research design are presented. These concepts have been used in the study to collect data, for discussion and argumentation. Finally, we present methods of data collection and credibility criteria, in order to highlight how the study data has been collected and illustrate the weaknesses of the study and how these have been addressed.

2.1. Research Approach

This work is based on an abductive reasoning. An abductive reasoning is used because the study began with establishing a theoretical framework and then went through the empirical data and finally returned to the theory. The theoretical knowledge is needed in order to be able to formulate interview questions and a questionnaire. Thereafter the theory and empirical data was brought together to answer the questions. Finally, conclusions could be drawn regarding the context that was not established in the empirical data.24

Abductive reasoning is a combination of deductive and inductive reasoning. The first stage is characterized by being inductive. In this step, a proposal is formulated to establish a profound theoretical structure. In the next step, a deductive reasoning is used which tests the selected theory on new cases. The original theory can then be developed to be more generic. The advantage of this reasoning is that it does not lock the researcher as much as either the inductive or deductive reasoning can do. The disadvantage is that the researcher

24 Dubois & Gadde, 2002; Ghauri & Gronhaug, 2005
25 ibid
unconsciously interprets past experiences and therefore cannot rule out alternative interpretations.\textsuperscript{26}

By assuming an abductive reasoning one is able to add new theories while working. Unlike inductive and deductive reasoning, abductive reasoning is more so aimed at creating an understanding.\textsuperscript{27}

\textsuperscript{26} Dubois & Gadde, 2002; Ghauri & Gronhaug, 2005
\textsuperscript{27} Alvesson & Sköldberg, 2008
2.2. RESEARCH METHODOLOGY

This study is based on a qualitative research method because it is most appropriate when it comes to creating an understanding of selected area. Through interviews, which are a part of the qualitative method, one can according to Alvesson build a deeper understanding than if a quantitative method was used.\textsuperscript{28} This is because the qualitative method is based on studying the interviewees and hence perceives their interpretations and experiences more profound than a quantitative approach would, where the focus is on facts that can be quantified and used statistically.\textsuperscript{29}

The qualitative research method is different from the quantitative approach in that the qualitative method is not measurable or generalizable. A qualitative approach is heavily influenced by the researcher's own understanding. When using a qualitative method, one strives to get a deeper knowledge of all possible conditions.\textsuperscript{30} In addition, a qualitative approach enables the gathering of information throughout the development and to follow new leads.\textsuperscript{31} A qualitative approach is particularly relevant when the problem does not have a clear definition or is poorly understood.\textsuperscript{32}

The substance for the choice of this method is primarily based on the fact that knowledge management within Lean is not particularly widespread in Sweden, which meant that there were only a small number of examples in Sweden to analyze. With this as background, I have chosen a qualitative approach for this study, because the strength of the qualitative approach is that it provides a good understanding of the problem at hand and it offers a holistic view of the problem.\textsuperscript{33}

\textsuperscript{28} Ghauri & Gronhaug, 2005
\textsuperscript{29} ibid
\textsuperscript{30} ibid
\textsuperscript{31} ibid
\textsuperscript{32} ibid
\textsuperscript{33} Holme & Solvang, 1997
2.3. Research Design

After selecting the research method, collection of information was performed through a case study. The choice is based on the fact that there is a limited amount of theory and empirical research of knowledge management within Lean. Because of this, it was determined that a case study was the most appropriate technique for collection of data.\(^{34}\) In addition, a case study is appropriate when the study is of a descriptive and exploratory purpose.\(^{35}\) An exploratory purpose is appropriate when the topic covered is relatively unexplored\(^{36}\).

2.4. Data Collection

The study is based on two types of data, primary and secondary data. Primary data is collected by one self through interviews with respondents in each organization, while secondary data is already existing data, collected by other people and researchers.

2.4.1. Primary Data

This report has used qualitative interviews based on an interview template (see interview guide Appendix 2, 3 and 4).

The selection of interviewees was based on their attitudes, beliefs, knowledge and experience within, as well as, outside the realm of Lean work. Face to face meetings were the primarily way of interviewing the interviewees, however phone and email was used to supplement the interview.\(^{37}\)

<table>
<thead>
<tr>
<th>Name</th>
<th>Profession</th>
<th>Department</th>
<th>Date of interview</th>
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<tr>
<td>Christer Nord</td>
<td>Director</td>
<td>Operational Development</td>
<td>2014-11-05</td>
</tr>
<tr>
<td>Nedzad Ramic</td>
<td>HR Competence Management Coordinator</td>
<td>Purchasing &amp; Manufacturing</td>
<td>2014-11-05</td>
</tr>
<tr>
<td>Carin Kuylenstierna</td>
<td>HR Business Partner</td>
<td>Purchasing &amp; Manufacturing</td>
<td>2014-11-05</td>
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\(^{34}\) Yin, 2008  
\(^{35}\) Kvale & Brinkmann, 2009  
\(^{36}\) Andersen, 1998  
\(^{37}\) Ghauri & Grønhaug, 2005; Merriam, 1998


### Gothenburg (Torslanda factory)

<table>
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<th>Name</th>
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<tr>
<td>Sarah Alverbratt</td>
<td>Competence Developer</td>
<td>Competence Development - Human Relation</td>
<td>2014-11-06</td>
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<tr>
<td>Heinz Bisenius</td>
<td>Senior manager</td>
<td>VTC Business Office</td>
<td>2014-11-06</td>
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<tr>
<td>Marie Lundgren</td>
<td>Supervisor</td>
<td>Volvo Car Academy</td>
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<td>Lennart Fransson</td>
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<td>PVC TA – Part Assembly</td>
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<td>Ninef Yousif</td>
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<td>Team Leader</td>
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### Olofström

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<td>Senior Manager</td>
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**Method**

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<td>Jan Andersen</td>
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<td>Natasha Hoogendijk</td>
<td>Manager</td>
<td>Virtual Manufacturing Engineering, final production</td>
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**Gothenburg (Manufacturing Engineering)**

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**Table 1: Presentation of the Interviewees**

The interviews are considered according to Merriam, Ghauri and Grønhaug to be the core of qualitative research and evaluation. I did, therefore, choose to conduct semi-structured interviews. With this choice, one avoids the rigidity that exists in a structured interview and the risk that it will get **off topic** as it can with an unstructured interview.\(^{38}\) After each interview, Merriam, Ghauri and Grønhaug instructions were followed; immediately go

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\(^{38}\) Ghauri & Grønhaug, 2005; Merriam S. B., 1998
METHOD

through the collected information and notes and summarize this in order to avoid the data to become an overwhelming amount.\textsuperscript{39} Accumulation of too much data leads us to forget to remove the irrelevant\textsuperscript{40}. As Merriam, Ghauri and Grønhaug recommend, I have summarized and analyzed each interview, direct observation, participant in the experiment, as well as, documents and material as quickly as possible, to maintain the timeliness of the information.\textsuperscript{41}

2.4.2. SECONDARY DATA

Secondary data collected for this study consists primarily of literature, articles published on the Internet, newspaper articles and scientific articles on the subjects of Lean, Lean production, knowledge management and information management. The search has taken place on Google, Google scholar, through the library databases at Linnaeus University, Volvo Cars Intranet and on websites of Lean forums. Keywords used were Lean, Lean production, knowledge management, information management and theory of change.
2.5. **Validity and Reliability**

It is important to critically examine the data to determine how reliable and valid it is\(^42\). As mentioned before, this study is based on a qualitatively approach, which means that the concepts of reliability and validity are difficult to apply. Reliability and validity are mainly terms used in studies based on a quantitative method, while the credibility and verifiability is more prevalent in qualitative research.\(^43\)

Validity is difficult to apply, because it is a measure designed to see what was intended to be examined and whether this has really been achieved. That is, if the problem formulation and the purpose of the study has been answered. Qualitative studies are not focused on the statistical representativeness in the same way as in quantitative studies. Genuine and authentic information is therefore more difficult to obtain because of fewer representatives.\(^44\)

The qualitative method's closeness to the study may contribute to the obtained information getting a deeper understanding than that of a quantitative study. However, it should not be underestimated that the proximity to the study may have caused various disorders, such as skepticism and selectivity in the empirical data, which may have affected the authenticity. Applying reliability in qualitative methods is difficult, because reliability is supposed to measure whether a method has yielded the same results in different studies, and be applicable at different times and under the same circumstances.\(^45\) Krippendorff emphasizes the importance that one should continuously look at the material critically in order to reach a sufficient level of validity and reliability.\(^46\) Results obtained from this study can be regarded as genuine, repeatable and authentic, because the previous concerns have been addressed in this study.

To achieve high *construct validity*\(^47\), the recorded answers have been sent back to the interviewees for proof reading.

The external validity refers to how well the results can be generalized in other cases.\(^48\) The results from this qualitative case study cannot be considered generalizable. The case study can

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\(^{42}\) Krippendorff, 2004  
\(^{43}\) Ghauri & Grønhaug, 2005  
\(^{44}\) *Ibid*  
\(^{45}\) Krippendorff, 2004  
\(^{46}\) *Ibid*  
\(^{47}\) Yin, 2008  
\(^{48}\) Bryman, 1997
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however be transferable. What this means is that the results from this study may be useful in similar contexts.⁴⁹

⁴⁹ Merriam S. B., 1994
2.6. CRITICISM OF THE METHOD

To reflect on the choice of method is important, because this selection shapes and positions the study. The various methods pros and cons should be considered. The abductive reasoning differs from other forms of reasoning, because it does not attempt to favor one conclusion above others. The abductive approach may have contributed to missed approaches that an inductive or deductive approach would not have.

The qualitative method has several disadvantages. First, the respondents represent only a portion of the total empirical field, and only one company in the organization has been studied. Secondly, I accounted for both the collection and analysis of the data, which may have contributed to that I affected the result. Subconsciously, I may have influenced the interpretation of the results in this study. Pre-understanding, perceptions and values may have contributed to some aspects being highlighted and others not, because of own interests. This is also the case for qualitative interviews, where it is important to consider that a position can arise from my side. Therefore, the interviews affect the defendant knowingly and unknowingly. By allowing them to receive the questions forehand they are able to better prepare themselves and by only asking open-ended questions, I tried to minimize my position.

Qualitative methods generally use fewer interviews than quantitative methods. Given that only a limited number of respondents, as well as, only one organization has been used to describe the empirical basis, it must be taken into account that the results might not have been the same if other respondents were interviewed or another company within the organization had been used. Respondents from different backgrounds and experiences contribute to the general material and its results.

2.6.1. CRITICISM OF THE SOURCES

The sources used in this study have been both primary and secondary. Secondary sources are materials that are not taken from the direct source, resulting in a greater risk that errors exist than they do in the primary sources. To critically examine the used source is important, to see from where the data originated, likewise to see whom the person behind the facts is in order to understand the context in which the source occurred.

Who is behind the information and the purpose for which it is published is used as criteria to assess whether the source is biased or otherwise not credible.
2.6.2. **Ethical Questions**

Ethical and moral responsibility of a scientist is an important aspect to consider. An interviewer must weigh the risks in relation to its benefits when it comes to choosing how interviews are conducted. Structured and semi-structured interviews are less likely to cause the respondent to feel that their privacy has been invaded. An open meeting on the other hand gives the interviewer a greater influence and freedom to explore the answers more carefully, but also means more risk. By sending out a presentation (see Appendix 1) explaining the reasons behind the study as well as allowing them to receive the questions (see Appendix 2, 3 and 4) forehand I believe it gave them an opportunity to better prepare themselves. In addition, before the interview officially started I stated: (1) Your participation is voluntary, you may stop at any time or choose not to answer, (2) If you want you can ask follow-up questions or clarification to any question, (3) Your participation is anonymous, all personal information will be treated confidential. Herby I tried to minimize my position and influence on the respondents.

Ethical dilemmas are a risk that a researcher faces. Having a supervisor, in my case Dr. Anders Ingwald, has been invaluable to discuss questions and issues with and is something that Merriam recommends. Since the supervisor only needs to know the circumstances of the case study, the confidentiality is kept high. Merriam gives three recommendations of what to consider before you undertake a research project, which I have considered: (1) "Consider possible consequences of the research, (2) present the results with as little distortion as possible, while maximizing the potential benefits of research, and (3) be especially careful in the distribution of the results." 

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50 Merriam S. B., 1998
51 Merriam S. B., 1998, p. 218
METHOD

2.7. THEORETICAL AND PRACTICAL SIGNIFICANCE

According to earlier research done at Volvo Cars different parts of Lean, knowledge- and information management as well as the theory of change has been conducted, but there has been no comparative study on them together. Furthermore, due to the lack of research on future impacts of the increasing globalization of the Swedish car companies, a comprehensive study of these concepts contributes to a more complete and deeper understanding. The thesis is an interaction between a theoretical and a practical perspective.

The thesis has a theoretical relevance because it can help to develop and create new theoretical knowledge that contribute to the development of knowledge about how Lean and knowledge management are conducted, and can be conducted. Furthermore, the thesis has theoretical relevance because it includes the motives behind the organizational way of acting and the possibilities to expand the business. The study may contribute to the accumulation of knowledge about how Lean principles (the principles described by Womack et al) can be applied in Swedish industry.\(^{52}\)

The thesis also has a practical relevance, because the result forms the basis of new knowledge and an understanding of the field. The thesis has tried to solve practical problems for the organization; how to improve their knowledge- and information management as well as the understanding of Lean in order to further strengthen Volvo Cars quality work. Furthermore, it has a practical application because the study was made at several companies within the organization; an attempt to unify the work with knowledge management and Lean. Interviews were also made on knowledge and information management, organizational development and Lean of the automotive industry.

\(^{52}\) Womack, Jones, & Roos, 2007
3. **THEORY**

The chapter begins with a history on Lean and knowledge management in order to create understanding for further reading. Thereafter, in depth theories on knowledge management and theory of change in organizations are presented. Finally, some key elements to implantation of Lean are presented as comparative information to knowledge management and theory of change.

3.1. **DEVELOPMENT OF LEAN**

Lean has long been on the forefront of successful management philosophies when it comes to production development. Below is short introduction to how Lean came to be, and its core ideas.

The origin of Lean comes from Japan and Toyota. Toyota has long worked systematically with improvements in order to minimize waste. Their method is called *Toyota Production System* (TPS).\(^{53}\) Lean production can be said to be a western variation of TPS.

It all started after World War II when Toyota struggled with lack of finances and low availability of raw material to run the business in a satisfactory manner. In an effort to learn more about car manufacturing, representatives from Toyota visited the leading automaker, which at the time was Ford. After careful studies of Ford's factories it was found that with regard to their financial situation adaptations were in order to make Ford's mass production principles adaptable at Toyota. The economy and the availability of raw materials meant that Toyota needed to charge for their cars before they were made and that the machines would have to do several different things. This caused enormous demands on shortening the setup times, lead-time and various forms of waste in Toyota's factories. Based on these preconditions the pioneers Taiichi Ohno and Shigeo Shingo developing the Toyota Production System. The two principles that TPS is based on are just-in-time (JIT) and Jidoka.

The development of TPS lasted more than 30 years before the rest of the world began to show interest.\(^{54}\) It took until 1988 for the term Lean production to first be formulated by Krafcnik as a concept, in the article *“Triumph of the Lean Production System”*. It took the world a couple of more years to really became aware of Lean, it transpired first when James P. Womack, Daniel T. Jones and Daniel Roos published the international best-selling book *“The Machine*
That Changed the World” in 1990. The meaning of Lean production is that its resources are used as efficiently and smartly as possible by eliminating waste. In recent years, researchers have presented Lean as a collective management approach, which includes other major management concepts. This phenomenon has been discussed by authors such as Hines et al. and Shah and Ward. In addition to the original Lean principles JIT and Jidoka, Shah and Ward argues that nowadays Lean consists of approaches such as Human Resource Management (HRM), Total Quality Management (TQM), Total Productive Maintenance (TPM). An in addition to the original principals Lean nowadays also use visual controls to see problems, such as: Production Analysis Boards, Red Bins, Shop stocks, 5S, Standardized Work, Andon, Heijunka boards and 4M, or Kaizen tools to solve problems, such as: Suggestions Program, Creating continuous flow, A3, QR/QC, SMED, Kanban.

To understand how the philosophy and methods should be used for knowledge management within a Lean organization, it is first required to have an understanding of these within Lean. The basic philosophies that define how to work with Lean within an organization will look different depending on who it is that defines them. Earll Murman et al in the book Lean Enterprise Value, defines Lean as follows.

"Becoming ‘Lean’ is a process of eliminating waste with the goal of creating value."

The core about the definition of Lean and its applications is the elimination of waste using Lean tools. However, it is important to note that Lean must be viewed as a whole and not be divided into a number of separate tools; otherwise it will not achieve its expected effect. To use only the individual tools of Lean and not see Lean as a whole system has been one of the prevalent reasons why many organizations are struggling with the implementation of Lean.

All activities carried out in a business are categorized based on whether they are value adding or non-value-adding. The activities that are non-value-adding are considered waste, and these should be systematically eliminated. According to Bergman and Klefsjö, an important part of Lean is to divide activities and time in value-adding and non-value-adding parts. All activities that do not provide value to a product or service are as mentioned above considered

55 Olhager, 2000
57 Shah & Ward, 2007
58 Ballé, 2007
59 Murman et.al., 2002, p.3
60 ibid
61 Liker, 2009
62 ibid
63 Bergman & Klefsjö, 2007
waste. Lean focuses on minimizing non-value adding activities. Within Lean, Liker has identified seven different types of wastes: (1) Over-production (2) Waiting (3) Transportation (4) Over-processing (5) Inventory (6) Defects (7) Motion. In regard to the non-value added time, it can in turn be divided into two parts, one that is necessary under the present conditions and the other that is pure waste and can be removed by simple means. The pure waste should be addressed immediately and eliminated. The other part that is necessary under the present conditions needs to be addressed and eliminated in the long run, but comes second in turn to the pure waste. Reducing and preventing waste and focusing on the value-added activities achieve a greater cost efficiency.

At the heart of Lean is commitment and teamwork, which means flexible, motivated team members who are constantly looking for a better way or a better technique of working to increase efficiency. As indicated Lean is a comprehensive transformational process that requires dedication and motivation of everyone in the organization for the desired results to be achieved. In Lean each principle, method and tool is linked. The Lean philosophy is based on the concept that if implementation of small changes is done over time then this will provide a new and improved attitude among employees. In addition to his daily routine, an employee shall question how the task he performs can be refined and advance the entire organization. This development in the daily work, says Liker, can give rise to an eighth waste, which is employee untapped creativity, which means that the organization does not take full advantage of the expertise and ideas of their employees. Small changes over time lead to a more efficient organization over time. It has been observed that best results are obtained in a decentralized organization where employees are allowed more responsibility; this is because the employees feel they have control and power to change their work environment. The employees' self-esteem should also be taken into account. No one should be singled out to bear the blame if inefficiency is detected. The errors are in the system and no individual should be blamed for it.

As discussed above, Lean is a comprehensive approach to eliminate waste in an organization. It incorporates everything from single processes, to management, organizational culture and structure. As mentioned before, the purpose of this thesis is to study how knowledge management occurs in a Lean organization and the problems that may arise in such in order to

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64 Liker, 2009
65 Bergman & Klefsjö, 2007
66 Liker, 2009
67 ibid
68 Scherrer-Rathje, Boyle, & Deflorin, 2009
improve the knowledge management processes. The introduction emphasized the importance of knowledge management in management of an organization’s intellectual capital. Furthermore, the paper will discuss that organizations are easily influenced by culture and changes. An intricate part of any organizational work with improvement processes is to remember what worked in the past and most importantly what did not. At one time, knowledge resided in a handful of people. However the business world has become more complex and technology has become more sophisticated, and as a response so has the distribution of knowledge and knowledge management. Today, it is impossible for one or a few people to know it all, and people rely heavily on computerized databases and managerial software to remember important facts and make knowledgeable decisions. Knowledge has become an important, if not the most important part in an organizations asset. And knowledge management is the management of an organization’s intellectual capital, and is the next part in this thesis. Based on the above notion the next part describes the historical background to this development and acts as a basis for further reading.
THEORY

3.2. DEVELOPMENT OF KNOWLEDGE MANAGEMENT

The emergence of knowledge management came about as a result to the explosion of data, information and knowledge, which was caused by the rapid growth of Internet and organizational intranets, databases and data warehouses. A contributing factor was the desire from organizations to keep their competitive advantage and reduce the risk of litigation. Many companies realized that if they managed human and intellectual capital better most issues could be avoided.\textsuperscript{69}

Knowledge management refers to how an organization deals, manages, transfers, and shares its inherent knowledge. Many organizations use knowledge management internally, often as part of their strategy. According to Davenport knowledge is defined as\textsuperscript{70}:

"... a fluid mix of framed experience, values, contextual information, and expert insight that provides a framework for evaluating and incorporating new experiences and information. It originates and is applied in the minds of knowers. In organizations, it often becomes embedded not only in documents or repositories but also in organizational routines, processes, practices, and norms."\textsuperscript{71}

From this definition it can be inferred that knowledge arises from many different sources and is interpreted in relation to the recipient's experience and expectations. Knowledge resides in those who know and as Gensicke expressed it "knowledge is a prerequisite for purposeful action"\textsuperscript{72}. Consequently, in order to structure and organize knowledge in an organization it is important to implement knowledge management.\textsuperscript{73}

Knowledge management focuses on the development and distribution of knowledge in organizations through technology solutions, social relationships and interactions. Knowledge management is a process that creates, disseminates and embodies knowledge. Furthermore, right knowledge needs to be available to the right people at the right time. In addition, the organization needs to learn and be able to use the inherent knowledge.\textsuperscript{74}

Knowledge management is strongly related to the concept of knowledge. Therefore, this chapter will begin with a description of what creates knowledge. As noted, knowledge

\begin{footnotes}
\item[69] Jennex, 2007
\item[70] Davenport & Prusak, 1998, p.5
\item[71] ibid
\item[72] Dombrowski, Mielke, & Engel, 2012, p.437
\item[73] Davenport & Prusak, 1998
\item[74] ibid
\end{footnotes}
management includes many sub-areas. The creation and transfer of knowledge is of great importance for the company and is therefore further introduced in the next section.

### 3.2.1. Data – Information - Knowledge

A variety of raw and disorganized facts are called **data**. When data has been evaluated, it is converted to **information**. All types of organizations need data in one way or the other, but it is important that the organization knows how much is the right amount of data. Too much data might make the employees clueless of how to assess or treat the data in order for it to be converted into information. It is therefore important that the organization early on determines what kind of data is relevant, timely and accurate. Information, unlike data, has a specific intent and meaning, which aids decision-making processes. Information generates **knowledge**, but only if understanding for the information has been established. Knowledge subsequently leads to a competitive advantage for an organization. Therefore is it important to have effective processes in an organization, which convert data into information and then into knowledge.\(^{75}\)

### 3.2.2. Knowledge – Implicit and Explicit

According to theorists there are different forms of knowledge, and they can be articulated explicitly or manifested implicitly. The main difference lies in how knowledge is shared. **Explicit** knowledge is clear and spoken and can be summarized, it is therefore easier to communicate and share. **Implicit** knowledge, on the other hand, is rather intuitive and unspoken, which makes it hard to distinguish.\(^{76}\) Dombrowski et al argues that much of human knowledge is implicit. Furthermore, Dombrowski et al says that implicit knowledge is action-oriented and has a personal quality, which makes it difficult to communicate. Implicit knowledge requires close interaction and a shared understanding.\(^{77}\) Explicit knowledge on the other hand can be clarified and summarized, can be transmitted regardless of subject, time and place.\(^{78}\)

\(^{75}\) Awad & Ghaziri, 2004  
\(^{76}\) Lam, 2000  
\(^{77}\) Dombrowski, Mielke, & Engel, 2012  
\(^{78}\) ibid
3.3. Knowledge Management

Last section presented a historic review of Knowledge management to give a background and substance for further reading. The next section presents the more technical aspect of knowledge management. Systems to easily disseminate and share knowledge are presented along with barriers to transfer knowledge. To conclude this section criticism towards knowledge management is presented.

Knowledge management is a key element in the management of an organization's intellectual capital. The **goal** of knowledge management is to improve the organization's ability to perform its core processes more effectively.⁷⁹ Some researches describe knowledge management as a systematic process of collecting, organizing, and communicating knowledge to members of the organization so that others can use it to become more efficient and productive.⁸⁰ The **aim** of knowledge management is to maximize organizational and individual knowledge by extracting implicit knowledge and translate it into explicit knowledge, which can then be interpreted, stored, retrieved, shared and disseminated⁸¹. **Benefits** of applying knowledge management are • Reduces time-to-market • New products are designed and commercialized more quickly and successfully, which will result in • Increased Revenue • Retained Market Share • Expanding Profit Margins.⁸²

Knowledge management focuses on the development and distribution of knowledge in organizations through technical solutions such as databases, but also through social relationships and interactions⁸³. Technical solutions enable easier access for employees in the organization to share knowledge. However, the storage of knowledge is a challenge, partly because it incurs a cost to implement and maintain a database but also due to the technical expertise required. As a consequence the knowledge is preserved in the minds of management and key personnel, instead of physically being stored or shared. Organizations regardless of size manage knowledge without necessarily defining it as knowledge management. Unsuccessful knowledge management is often due to shortcomings in organizational aspects such as culture and employee engagement. For effective knowledge management an organization must prioritize the ability to share knowledge.⁸⁴ One such priority is investing in an IT system to simplify easier exchange of knowledge.

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The introduction of an IT system is one of the most common measures for increased knowledge sharing, but it can give both positive and negative effects. In the right conditions, an IT system will create an information base that employees can use for hints and advice. It might also increase the communication within the company so that new ideas and thoughts are discussed and developed. However, there is risk that the system becomes unorganized and obsolete making it impossible to search efficiently. When sharing knowledge there are two different models of information transfer, push and pull. The traditional information transfer model is the pull-model, which enables search by specific criteria to present information. This usually occurs based on a user’s interests and therefore is it important that the information is carefully indexed, categorized and easily foreseeable. The push-model, means that the information is sent or pushed from the originator to potential stakeholders depending on predetermined criteria’s. It is important that organizations manage a balance between the two models otherwise there might be unforeseen issues. For example, the push-model might send too much information out to stakeholders and thus, relevant information can be filtered out with irrelevant information. The pull model, builds on the fact that the stakeholders of the information must be aware that all information about a specific subject is not necessary. The decision therefore must be based on a context that is constantly changing. If organizations do not strike a balance between the two models, there is a risk that employees will spend more time searching the database than coming up with new solutions. Therefore is it important to keep the IT system organized and updated in order for employees to see its benefits and how it can improve their work.

Recently, there has been criticism towards the use of technological tools for knowledge management as the sole communication method. Other ways to enhance the ability to create knowledge is to have discussion groups, weekly meetings, have a common forum where questions can be raised to those with expertise in the company. All these techniques increase communication within the company, which is essential in sharing knowledge. To successfully transfer knowledge, from a non-technical perspective, a personal relationship and integration between individuals is essential. The following five items are important contributing factors:

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85 Heide, Johansson, Simonsson, 2005  
86 Telleen, 1996  
87 Ibid  
88 Alavi & Leidner, 2001  
89 Ajmal, Helo & Kakäle, 2009; Heide, Johansson, Simonsson, 2005  
90 Alvesson, 2004  
91 Soliman & Spooner, 2000
(1) **Social gatherings of staff.** In some organizations, it is not considered value-adding to talk with colleagues, but communication between employees has been considered to create advantages for the organization. This is because thoughts that might not have been raised at organized meetings are easier discussed in a less formal environment. In order to spread the implicit knowledge it is important that organizations encourage employees to mingle and exchange ideas and opinions with each other. Employers’ fear that the discussions are about hobbies is misguided, it has been shown that discussions largely are about work, since this is what the employees primarily have in common. Through these conversations employees find out what they know and what they do not know, and this knowledge is then spread and in the process new knowledge is created for the organization.\(^\text{92}\)

(2) **The office layout.** Creating an environment where people can easily communicate can be challenging, but by creating open workplaces, common recreation areas and by having informal meetings the opportunity to thoroughly discuss any issues in various projects is supported. Many companies enable employees to discuss creative solutions to problems and easily share information with each other using these methods.\(^\text{93}\) But it is not guaranteed that the exchange of knowledge will occur, for communication and knowledge sharing to occur the willingness to share knowledge must exist.\(^\text{94}\)

(3) **Trust between employees of the firm.** One of the most fundamental ingredients to increase knowledge sharing is trust between employees.\(^\text{95}\) If employees trust each other they are less likely to feel exposed to open up. If trust does not exist the willingness to share knowledge decreases and implicit knowledge stays unspoken.\(^\text{96}\)

(4) **Learning and mistake handling.** An organizational culture that encourages openness from employees to discuss their mistakes with other employees can easily lead to the creation of a learning organization. A culture where employees are not penalized for their mistakes benefits knowledge management, because employees are not afraid to share their mistakes and the organization can learn from them.\(^\text{97}\)

(5) **Senior management involvement and support.** The employees who have been in the business a long time are often considered to be experts in their field and involving them in the

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\(^{92}\) Davenport & Prusak, 1998

\(^{93}\) Roos, Roos, Dragonetti, & Edvinsson, 1997

\(^{94}\) Davenport & Prusak, 1998

\(^{95}\) Soliman & Spooner, 2000

\(^{96}\) Turban & Aronson, 2001

\(^{97}\) Soliman & Spooner, 2000
work often creates a culture where motivation to spread knowledge increases. The experts have a lot to teach the novices and through support and advice transfer of implicit knowledge to novices is possible.\textsuperscript{98}

Knowledge management is a broad subject and affects an organization in several different ways. Stankosky (left) presents roughly what knowledge management consists of.\textsuperscript{99}

**Organization.** Affects the operational parts of the knowledge resources such as processes, organizational structures, traceability, techniques for the transmission of knowledge and the optimized use of the company's knowledge resources.\textsuperscript{100}

**Leadership.** Affects the strategic processes such as values, goals, knowledge needs, sources of knowledge, priorities and allocation of company resources within knowledge management. It also stresses the importance of integrated leadership and systems thinking.\textsuperscript{102}

**Learning.** Focuses mainly on principles and how individuals in practice best collaborate and share knowledge. The focus is to find the attributes that create a learning organization.\textsuperscript{103}

**Technology.** Addresses the various technical solutions that support knowledge management processes and knowledge management strategies, such as IT systems.\textsuperscript{104}

Knowledge management is a topic that must be interacted from the board of directors and implemented throughout the entire organization. If implementation of knowledge management fails, it is mainly for two reasons; culture and leadership.\textsuperscript{105}

\begin{itemize}
\item\textsuperscript{98} Turban & Aronson, 2001; Soliman & Spooner, 2000
\item\textsuperscript{99} Stankosky, 2005
\item\textsuperscript{100} ibid
\item\textsuperscript{101} ibid
\item\textsuperscript{102} ibid
\item\textsuperscript{103} ibid
\item\textsuperscript{104} ibid
\item\textsuperscript{105} Ichijo & Nonaka, 2007; Mason & Pauleen, 2003
\end{itemize}
3.3.1. **Knowledge Management System**

Although knowledge management is mainly process-oriented with strategies that can be derived from the organizational culture, policies and motivation, knowledge management needs the right methods and the right technology for it to be as efficient as possible.\(^{106}\)

The management of knowledge is simplified by the use of a knowledge management system, where knowledge flows from the individual who has the knowledge to the individual who needs the information. In addition, the knowledge will develop and grow through the process. The next step is for organizations to determine which technology tool they will use.\(^{107}\) The following technologies are some of the most important ones in the development of knowledge management systems, according to Dyer\(^{108}\): 1. Data warehouses 2. Search engines 3. Information portal 4. E-mail 5. Groupware. If these technological aids are used efficiently by the organization they have a competitive advantage against organizations that do not. They reduce the loss of intellectual capital in the event an employee leaves the company. Furthermore, it enables access to external information and increased productivity as access to information becomes more readily available.\(^{109}\)

Although, as more information is readily available and turned into knowledge the more knowledge transfers need to occur. More transfers means a greater challenge to get the recipient to understand the given information and turn it into knowledge. These challenges are the topic for the next passage.

3.3.2. **Barriers When Transferring Knowledge**

A transfer of knowledge is complete if the receiver has acquired and understood the new knowledge. Unfortunately, it is common that problems unfold when knowledge is transferred, so-called barriers. Barriers that often occur in the daily work are: ▪ Time-based ▪ Cultural ▪ Linguistic or ▪ Distance-based. Unless these barriers are addressed knowledge transfer will not be successful and the organization will lose its competitive advantage.\(^{110}\)

Even more complex barriers arise when employees who hold key knowledge leave the organization. Typically this would be resolved with the person in question documenting or

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\(^{106}\) Turban & Aronson, 2001

\(^{107}\) Ibid

\(^{108}\) Dyer, 2000

\(^{109}\) Turban & Aronson, 2001

\(^{110}\) Lindkvist, 2001
teaching their skills to a replacement, but not always.\textsuperscript{111} A successful business is where the corporate culture gets all employees within the organization to work towards the same goals and visions. It is important that everyone is aware of the common goals and vision of the organization and that everyone knows that their work contributes to achieving them.\textsuperscript{112} Companies that fail to get employees to work towards the same goal, rarely succeed in building the atmosphere and culture in the company needed to make everyone feel included and willing to share their knowledge. To create a successful knowledge management structure, it needs to be implemented throughout the whole organization. Companies need to develop an organizational culture in which employees do not expect to get anything in return. If they do not, it is a risk that individuals compare the value of sharing knowledge with the knowledge they get in return, and that could result in a protective behavior of the knowledge.\textsuperscript{113} So an essential part is to establishing a personal relationship and integration between individuals to support knowledge management.\textsuperscript{114} The main obstacle for sharing knowledge is individual willingness to share knowledge\textsuperscript{115}. It is therefore important to understand that employees choose to share information for various reasons\textsuperscript{116}. It is only when employees are willing to share their knowledge with colleagues that organizations can begin to manage knowledge resources efficiently. It has been found that knowledge sharing behavior is stimulated by the satisfaction of helping others and making a contribution. Although the mutual benefits for both partners was a contributing motivation to share knowledge. Lin argues that the employees' attitude towards the sharing of knowledge can be affected by their behavioral intentions. Seeing ones knowledge as a public good belonging to members of the organization may be a motivation to contribute.\textsuperscript{117} This view is associated with a compassion for the organization that creates an obligation to share their knowledge\textsuperscript{118}. The organization must, as stated before, establish a culture that encourages employees to share their knowledge and work towards the same goal.\textsuperscript{119} In addition, there must be technological tools that enable employees to easily find information and share their knowledge. To facilitate a smooth flow of knowledge, individuals should be able to communicate with each other even when they are not in the same place, it is important that

\textsuperscript{111} Roos, Roos, Dragonetti, & Edvinsson, 1997
\textsuperscript{112} Turban & Aronson, 2001
\textsuperscript{113} Jashapara, 2005
\textsuperscript{114} Soliman & Spooner, 2000
\textsuperscript{115} Lam & Lambermont-Ford, 2010
\textsuperscript{116} Wang & Noe, 2010
\textsuperscript{117} Lin, 2007
\textsuperscript{118} Soliman & Spooner, 2000
\textsuperscript{119} Sveiby, 1995
companies include e-mail, information portals and groupware to assist their employees. Through these technical aids, they communicate with each other and knowledge is acquired and spread more easily between individuals and the organization. The employees must realize that it brings benefits to working together, but this requires the organization to make employees feel part of the company's vision and goals. One task of knowledge management is to show the positive effects of people's knowledge and skills as a competitive advantage. If the organization cannot convince their employees of the benefits of knowledge management it is going to be hard pressed to get the support from investors.

3.3.3. Criticism Towards Knowledge Management

One of the main criticisms of knowledge management is that a lot of money and time is put into it but that gains and profits are difficult to estimate. Moreover, it is difficult to outline what is knowledge management and what is organizational culture or strategy. The organizational culture in itself can be a barrier to a successful implementation of knowledge management. It is argued that a lack of and ineffective leadership creates internal barriers, such as trust- and confidence problems within the organization. It may also be that organizations sometimes focus too much on saving their existing knowledge instead of developing new. Lack of incentive for employees, lack of documentation and lack of information and communication systems can be a hindrance to knowledge management development. In addition, the lack of resources can hinder knowledge sharing. Others argue that relying too heavily on technological tools is the reason for unsuccessful implementing of knowledge management.

One of the main limitations of sharing knowledge, according to Wang and Noe, is the lack of incentives. They therefore recommend reward- and recognition incentives to stimulate and build a supportive culture. Riege believe that reward for a knowledge-sharing behavior should be done by integrating the desired behavior with the organization's performance and compensation. This opinion is not shared by Lin, who argues that a reward system does not affect how individuals share knowledge. Furthermore, Lin emphasizes that the expected

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120 Turban & Aronson, 2001
121 Hutchinson & Quintas, 2008
122 Nonaka & Tee, 2001
123 Mason & Pauleen, 2003
124 Ibrahim, 2010
125 Fard & Selseleh, 2010
126 Sooliman & Spooner, 2000
127 Wang & Noe, 2000
128 Riege, 2005
organizational rewards do not affect employees' attitudes and their motivation for sharing knowledge.\textsuperscript{129} Turban and Aronson, as well as Soliman and Spooner, claim that reward systems offering promotions, bonuses and higher salaries will increase the frequency of knowledge sharing. Transfer of knowledge to databases has been shown to correlate more closely with external rewards than with internal benefits such as self-fulfillment and joy in helping others.\textsuperscript{130}

No field of study is without criticism, this is also true for knowledge management. Questions are raised about why organizations implement knowledge management or why it does not succeed. One of the reasons mentioned above is that it is hard to distinguish between the culture of the organization and knowledge management, then another is that the organization in itself can be a barrier. To have organizational culture and employees embrace and welcome change is the key factor in successful implementation of knowledge management. This is especially true in a Lean organization, which strive to continuously improve all aspects and areas of the organization.\textsuperscript{131} This is why the next two parts will touch on the subject of theory of change and organizational learning.

\textsuperscript{129} Lin, 2007
\textsuperscript{130} Turban & Aronson, 2001; Soliman & Spooner, 2000
\textsuperscript{131} Näslund, 2008
3.4. Theory of Change

Listed below are theories about how people react to change and what represents reasons for continued change. Before talking about what constitutes a learning organization it is important to establish an understanding for the ones (employees) that make up the organization. What drives them to change and what does not! Finally, can an organization enable easier adoption to new circumstances!

In the book “The favorable change process: About the individual and organization”¹³², Angelöw reports several reasons why changes meets resistance or why they succeed. One of the reasons individuals are affected differently by change, according to Angelöw, is because we are different as people. According to Angelöw, we value change in the organization differently because of its impact on us as individuals, employees, and on our characteristics. A change can be assessed as positive, negative or irrelevant. A negative change will create an opposition to change whereas a positive provides the opposite effect, however an irrelevant change will create neither.¹³³ The resistance to change tends to be particularly challenging when:¹³⁴

✓ There is profound and radical change.
✓ There are unexpected and sudden changes.
✓ The people involved feel they lose out if there are changes.
✓ There is a strong belief in the current method of working.
✓ The background, purpose and significance of the change is diffuse and unclear. This gives rise to considerable uncertainty.
✓ If there are negative experiences of past changes.

The concept of change includes a variety of elements, of which the basis is that you feel motivated.¹³⁵ When an individual comes to the realization of the need for change, or have a desire for change, and this leads to a state of readiness, Angelöw mean that an individual has a will to change. The will to change can also be formulated as the fulfillment of conditions an individual has to have in order to be motivated to change. Angelöw defines the conditions for

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¹³² Translated from “Det goda förändringsarbetet: Om individ och organisation i förändring” by Angelöw, 1991
¹³³ Angelöw, 1991
¹³⁴ Bruzelius & Skärvad, 2004
¹³⁵ Angelöw, 1991
motivation to change, as follows: participation, confidence, desire, credibility, knowledge, information and safety.\textsuperscript{136}

Alvesson and Svenningsson present a range of methods that enables reduced resistance to change. These measures include, dividing employees into workgroups and letting them look through problems the organization has and come up with a solution. Expressed differently, they assure the quality of the operations and management of problems. Another method is to divide them into workgroups where each member has a specific role to fill and where they are encouraged to be experimental and problem solving. A recurring opinion from the authors is that the employee's resistance to change is reduced by sharing the knowledge and information about the project and if the participants are actively engaged in the change.\textsuperscript{137}

One of the most important conditions for successful establishment of Lean is that management is fully behind the change. If employees perceive that change is not well rooted they will quickly lose interest and return to their old routines. It is also important that the staff has great autonomy and is allowed initiative. By enabling employees responsibility, their interest to be part of the change is increased.\textsuperscript{138}

3.4.1. The driving forces behind change

Change in an organization might occur when there is instability among various internal conditions in the organization or between the environment and the organization. The internal conditions may be due to instability between cultural- and structural conditions, alternatively how authority relationships within the organization work. The external conditions may be due to lack of environmental adaptation of the organization, such as political, competitive and/or technological changes. In both cases, resulting forces are working to level out the instability.\textsuperscript{139} The most prevalent forces in today’s environment are:\textsuperscript{140}

1. Market conditions – both in relation to demand and prevailing trend
2. Political – globalization
3. Technology – the digitization of society, distribution of information and the Internet
4. Media – ownership and commercialization
5. Cultural and demographic changes

\textsuperscript{136} Angelöw, 1991
\textsuperscript{137} Alvesson & Svenningsson, 2007
\textsuperscript{138} Scherrer-Rathje, Boyle, Deflorin, 2009
\textsuperscript{139} Jacobsen, 2005
\textsuperscript{140} ibid
6. Changes in competition and ownership
7. Integration between the different forces is also possible

The various forces that affect organizations evoke energies that will bring forth homogeneity between the internal conditions (strategy, goals, structure, authority relations and culture) and the external demands placed on organizations. In response to the forces that organizations are exposed to, Jacobsen says that there are certain characteristics that these organizations will have to possess in order to make the right decisions.

1. Initially, one needs to be able to identify the forces that one is to being weighed against.
2. Then develop solutions to the challenges or difficulties, which the forces are demanding of the organization.
3. Finally, implement the necessary changes.

If the desire for change can be met, conditions are favorable for the employees to willingly let the company change and they with it. This leads us to the next piece, a learning organization, and the benefits and obligations provided with such an organization.

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141 Jacobsen, 2005
142 ibid
3.4.2. A LEARNING ORGANIZATION

Below follows a brief explanation to what a learning organization is and some key dependencies for successful implementation.

The previous sections attempted to clarify the concept of knowledge, what it includes and how it emerges. Furthermore, it presented a representation of why knowledge is a critical resource and what the concept of knowledge management means and its origin. The previous section awarded knowledge management with its final aim of achieving a learning organization. This section discusses the subject of a learning organization. The concept can be defined as an organization's ability to maintain and increase the internal knowledge resources. The challenge is not the collection and dissemination, but to create awareness, continuity and a culture around the learning processes. Marissa Martineau et al describe their view of learning organizations as follows:

“A learning organization actively creates, captures, transfers, and mobilizes knowledge to enable it to adapt to a changing environment… a learning organization does not rely on passive or ad hoc process in the hope that organizational learning will take place through serendipity or as a by-product of normal work. A learning organization actively promotes, facilitates, and rewards collective learning”.

The fundamental aspect of a learning organization is that employees in the organization are developing and interacting, and thereby constantly learning new things. The interaction is a social process between employees, resulting in a well-informed decision-making and is an essential stepping-stone for an adapting- and learning culture. A learning organization needs to adapt to a changing environment and for that it needs to have systems, processes and mechanisms in place and be used persistently to improve employee competences in order to achieve sustainable objectives, both for themselves but also for the area in which they operate.

It is not always apparent what a learning organization really aims at and what the purpose of it is. One of the key points of the concept is that a learning organization helps us to have the knowledge of what happens when individuals are faced with problems of an innovative nature and great uncertainty. It is not the organizational structure and strategic causes that call for a

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143 Martineau, Knox, & Combs, 2014
144 ibid
145 Senge, 2006
learning organization. Rather, uncertainty and a dynamic environment causes a demand for creative and innovative approaches to the tasks that individuals face.\textsuperscript{146} Being a learning organization also means to continuously oversee employees' experience and to make sure the experience is transformed into knowledge that is relevant and accessible to all employees. Hereby the authors imply that organizations have a responsibility as quality controllers of the knowledge’s usability and availability. Creating a learning organization is a never-ending project; it is a commitment that requires constant awareness and resources. It is a constant challenge because it requires people to go out of their comfort zones.\textsuperscript{147}

It is important for management to clarify their visions and goals, because it is a fundamental step to increase the rate of learning in the organization.\textsuperscript{148} Creating a learning organization affect the organization as a whole. It is not sufficient that employees are motivated or have an interest in improving themselves and their work. Leaders must manage to convey a shared vision and common goals at all levels of the organization. A shared vision creates a belonging and a shared commitment. Business leaders are thus faced with a challenge to identify plausible ways by which they can stimulate employees to continuous learning. At the same time, consideration needs to be given to the fact that characteristics between individuals differ, which among other things means that individuals have different degrees of receptivity.\textsuperscript{149} Companies that fail to get employees to work towards the same goal, rarely succeed in building the atmosphere and culture in the company needed to make everyone feel included and willing to share their knowledge. To create a successful learning organization, as well as, a successful knowledge management structure, it needs to be implemented throughout the whole organization. An essential part is to establishing a personal relationship and integration between individuals to support learning and knowledge management.\textsuperscript{150} A central obstacle for sharing knowledge is an individuals' willingness to do so.\textsuperscript{151} It is therefore important to understand that employees choose to share knowledge for various reasons. Individuals' commitment to the organization and their personal contacts strongly affects communication and exchange between people in the organization.\textsuperscript{152} Cooperative cultures, compared to competitive cultures, are more beneficial to knowledge sharing. This is because trust among colleagues and their relationships affect organizational culture.\textsuperscript{153} It is argued that

\textsuperscript{146} Stacey, 1993  
\textsuperscript{147} Senge, 2006  
\textsuperscript{148} Soonhee & Hyangsoo, 2010  
\textsuperscript{149} Senge, 2006  
\textsuperscript{150} Soliman & Spooner, 2000  
\textsuperscript{151} Lam & Lambermont-Ford, 2010  
\textsuperscript{152} Wang & Noe, 2010  
\textsuperscript{153} Jashapara, 2005
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when individuals feel that they are structurally embedded in a network they share knowledge to a greater extent.\textsuperscript{154} Individuals also chose to share knowledge for altruistic reasons because they feel satisfied helping others. Another reason is external motivation, individuals satisfy their needs through additional resources in the form of, for example, money, promotions and non-financial.\textsuperscript{155} In some organizations individuals keep their knowledge to themselves, and do not share, because they feel that sharing knowledge will lower their status\textsuperscript{156}. Some researches argue that employees share their knowledge when they feel that it enhances their professional status. Researchers emphasize that knowledge sharing between employees predominantly occur without expecting knowledge to be returned.\textsuperscript{157}

It is clear from the above discussion that no matter what type of organization one is, one will share knowledge. This is especially true of a learning organization, which constantly renews the individual's knowledge, experience and skills through an environment that encourage challenges and confronts common objectives and goals.\textsuperscript{158} The three properties that characterize a learning organization are: 1. \textit{“Well-developed core competencies that serve as launch points for new products and services} 2. \textit{An attitude that supports continuous improvement in the business’s value-added chain} 3. \textit{The ability to fundamentally renew or revitalize.”}\textsuperscript{159}

For the transfer of knowledge between individuals and the organization to be effective, the companies must clearly and openly prioritize the sharing of knowledge.\textsuperscript{160} It is about creating an environment and culture for employees that encourages learning but also to teach others. It should be noted though, that increased knowledge does not automatically convert to increased communication. The people in question must be motivated to inform others for the transfer to occur.\textsuperscript{161}

In recent time two of the driving forces behind business’ success are organizational learning and Lean by contributing to competitive advantage in organizations. With regard to adapting to the changing environment organizations apply Lean in order to be efficient and also strive to learn and innovate in order to remain competitive.\textsuperscript{162} As a management method Lean is the

\textsuperscript{154} Wasko & Faraj, 2005
\textsuperscript{155} Lam & Lambermont-Ford, 2010
\textsuperscript{156} Teigland & Wasko, 2003
\textsuperscript{157} Wasko & Faraj, 2005
\textsuperscript{158} Johnson & Scholes, 2002
\textsuperscript{159} Klein, 1998, p.122
\textsuperscript{160} Axelsson, 1996
\textsuperscript{161} Boonstra, 2004
\textsuperscript{162} ibid
first to emphasize explicitly on knowledge creation. It does so by helping organizations organize the flow of problem solving (knowledge creation) together with the flow of work to produce parts or services.\textsuperscript{163} This is why being a Lean organization is so important. As mentioned in the beginning of the chapter, one of the most important assets a company has is its intellectual capital, and having a management method that focus explicitly on knowledge creation and organization of it, greatly increases the chances for a competitive advantage.

\textsuperscript{163} Balle, 2009
3.5. Lean

Listed below are theories regarding motives, anchoring, implementation, and effects related to Lean.

3.5.1. Motives for Implementing Lean

The driving forces for implementing Lean can be external requirements, an inner ambition, or both simultaneously with the latter being preferable. If Lean is implemented just because it is trendy or to keep up with others, this will not be a sufficient driving force to succeed. The internal motivation comes from people who realize that they need to increase the efficiency of the organization. This is then spread in the organization through a two-way communication.

According to a recent study made by Nordin et al it is indicated that the main drive that influenced implementation of a Lean system is an organization’s continuous improvement program. Other highly influential driving forces are focus on customers and the desire to employ world best practice.\(^{164}\)

![Figure 3: Driving Forces to Implement Lean](image)

Lean is a cultural change that requires a strong enough internal motivation in all employees. Success factors are a desire to improve processes and practices, whereas cost savings and staff reductions are obstacles to success.\(^{166}\)

\(^{164}\) Nordin, Deros & Wahab, 2010  
\(^{165}\) Nordin, Deros & Wahab, 2010, p. 377  
\(^{166}\) Losonci, Dementer, & Jenei, 2011
3.5.2. **The Importance of Anchoring Lean Within the Organization**

A necessary condition for successful Lean-work is support throughout the organization. Employees must understand and accept the purpose of the change. If they do not, then it is pointless to invest in the education and training required to achieve the expected results. To implement Lean, major changes are required in the organization. It must include a comprehensive approach and not just bits and pieces here and there. Management should be involved and visible in order to create an environment where it is allowed to fail.\(^{167}\)

The **bottom-up** approach is not sustainable. When applied it usually forms small isolated islands of Lean-work, but the risk is that the Lean work subsides and the business returns to previous practices. The **top-down** approach is based on change within the whole organizational culture, system and thinking. For perseverance management's total commitment is required. Management is responsible for strategic direction (top-down) and improvement work managed by employees (bottom-up).\(^{168}\)

3.5.3. **Implementation of Lean**

How Lean is implemented is crucial, because it will affect the obtained result, as well as, ultimately decide if the implementation is successful. A broad implementation of at least five tools applied simultaneously is recommended. Lean should not be considered as merely a process or a project, but as a long-term commitment.\(^{169}\) There is a risk when focusing on a few tools and techniques that this will lead to a weak foundation, which focuses on the present instead of the future. This prevents certain basic conditions to be fulfilled such as process philosophy, understanding of the capabilities and needs, and the link between improvements and strategy.\(^{170}\)

Bhasin and Burcher explains that based on experience, the adaptation of Lean and its tools is a critical challenge and the success largely depends on the understanding that Lean is a system and not just a toolbox. The system must be implemented using a top-down approach, but built from the bottom-up and have the support of the entire organization. It is not as easy

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\(^{167}\) Scherrer-Rathje, Boyle, & Deflorin, 2009  
\(^{168}\) Ibid  
\(^{169}\) Tortorella & Fogliatto, 2014  
\(^{170}\) Ibid
as just taking a tool out of the box. Lean is a learning system from which the customers benefit by higher security, shorter lead times and greater understanding of their business.\footnote{Bhasin & Burcher, 2006}

To improve the efficiency of Lean, the following three advices are given:\footnote{ibid}

1. Implement methods that help to communicate information to problem solvers and create stable structures for continuous improvement. In this way, standards can improve, learning is simplified and positive results are maintained. Ad hoc teams should be avoided. They rarely lead to the creation of a culture that is based on quality improvement being everyone’s responsibility.

2. Management must be committed to solving problems. Management often misunderstands their role in the implementation of Lean. Allowing employees to identify and solve problems on their own goes against a Lean approach, cooperation between management and employees is vital. Part of the challenge lies in getting top management to resist quick fixes at the expense of addressing the root of the problem with a long-term philosophy.

3. Have a holistic focus and look at the larger context.

All employees should be involved, from the operator to the highest administrative management. It is only the employee who understands their part in the whole and that is the best at detecting waste at their station. Furthermore, the importance of job security is stressed for a successful implementation of Lean. The purpose of Lean is not to make cuts in the workforce but deliver better products and services. Lean should not be seen as a short-term solution, but as an effort to avoid future crises.\footnote{Scherrer-Rathje, Boyle, & Deflorin, 2009} If the gains achieved through more efficient work methods are translated into downsizing the work force, commitment to Lean will drastically decrease. According to Peterson et al, people cannot be motivated to change if the consequence is that they themselves will suffer.\footnote{Petersson, Johansson, Broman, Blücher, & Alsterman, 2009} Larsson believes that the time freed up by elimination of unnecessary waste should be devoted to reflection and education. Introducing Lean is 80% of developing a new organizational culture and the remainder is about which tools to use. It is about developing a learning organization with a supportive leadership.\footnote{Larsson, 2008}
The implementation of Lean has five main principles for how the work procedure should be.  

1. **Specify the value**: That which creates value in the process should be specified from a customer perspective. There is no need to produce anything that is not in demand.

2. **Identify the value stream**: The whole process should be mapped and that which creates value should be identified. This provides transparency of the work.

3. **Create a value stream**: This is the implementation phase, which means that wastes are addressed and eliminated as far as possible.

4. **Establish demand management (pull)**: No activity should be conducted if there is no direct need.

5. **Strive for perfection**: When the preceding principles are established perfection is a possible goal. Perfection is about producing what the customer wants, exactly when demanded, for a reasonable price and with a minimum of waste.

The five principles indicate a desire for the product to flow through the company's processes in order to create better value for the organization. Value for the customer is getting the right product, at the right time, and of the right quality. According to Olhager, it is important to initially define what customer value is, before identifying the activities that do not add value to the process. After working with value stream analysis in early implementation, it is recommended to start with improvements.

A study made by Scherrer-Rathje et al showed that organizational culture is a key success factor. This means that there must be commitment and willingness among all employees as early as possible to embrace Lean. Engaged employees will become motivated, and the chance to create a culture of continuous improvement increases. The key success factor proved to be the managers and management's commitment to the change process. Managers must demonstrate commitment and take the time to mentor and educate their employees. The study also showed that in the beginning of the implementation external help is often needed,
but the study also points out that it is important that the organization does not become dependent on consultants. Good communication is also essential for successful implementation. If good communication is missing, the initial commitment of employees will fade. A realistic view of the time it takes to implement a change is also important. There must be an awareness that the effects of Lean will not come immediately, Lean is based on long-term commitment and the results will take a while to be significant.\(^\text{185}\)

### 3.5.4. Effects of Lean

The results of an implementation of Lean principles can be summarized in four parts:\(^\text{186}\)

- Improved quality and safety by reducing mistakes, accidents and errors.
- Shorter lead times since the work is done faster and also better
- Better output because the same people with the same equipment will be able to perform much more
- A stable work environment with standardized processes form the basis for continuous improvement

Studies show that efficiency increases with the introduction of Lean in organizations, as evidenced by, for example, reduced lead times and reduced amount of error. This is often done through organizational changes in terms of new ways of working and reduction of obstacles and problems, rather than through investments in technology, hiring of new staff and increased resources.\(^\text{187}\)

\(^{185}\) Scherrer-Rathje, Boyle, & Deflorin, 2009

\(^{186}\) Losonci, Dementer, & Jenei, 2011

\(^{187}\) ibid
3.6. Criticism towards Lean

A study from the UK reported by Bhasin and Burcher shows that only 10 percent of organizations succeed in implementing Lean. According to Bhasin and Burcher, it is believed that the poor result is a lack of philosophical thinking. Lean has mainly been seen as a set of tools with fast-expected results instead of its long-term thinking.\(^{188}\)

In US / Japanese factories many of the factory workers have an uptime of 57 to 60 seconds, not leaving much time over to relax and recover between their work activities. In Japan there have even been some cases of sudden death from cardiovascular diseases linked to working with Lean. This has occurred while employees have worked too much and died of overwork. The reason for the sudden death is considered that Lean makes excessive demands while at the same time gives employees a low control in their work situation.\(^{189}\)

Theorell et al argue that when improvement methods such as Lean are introduced in the factories, the demand increases, because fewer people are forced to do more. The improvement method has been perceived as more restrictive than before according to employees. Theorell et al further argues that there is no proof that Lean gives increased influence and empowerment. The perceived higher stimulus at work is only a result of more work, resulting in higher stress levels. Furthermore, Lean is a philosophy that is used to save resources, which results in major staff cuts. Once again leading to that the remaining staff had a higher workload. Staff cuts also contributed to the remaining employees' health deteriorated when they became worried that they too would be fired.\(^{190}\)

Parker argues that Lean reduces the quality of the work performed. The employees, mostly workers at the assembly line, were not as dedicated and showed signs of anxiety and depression.\(^{191}\)

Conti et al argue that Lean is considered to be stressful and the concept of leadership by stress (management by stress) is well published in the literature. Department managers push employees to the breaking point in order to reduce inventory and eliminate non-value adding activities in pursuit of profit maximization. Conti et al, however, is reluctant to validate the criticism of previous studies, because they lack statistical significance and are not

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\(^{188}\) Bhasin & Burcher, 2006  
\(^{189}\) Theorell et al., 1999  
\(^{190}\) ibid  
\(^{191}\) Parker, 2003
generalizable. Nor is it possible to prove the correlation between stress and implementation of Lean.\(^{192}\)

There are thus numerous studies showing that the application of Lean can provide a deteriorating in ones job situation. As mentioned for knowledge management, no field is without criticism. The important message here is that if one is aware of the risks one can take the appropriate steps to minimize them.

\(^{192}\) Conti et al., 2006
4. **Empirical Data**

*The chapter begins with a short description of Volvo Cars. Thereafter, the empirical data is presented in accordance to previous structure.*

4.1. **Company – Short Description**

The 14th of April 1927 marks the birth of Volvo AB. This is the date when the first mass-produced car left the Volvo factory in Lundby on Hisingen, Gothenburg. Volvo Cars was part of the Swedish Volvo Group until 1999, when American Ford bought the car manufacturer. In 2010, the Chinese company Zhejiang Geely Holding Group acquired Volvo Cars. The Chinese company is the owner at present time. The company ownership is as follows; 51% Chinese Zhejiang Geely Holding Group, 37% a regional investment fund in Daqing and 12% of a similar fund in Jiading. Volvo has its headquarters in Torslanda on Hisingen, Gothenburg. This site also houses one of Volvo Cars assembly plants, the Torslanda plant. Additionally, it is also the major site for the development department, crash test center, a central warehouse and several other important facilities. Manufacturing also takes place in Skövde and Olofström in Sweden, Gent in Belgium and Chengdu in China. Volvo Cars employs more than 23,000 people and sell to more than 100 countries.¹⁹³

4.1.1. **Volvo Cars Lean Approach**

The Lean approach, the production system, at Volvo Cars is based upon a 5 principles set-up. The global system is designed around the employees and have clear Lean way of working supported with Lean leadership that integrate the need for Lean values and principles in order to reach the goal of being Best in Class. Behind the 5 principles there are 11 development areas. Implementation have two phases: (1) Stability and standardization and (2) Improvement. In addition, Volvo also has a goal-system based on Leans QCDSM, though which Volvo Cars has chosen to add some categories of their own, but the strive is to be the best in all categories.¹⁹⁴

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¹⁹³ Volvo Car Group, 2014
¹⁹⁴ Information provided by Christer Nord, Director of Operational Development at Volvo Cars.
4.1.2. **Volvo Cars Manufacturing System - VCMS**

Volvo Cars has developed its own production system called Volvo Cars Manufacturing System (VCMS). The production system is inspired by Lean production but takes its basis in Volvo Cars philosophy and culture, Total Production Management and Ford Production System. The main task of the system is to realize and develop a production system that is Lean, flexible and process-oriented. Using VCMS as a work procedure serves the purpose of constantly learn, develop, implement, share and then implement standards. The system has proven to support higher production efficiency as well as a behavior that avoids wasting resources.\(^{196}\)

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\(^{195}\) Information provided by Christer Nord, Director of Operational Development at Volvo Cars

\(^{196}\) Information provided by Christer Nord, Director of Operational Development at Volvo Cars
4.2. Knowledge Management

Implicit knowledge is transferred in real time between individuals. This can be done both at informal and formal meetings. Informal meetings at Volvo Cars occur mainly in the dining hall or during coffee breaks. At formal meetings such as group meetings at the factories, lessons learned are conducted in a more organized manner. Lessons learned are included as a topic at these group meetings. The group meetings are mandatory and conducted at least once a day. Each group has formally elected coworkers responsible for specific areas of expertise.

We have selected persons within the group responsible for a specific area of competence. [...] Those who are managers of a specific area of competence have a particular obligation to work within their fields with: Quality, Cost, Delivery, Improvement, Safety, Medarbetare (coworker), Environment and Leadership (QCDISME-L). [...] We see the sharing of responsibilities as a competence and knowledge transfer. [...] Working with managers responsible for a specific area of competence has resulted in increased participation and involvement within the group.

Once a month, area managers with their team leads and discuss improvements done in their respective groups. At these meetings, three improvement projects are selected and presented at a special monthly meeting between the team leads and their supervisor. These meetings also include reports about lessons learned and Kaizen projects. In addition to the special monthly meeting that focus more on improvements, team leads and supervisor meet regularly every week to discuss regular work. This structure also applies to the supervisors and their superintendent, who meet weekly and exchange experiences and they as well have a special monthly meeting, which focuses on improvement work. Management also invites their employees to information sessions once in a while.

The regular meetings with our supervisor gives us team leads a chance to share experiences but also hear with our boss what he has learned from other groups. [...] These meetings are perfect to share knowledge and tips on other improvements that we can implement ourselves. [...] the meetings are very inspiring and instructive.

When we have completed a Kaizen project we present this as a PowerPoint presentation. [...] Anyone can come and listen, it is relatively common for people from the management to come and listen, and they always have a lot of questions. [...] But they (management) seem

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197 Medarbetare (Coworker) – this word is usually not translated into English due to its specific meaning.
genuinely interested and they have never tried to 'trick' someone, on the contrary, they often ask how they can help.

There are on-line meetings with other factories regarding improvements but also regional meetings sometimes representatives from the factories meet at the regional meetings. It is not uncommon for representatives from Gent (Belgium) but also factories in China to participate in these regional meetings. The regional meetings occur about once a quarter. At these meetings general information about the Company's business and results, but also improvement projects is given. One respondent told during his interview that an employee from another factory had spoken about an ongoing project at a regional meeting, which is a type of knowledge transfer.

[...] it is educational and inspiring to meet colleagues from other factories and hear how they work with VCMS.

**Formal methods** that Volvo Cars uses to share knowledge are primarily knowledge databases, internal meetings, internal and external training courses, e-learning and professional development activities. An additional formal method of knowledge! sharing is coaching programs within the organization. **Informal methods** are especially networking and relationships between employees.

A couple of times each year, internal trainings are held at Volvo Cars Academy. These training programs aim at enhancing safety awareness, creating a base for further improvement work and establishing a unified approach at the company. Those respondents who have facilitated these trainings mean that an important part of them is to use real examples and discuss participants' experiences. In addition to Lean-related courses such as *Lean Learning Academy* and *Simulated Work Environment*, training is also conducted in Leadership such as *Aspire Lean Leadership (ALL)* and IT-based systems such as *SharePoint, Share Knowledge, Performance, MAXIMO, Intro to Management* to name a few. Individual learning by studying literature is an example of another important learning situation. In addition, Volvo Car offers internal courses and helps organize external courses for employees. These courses can cover general subjects suitable for all employees, and provided, if necessary, more specific courses often held by an employee at Volvo Cars that is specialist in the area. There are two different approaches to meet the need for training:
One way is known as a *Learning Need Analysis (LNA)*, this is an evaluation that takes place once a year, when one goes through requests from the organization's employees and the needs as regards for future competencies. [...] The other way is called a *Service Request*, the origin of which comes from our employees regarding training. This generates an inquiry to the HR organization, which is reviewed and determined if the course should be designed internally, externally or not at all.

The internal courses are a typical learning situation where individuals learn from each other.

Another formal method of knowledge sharing is coaching, which Volvo Car uses. There are, for example, coaches responsible for an introduction program for new employees. New employees in the factory are part of a team where the team leaders take on the role of a coach. Through coaching the new employee receives help to get established in the organization and an appointed person to turn to who can guide the new employee. In addition, the managers of a specific area of competence and colleagues help to train the new employee. This is considered a very good initiative, especially because it is a formally appointed person one can turn to without feeling one is a burden. A point that was particularly emphasized by the strategic managers was that the importance of continuously developing coaching and to use it more extensively. Another general opinion is that there are flaws in the dissemination and reuse of knowledge within the organization; at this an expanded coaching program could ease a better dissemination of knowledge between employees.

*We believe in a concept called Train-The-Trainer (TTT).* Education and training starts from VCMS experts to the highest management and cascades through management all the way down through the organization. [...] If the leaders lack knowledge and understanding for why we are implementing change management, they can not train and motivate their employees. *Decisions and change must be anchored from the top if we expect our employees to act as we teach.* [...] *We believe this concept creates ownership.*

Most of the work at Volvo Cars is done in teams and through this teamwork, employees come close to each other, which means that there is a lot of information sharing between them. Although, groups vary and individuals sometimes change groups, there is great fellowship in the various groups. It is important that employees get along with new groups and coworkers quick and easily. Due to the fact that coworkers occasionally change workgroups or that new employees begin and the fact that close cooperation is needed, a broad networking is quickly built up. The networks serve as informal network that helps employees know who to contact.
I think the most important part is our personal contacts, that one knows employees and knows that one can contact them with questions. […] we are all working towards the same goal.

A big part of the lessons learned discussions, knowledge sharing and knowledge gathering that takes place is in fact of an informal nature. It is then especially important that the message is relevant and understandable by all employees. Respondents point out the importance of planning how communication of the overall message to its employees should be conducted, so that the message creates meaning, understanding and commitment.

Within the Volvo Cars organization there are employees who have difficulty understanding and embracing the central and overarching message, for example regarding the organization's vision, values, new strategy or objective. [...] The reason why people have difficulty understanding may be because the message both language- and content wise, is too far from the employees' own reality. [...] Messages need to be translated so that they become relevant and understandable to all employees.

This is one of the reasons that a lot of knowledge sharing is done through informal methods such as dialogue and within teams, in order to increase understanding and ultimately participation.

It is difficult to be involved in the process of improvement work if one does not understand the overall reason why we do things the way we do them. [...] every leader breaks down the goals and vision to their level and communicate this to their employees. [...] It is important that we clarify what we want to accomplish in a way that everyone can understand.

When interviewees talked about employee's participation in knowledge sharing, it became apparent that the sharing of knowledge within the organization was connected to relationships and building social networks. The relationships contributed to employees having an easy way to informally share knowledge with each other. Since Volvo Cars was working in teams, there was daily communication, which contributed to natural dissemination of knowledge.

Relationships are very important as well as building networks, these relationships and networks makes it easier for me to share and gather knowledge.

Knowledge is more of a dialogue than a monologue. [...] as a leader regardless of level, we strive to not give answers rather ask questions to encourage critical thinking and discussions.
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This representation is confirmed by several interviewees who emphasized the importance of relationships and social networks for the sharing of knowledge. Networks operated as informal channels of communication that helped the employees to know who they could contact. Another forum of an informal nature where knowledge exposure and lessons learned discussions took place was on coffee breaks. Any one of the employees could take the initiative to talk about what happened in a specific project. This sometimes resulted in that the narrative became a dialogue with the other employees present at the time. Dialogues of this type primarily focus on problems and unforeseen events.

Most respondents have pointed out the importance of these informal exchanges. The disadvantage of this type of knowledge transfer, according to several of the supervisors is:

[...] we rarely document these experiences. [...] loss of documentation does in the end result in that we probably forget that experience.

Knowledge dissemination of this type is characterized by being unsystematic in the sense that there is no agenda, structure, documentation or follow-up of dialogues. Furthermore, only those employees present at the discussions are able to take part in the knowledge content.

Much of today’s lessons learned and knowledge transfers occur through informal meetings and contacts. At Volvo Cars there is a work plan developed, which includes who has what knowledge and how to contact them. The work plan simplifies the procedure for employees to get in touch with the right coworker when questions or problems arise. Several respondents mention that they primarily use their personal phonebook when seeking coworkers with knowledge and experience in different fields.

I think we all have a personal phonebook with a list of people we contact, depending on what the problem is. [...] Obviously, we first turn to our managers for advice if we consider it necessary, but we have so many experienced professionals that over the years we have learned who to search for depending on what the problem is. [...] Clearly, if the problem is sophisticated and requires specialized machinery and knowledge, we contact the maintenance department. [...] sometimes it is easier to call a friend who has worked here for 40 years.

I think that the work plan is primarily important for our new employees and team leaders, until they have expanded their network and received a little more experience.
The administrative offices at Volvo Cars are mostly constructed as an open plan office, very few employees sit in their own rooms. Therefore, the most common occurrence when a coworker in the administrative environment is seeking an answer to a question, would like to discuss something or get advice is to ask employees in the open plan office. The open plan office contributes to a sense of equality and community. Both at the main office in Gothenburg and out in the factories, there are several common rooms available, where both formal and informal meetings are held. Formal meetings can take place at either the main office in Gothenburg or at the factories, while informal meetings take place in small groups where they can sit and exchange thoughts and ideas with each other. Another way is to send out questions via specific e-mail groups. There are a number of such e-mail groups, each focused on a specific area of knowledge. The use of these e-mail groups varies. Some do not use e-mail groups at all, while others use them occasionally, mainly in order to provide answers to other people's questions. A shortcoming of these e-mail groups is that the answer to the question most often only is sent to the person who asked the question and not to the whole group. Furthermore, documentation is seldom done of this information, making it almost impossible to find answers at a later date.

Since we sit so close to each other it is often easy to ask if you have trouble, which saves a lot of time and frustration. [...] we have a number of meeting rooms that we can use for group work or common projects. [...] sometimes one may want to work a bit uninterrupted and then it is nice to sit in one of those rooms, as long as it is not booked of course.

Newspapers, trade publications and other literature are examples of sources to acquire and develop skills. There were several respondents at the strategic level that pointed out the importance of trade press and such in comparison to people at the operational level. Conversely, it was several employees at the operational level who stressed the importance of Internet as a source of knowledge, especially when the knowledge sought is technology related. However, the consensus was that there was too little time to search for sources of knowledge on the Internet, at least to the extent that was desired. In addition, several team managers considered it unnecessarily complicated to access their e-mails.

[...] we are dependent on being able to read e-mails no matter at what level one works at. It may be that we are asked to confirm a rental car, or a participation in a meeting. [...] The current system makes this very complicated, and for those that are not so technologically enabled, it really is a struggle. [...] It should not be that difficult to install a card reader on a
Additional forums of a more formal nature are company-wide databases. There are a lot of those at Volvo Cars, but the ones used most frequently are SharePoint, Team Center, Lotus Notes, Business Management System (BMS) where VCMS is part of, and share knowledge (blog). The administrative part of the organization can access most of these and also have authority to add or change current information. Volvo Cars intranet is an additional forum for communication and storage of knowledge reports. These formal methods are more thoroughly discussed in the next section.

4.2.1. **Knowledge Management Systems**

Volvo Cars has different technologies to foster knowledge management. They incorporate, inter alia, e-mail to communicate with each other. They have access to multiple search engines in different databases, as well as SharePoint and TeamCenter. They use groupware in which they have shared calendars and a variety of planning programs. They also have a well-functioning information portal and use data warehouse.

> [...] Today, information is almost exclusively spread by a push model, it is rarely that the organization uses IT as a pure two-way communication tool. Instead, the informers dominate the way we use our intranet. [...] An improvement to this would be to let more “regular” employees be editors on the intranet.

**SharePoint** is a web application framework. The content in SharePoint is indexed based on the business structure. This database provides some help to search for specific answers or within specific areas, but both indexing possibilities and available search engines need to be developed. It is a platform where individuals can share knowledge with their colleagues across national borders and corporate boundaries. By joining a network group or starting a new one, individuals can share and take part of each other's knowledge.

*The advantage of this type of tool over other types of communications is that it may include more readers of the same document; you do not need to send multiple copies in order to disseminate the information.*

**TeamCenter** enables a secure environment in a web-based collaboration utility, which allows companies, suppliers, and customers to share information. TeamCenter builds on Windows SharePoint Services, a close integration between TeamCenter Community, Microsoft Office
and Microsoft Windows.

**Volvo Cars intranet** is an additional forum for communication and storage of knowledge reports. The intranet is unified throughout the entire Volvo Corporation, but it is possible to adjust the content to workplace and that of individual preference. In this way, newsfeed and other important facts get adapted according to preference. Because the intranet is unified across the entire Volvo Corporation, all tools are not specifically designed for a specific department. The use of the intranet is mainly limited to staff-oriented issues.

**Business Management System (BMS)** is part of Volvo Cars intranet and a platform where manuals, routines and support tools are gathered. Most people who use the intranet at the operational level do this primarily because the VCMS is there. VCMS is widely used and includes several important documents such as error and damage report as well as instructions, descriptions and other forms.

*From an administrative point of view this is a very good website. [...] we use the site to access instructions and reports vital for our daily operations. [...] we can specify different workgroups and also the newsfeed we want to be part of.*

(Operational level) The intranet serves mostly as a channel of information from management. There are very few opportunities to influence the content and I think that this is work that needs to be developed. [...] Basic things like search capabilities need to be improved, I rarely search the Intranet rather use Google instead.

A database system that is widely used mainly by Six Sigma certified personnel is **Six Sigma Tracking System** (SSTS). This tool allows you to search for previously completed Six Sigma projects. Unfortunately, this tool is very complicated to operate. Usually, only projects from Black Belt (highest level) and some from Blue Belt (intermediate level) will be stored here, and nothing from the Green Belt (lowest level).

*Six Sigma Tracking System is a tool that is used for storing Six Sigma projects, primarily Black Belt and Blue Belt. [...] this is because the system is very difficult to use, you have to be very knowledgeable to be able to use the system. [...] it would be desirable if there was a database system that was easier, where even Green Belt projects and Kaizen projects could be included.*

Several respondents who have worked with SSTS agree that it is very complicated to add
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projects and not suitable for Green Belt or other personnel to use. In addition, the system is
difficult to search for old projects. Several respondents ask for a supplement to this system.

Today, we save our Kaizen projects at one of the intranet hard drives. Unfortunately, it is
very seldom that we are looking for old jobs. [...] this is mainly due to the fact that today
there is not a predetermined standard for how we should name the folders or any real search
engine. [...] it has happened that implemented improvement work has been basically the same
as another group in our facility. To realize this after the project is done felt less than
motivating and one might question the benefits of the project.

When asked why this might happen, the answer from a number of respondents are as follows.

(Operational) [...] We feel that we are trusted to perform our daily activities, but for some
reason it seems that they (management) are afraid that we will delete or destroy the computer
system.

(Management) [...] we must stop looking at employees as a risk when it comes to losing data.
[...] we are all here to develop and contribute to our business success.

4.2.2. Barriers when transferring knowledge

One of the biggest limitations of knowledge sharing within the organization is the limited
time that is devoted to documentation and monitoring. Often the daily routines take
precedence or that a new project stars before the previous project has ended, which leads to
record keeping and follow-up being deprioritized. Furthermore, an inadequate knowledge
database creates limitations for knowledge sharing, since the desired knowledge in many
cases is not researchable. A recurring problem is a badly structured database with unfavorable
structure, which makes it difficult to find old documented knowledge. A contributing factor to
this could according to some respondents, be an abundance of documentation of tasks, for
example. This is something that several respondents believe could create friction and irritation
within the organization. Especially because the people who write these documents may feel
that the time spent documenting is not contributing to anything since it is not searchable
anyway.

(Operational level) The goals (the visual scoreboard within the factories) must be reviewed.

We waste resources because we are trying to measure things that cannot be measured.

Another barrier to knowledge management in organizations can be employees not willing to
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share their knowledge. However, this is something that respondents do not believe exists at Volvo. Interviewees pointed out that although employees easily can contact each other with questions about work, that information is forgotten after a while. Therefore, knowledge should be documented so it is available in the future. Attitude and behavior to the database was considered a bigger problem than the database's existing structure.

*It is important to strike a balance between structure and the ability that you can actually use it. Otherwise there is a risk that one builds a database that requires too much administration and training, hampering the usability. [...] the database needs to be simple to use and effective. [...] if it requires too much administration it is not used at all because one will have a hard time seeing the benefits.*

Language barriers can be a barrier to knowledge transfer and communication. This barrier is something that affects several departments at Volvo in different ways. Respondents explained that some meetings and trainings are held in English. Several respondents replied that:

* [...] This can make many feel insecure and have difficulty to comprehend the true meaning of the message. Furthermore, be afraid of asking questions. [...] There is a risk of misunderstanding due to limited knowledge in teaching, but also upon receipt of the information.*

Another matter that respondents felt was important was the cognitive barrier. Trying to teach someone when the person does not have sufficient basic knowledge, a comparison was made to try to find information in huge database when one does not know what one is searching for.

*We hire a lot of people through recruitment agencies and sometimes we get the wrong recruitments, which cause a lot of extra work for us. [...] it means we have to train them before we can put them to work, which takes time and valuable resources. [...] this is something we and our recruitment firms are working intensively with, to try to make the matching process better. [...] the matching process has become much better but we still have a long way to go.*

Some of the respondents expressed criticism regarding databases, email groups and intranets as knowledge sources.

*(Operational level) [...] the problem with technology-based forums is that they only work when the majority of employees use them. [...] in production, our problem is that there is no*
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good database for retrieval of old improvement projects. [...] it is easier to ask coworkers if they heard of anyone doing a similar project before searching for improvement projects on your own. [...] besides, we only have access to our own factory and not the whole corporation.

A number of attempts have been made to set up virtual discussion forums but several of them have died out. Several of the respondents meant that the cause these development efforts failed is because those responsible have not informed the potential users of their existence or conveyed any purpose with them. Respondents point out that there is no real discussion forum that they are aware of in existence today. Explanation of purpose, and the formulation of guidelines should, according to several of the respondents, be made clear. Another obstacle to the use of technology-based forum is the lack of indexing and search capabilities. The structure is often perceived opaque, and it is time consuming to search for something specific. As stated earlier, this is perceived as a major problem in Kaizen and Six Sigma projects.
4.3. A LEARNING ORGANIZATION

The corporate culture at Volvo Cars has evolved throughout the years, partly because of new ownership, new employees and management, but perhaps the most significant change is the work Volvo Cars has done themselves with actively working to change the culture. Today the culture is considered the best ever. Employees feel enthusiastic and involved in the development at Volvo Cars. Relationships are considered very important at Volvo Cars and knowledge as well as skills is highly valued. Volvo Cars is very aware of the importance of business culture and the significance of technology for knowledge management and considers these elements as means for the management of knowledge. All respondents interviewed concur that the culture is of an open nature, where there are no stupid questions. It is the practice of sharing knowledge if someone comes and asks a question. The following quote is a display of that.

[...] when I share my knowledge with my coworkers I am part in their development and see them learning new things. It is inspiring to see how they utilize this knowledge and also use this new knowledge to teach others in the organization. [...] at Volvo Cars we are trained to be coaches and have an educational approach based on the notion that instead of giving direct answers we ask questions to encourage critical thinking and participation. This method has proven really successful, we see how coworkers derive good solutions and are more involved and committed.

Several respondents point out the individual difference in the culture. Some people would not have any problem talking about their own mistakes and shortcomings, while others would have greater difficulty. As regards to sharing past experiences and mistakes, respondents mean that managers and management needs to lead by example and be open about their previous mishaps. Only then will the culture truly evolve. Another respondent says that people talk about good examples, but that mistakes are often left out. When mistakes happen the reason is not always explicitly explained. There is an understanding among respondents for managers and management willingness to protect employees and the perceived difficulty in communicating this information. Meanwhile, this is the kind of information that is essential to be communicated in order to learn from mistakes and be able to avoid them in the future. It should be clarified that there is a difference between a mistake and an accident, the latter is always communicated and actions taken to avoid future ones.

We have to be clearer in our communication to our employees. [...] we try to better
understand business requirements and employees' difficulties in their daily activities by being out at GEMBA. We do different type of visits at GEMBA in order to identify existing security risks but above all to develop good relationships with our employees. [...] They also teach us to understand the value stream and the problems associated with this.

It is perceived from an employee perspective that there is an utmost confidence in the employee from coworkers, managers as well as management and they do not feel threatened by one other. In addition, the company conveys great importance in trusting employees, which employees feel to be true.

There are no stupid questions, as well as there is no mistakes that result from stupidity. We look at a mistake as a flaw in our standardized work and this is an opportunity for improvement work. [...] sometimes mistakes depend on the fact that I as leaders failed to communicate my message clearly enough. [...] our employees are well trained and competent, and we can all make mistakes. Blaming someone for a mistake will not improve the company.

Most of the employees in the company share the same norms and values. A contributing factor to this is that there is a mutual support between the company and the employees. This is also something that Volvo Cars has in mind when recruiting staff. At Volvo Cars new employees are knowledge-thirsty and ambitious. This recruitment is done knowingly so employees share the same norms and values and are willing to participate in the improvement work. This controlled recruitment has helped create a unified organizational culture that management strives for. One result of this recruitment is that knowledge sharing has become much better in the past decade. The company strives to have a rather soft approach, this image manifests itself in the way employees treat each other, and the focus is that employees should feel good and happy. In addition, most of the employees who have been with the company for a while participate in cultural networks that spread the company's norms and values that further strengthens the organizational culture.

I think it is important that we share the same norms and values at the company, it gives a sense of community and organizational direction. [...] by treating each other with respect, humanity and trust we will all have a better work environment. [...] if we as employees are happy and thrive, we perform better.

Another aspect of the culture is linked to the business strategy, which focuses on a decentralized organization. Several respondents believe that this is a well-functioning work
strategy, where the one doing the job is actually the one who has responsibility over it. One respondent argues that in order to succeed with knowledge sharing, the most important part is to understand why things happen and not just to rely on tools and templates. If individuals understand why things happen, they are much better suited to cope with other challenges. Seemingly, most knowledge transfer takes place in everyday work and improvement projects, because one sees what worked well or what did not. Such experiences may be linked to existing as well as new and necessary tools. Collaborative evaluation of improvement work is an approach to consciously reflect on the experienced occurrences, however this is something that occurs only occasionally. A consequence due to the lack of evaluations is that the team misses the in-depth and collective knowledge. In addition, other teams miss out because the lack of documenting as well as the cause and solution to the problem. Knowledge development is made possible by employees working together to establish the cause and effect relationship for successful and unsuccessful actions and phenomena.

Knowledge management and transfer often occur from one person to the other, face-to-face, otherwise it is a lot of reading and learning where we as colleagues teach and learn from each other.

Our aim is to share our knowledge within the group from projects as well as day-to-day work, as well as documenting it so that others can enjoy it. Although it is not always we find time for all of this. [...] 

Some companies have bonus-based systems implemented to stimulate the sharing of knowledge, Volvo Cars has chosen not to. Volvo Cars system is based on an employment agreement, which defines what is expected of an employee. In return, Volvo Cars puts a lot of effort into making sure they have all the necessary conditions to live up to the agreed objectives.

It is about creating clear goals for knowledge sharing. This creates incentives for employees to participate in knowledge sharing.

The empirical data showed that the majority of the interviewed employees were driven by other motives for sharing knowledge than purely monetary incentives. Several interviewees pointed out that the leading motivation to share knowledge was because it was fun. To be able to share your own challenges and hear about others, were motives for sharing.

I like to share my knowledge and enable it to spread as much as possible. [...] If people see
change in their everyday life this will inspire more people to share knowledge and the result will be a better work environment. [...] 

A small incentive to perform better than the other teams is that if we win we get coffee and cake for the entire team as well as being mentioned in the info sheet and get a diploma. [...] It is fun with the attention and the team feels that their improvement work makes a difference.

Several interviewees are motivated by seeing other individuals grow and develop as well as being part of individual's development. Being part of an individuals’ knowledge development was closely related to another important factor for why employees wanted to share knowledge and that was to be able to see a clear effect of knowledge sharing. How well the effect turned out to be was partly related to the recipient's interest to receive knowledge. If there was no interest from the recipient to gain knowledge, the interest to share knowledge was also subdued. Another reason for the interest in knowledge sharing was the ambition to create a retrieval database system of knowledge as well as being able to see how knowledge was used and how it affected the work environment was a contributing motivational factor. A contributing factor, but not a prerequisite, to share knowledge was to gain knowledge in return. Interviewees pointed out that it was not required to give knowledge in order to gain knowledge, but if one was not interested in being involved in improvement work or share knowledge the giver would eventually lose interest and stop. This was an insight that was shared by many of the interviewees.

We do not share knowledge with the requirement to get any in return, it does not work like that here. We share knowledge because it is fun and rewarding. [...] we used to have some employees, especially those who had been at the company for a long time who were less satisfied and inspired to participate in the beginning, but some of them are now the main knowledge injectors and the most committed ones.

The interviewees mentioned that there is a risk that company lost knowledge when older experienced employees and key personnel left the company. These employees knowledge was considered important to document and disseminate within the organization. The difficulty previously highlighted with documenting knowledge and making it understandable as well as accessible was reflected in the fact that the interviewees perceived a danger that the company had not ideally managed to find a reliable system to transfer the retirees and experts’ knowledge and experience to younger employees. All interviewees touched the loss of skills when the market declines and older employees with great experience retire, as something that
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affects the businesses negatively, something that is reflected in the quote below.

(Operational level) When older people retire, or when someone leaves, it is important that the knowledge does not disappear from the company with that person. Unfortunately this is quite common today. This problem is not a new one, we have discussed it for a long time, but I do not really believe we have gotten anywhere. We have not really found a good way to pass on knowledge within Volvo Cars, or at least not that I am aware of.

(Strategic level) Efforts to identify the critical competencies are in full swing, but it takes time to create a long-term solution how to replace those who retire or leave the company. [...] unfortunately, today we have no system to safeguard this experience that our experts possess. [...] It is our hope that much of the knowledge is disseminated in our daily work and in our improvement work.

Other interviewees highlighted the opportunities that come with a generational shift. They felt that it was easier to shape a behavior of a new employee than to change it from an older employee, which the quote below shows:

Experience can be a burden. One has learned to work in a certain way and it creates a reluctance to change one's ways.

Several interviewees shared the view that a learned behavior could be a barrier to the company's investment in a system for knowledge transfer. Once again the personal relationships were highlighted in the reasoning about knowledge transfer systems. This time as an opportunity where a couple of the interviewed claimed that it is important to know whom to contact to resolve problems that can arise in the daily work or in a project. Therefore, a sensible approach on how to connect employees of different ages in order to create what they called a knowledge capital in the company is important:

The collective wisdom of the company is entirely dependent on how good we are at connecting people's knowledge. Not taking advantage of the older generation or our experts opinion would be a waste. Wisdom from each individual is worth a lot, but we must also ensure that we can build a network and a knowledge-capital in the company.

This is also reflected in one of the company's visions. (Olofström)

With the world's best employees, we build the world's best cars.
In order to create knowledge capital, the company has started evaluating its strengths and weaknesses within the organization. Volvo has recently also begun a project to identify their critical skills and develop a plan on how to replace them. In addition, the evaluation has found that the improvement work has a great impact on the process of knowledge transfers. According to the interviewees at all levels of Volvo Cars, one of the fundamental problems is how to disseminate it. Today’s working groups are dedicated to improvement work from start to finish but does not take into consideration the post-implementation stage and its importance for knowledge transfer. After an improvement project is completed, several of the interviewees, regardless of organizational affiliation, experienced that interest is lost for these improvement efforts and that focus completely is shifted to the next project even though the final documentation is yet to be finalized. Therefore, most of the employees have started to create informal horizontal networks within the organization between different experts, working parties and corporate functions to exchange experiences already during the improvement project. Experiences that would otherwise be difficult to be captured and disseminated in the organization are now exchanged during daily work or improvement projects. A few respondents stated that in order to successfully implement a systematic approach or a new tool strong conviction and determination is required:

One has to decide. We believe that it is strategically important that the knowledge we have generated is reused. Therefore this has to be pushed more intently from a managerial level.

[...] We are on the right track but we have a long journey ahead of us to reach our goals.

Time constraints have been discussed before, but several respondents mention additional difficulties that can arise when this problem occurs. They argue that the company is really keen on making sure the employees develop, but sometimes they may not have sufficient time for training or completely finalizing projects. An example given by one of the team managers gave was the hiring of temporary employees via a recruitment company when there are not enough permanent employees to perform all of the work. This has caused problems in the past:

We hire workers from recruitment companies relatively frequently [...] in the past it was a disaster, we could get a person who had no match to what we requested at all. [...] Through close cooperation between Volvo Cars and recruitment companies, we have together become a lot better. [...] We at Volvo Cars have improved our specifications on what it is we want and recruitment companies have learned to match these. [...] Of course there are still
mismatches today, but they are a lot less and we have developed a wide cooperation with our recruitment firms that helps us make the process even better.

All respondents agreed that experience and knowledge is extremely important. Some respondents pointed out that there was an uncertainty about what kind of experience and knowledge should be transferred. It is perceived that there is no clear picture of what is important to share. Therefore questioned were raised about the use of lessons learned documentation and its effectiveness. Several respondents were asking for a more distinct goal of what Volvo Cars wants to accomplish with knowledge transfer.

Many of the improvement works carried out only reach a few. [...] We present our Kaizen projects and anyone who is interested can attend, we also call around to different teams and invite those we believe can benefit from it. [...] It would be beneficial if different groups easily could search for previously implemented improvements works. Nowadays we are supposed to upload our projects to a specified database disk. Although, after completing the Kaizen project most of them end up in a binder at our team's workstation, there is simply not enough time and the structure is so terrible that it is hard to find anything there. [...] There should be an information portal of some sort for the Kaizen projects that are to be presented so that one could attend if one was interested. Nowadays, we usually hear about a Kaizen project from our network or our supervisor.

A more distinct goal would clarify why it is important to share lessons learnt. A few respondents pointed out that there already are demands for the dissemination of lessons learned in the knowledge management methodology at Volvo Cars. Some respondents believe that there could be a lack of knowledge from some of the employees regarding how and why they should disseminate the lessons learned. Several respondents point out that it is the individual's own responsibility to ensure that the lessons learned is being shared. One respondent suggests that there might be a fear that knowledge management will create more internal administration and increase costs, which reduces the profit margin, as a reason some are reluctant to do some of the work. The majority of the interviewed believes that strong management support is needed to impact the work with lessons learned. One respondent points out that it is not enough that a few individuals work with knowledge transfer, the entire Volvo Cars Corporation must work together on this. For knowledge transfer to really have an impact across the organization, several respondents believe it is absolutely essential that the importance of this work is communicated from the CEO down through the regional managers.
and team managers to the whole organization. A number of respondents answer in response to that comment that the knowledge and lessons learned transfer has been given greater management focus in recent years. There is more talk about it internally and now measurements are taken on how the goals and the number of errors in production are addressed.
The organizational culture is, according to several respondents, very open and the company is working to develop the Lean approach so that it involves and looks the same throughout the organization. Several of the respondents believe that Lean is a good approach, because it gives a consistent work procedure that new employees easily can follow.

*The good thing about Lean is that we get a better track on the situation and do not waste so much with our capital, we minimize buffers, gets shorter lead times to customers, we do not risk large volumes of quality deviations and so on.*

A standardized approach simplifies our everyday work because there are detailed work procedures of how my work should be performed. [...] By following the instructions in Operator Instructor Sheet (OIS) we know that many of the risks that existed before are minimized. [...] In Work Element Sheet (WES) I can clearly see pictures of how I should do my work. [...] The instructions create a standard that we can build on. [...] Standardized work procedures provide us with greater efficiency and a basis for further improvement work.

With Lean respondents explain that they have been given a shared direction, support and purpose. Furthermore, that there is now a common approach to the organization and that it is therefore easier to implement improvements.

*The good thing about the Lean approach at Volvo Cars is that it has been built on thought out routines and procedures. We are not forced into anything, we are given good reasons and leaders are describing the pros and cons with the change.*

*Lean has generated a very positive spirit and we like the responsibilities we have been give. Previous operations and change management many times lacked this basic feature, although there is more to be desired. But we are a relatively young organization in comparison to others in this journey towards a fully Lean organization.*

Several respondents argue that a disadvantage of Lean may be that our subcontractors do not meet the requirements linked to Lean that the company has set on them and also that the reaction time for decision making becomes shorter because everything happens faster.

*There are obviously both pros and cons of Lean but the benefits definitely outweigh drawbacks.*
One of the employees points out that:

_We are constantly given very much information about what is happening, how the production is doing, how much we sell, what the productivity is, there are a lot of numbers all the time. All these numbers sometimes overwhelm some of us, there is a lot of them to keep track of._

[...]

_We are constantly asked to measure more parameters of our daily work. [...] I believe most of these measures are good, they help us see how well we are doing, but sometimes it feels like we should take a step back and really think about which ones gives us what we want. [...] we should measure procedures because they have a clear purpose, otherwise it is wasting recourses._

There is also information spread through information sheets, at the monthly meetings and on the monitors at the factory.

_We have a new system in some of our facilities called ANDON, it really helps us keep track of problems, or rather is supposed - to we only have parts of it up and running. [...] all these tools and information are supposed to help us in our daily work and it really does, as long as you know how they work and what to look for._

_Our current system is informing us how well or how poorly our current operations are going and it helps us to know what we need to do to improve ourselves._

In addition to the monitors, the information sheets and so on, we have a visual board at each production line and the team managers and their groups are responsible for its content. The visual board is easy to comprehend and lets employees and others see if the targets are met. The goals are filled in with red or green for each day depending on whether the objectives have been met (green) or not (red).

The two primary models for improvement work at Volvo Cars are, DMAIC (Define, Measure, Analyze, Improve, Control) and GEMBA (roughly means to be where the action takes place) models. DMAIC is a methodology for improvement work. Coworkers throughout the organization use this systematic process in order to improve operations. GEMBA in Lean Manufacturing is usually symbolized with a walk. It is the best approach to see the organization with one’s own eyes, unmediated, what works and what does not.
5. ANALYSIS

This chapter analyzes the empirical data collected about Knowledge management within a Lean organization alongside the previously presented theory.

5.1. KNOWLEDGE MANAGEMENT

Alavi and Leidner writes that organizations could with the help of knowledge management become more efficient, support and assist employees by both spreading and documenting the implicit and personal knowledge that each individual possesses.\(^{198}\) At Volvo, this is done in the daily work where seniors and experts share their implicit knowledge by working closely with novices and younger employees, and novices and younger employees share their implicit knowledge to seniors and experts in the form of new theory. The company also disseminates the implicit knowledge when they organize formal and informal meetings and social gatherings. At these meetings or social gatherings the organizations' employees exchange ideas, opinions and thoughts with each other, which facilitates the dissemination of implicit knowledge. However, as Alavi and Leidner describes the knowledge is preserved first when it is captured and processed. Especially the implicit knowledge, the one that is exchanged during coffee breaks and other social gatherings rarely lead to documentation.\(^{199}\) One of the main reasons for the lack of documentation is, according Alavi and Leidner, the shortage of time.\(^{200}\) Thus they confirm several of the respondents' allegations that one of the biggest problems with the preservation of knowledge is the lack of time to document knowledge. Moreover, according to the authors this is one of the major reasons why knowledge management fails.

At formal meetings knowledge was primarily disseminated through reports while implicit knowledge was shared via, verbal statements, metaphors and documentation, which, according to Nonaka and Tee, is common.\(^{201}\) Both explicit as well as implicit knowledge was shared within working groups. This was something described as normal since interviewees worked in teams, project groups, or other constellations because daily communications took place with other colleagues, which contributed to a natural sharing of knowledge. The implicit knowledge was also shared through social interaction between employees within working groups as well as where employees shared the same work environment.

\(^{198}\) Alavi & Leidner, 2001  
\(^{199}\) ibid  
\(^{200}\) ibid  
\(^{201}\) Nonaka & Tee, 2001
The sharing of knowledge was also achieved through other informal methods such as networks. Jashapara argues that individuals share knowledge to a greater extent when they feel they are structurally embedded in a network.\textsuperscript{202} In the study it was found that networks enabled employees to learn about what others within the organization worked with and whom they could contact. The networks worked as informal areas of expertise. At Volvo Cars there are detailed specifications of specialists in different fields of knowledge and references to who to turn to for help and who is the deputy if the person you are trying to reach is not available. In addition, employees have personal knowledge of several employees at each plant as well as at the administrative department and hence great knowledge of who possesses what knowledge. During interviews it was made clear that knowledge sharing was done primarily through the interaction between individuals. Individuals preferring a dialogue when it came to knowledge sharing, and that dialogue is lacking in information systems. The empirical data also showed that employees prefer personal contact in order to understand the essence of the knowledge. Face-to-face meetings were the preferred means, because it allowed the sender and receiver of knowledge to display passion in the matter; more so than a book or any course could give. This argument is supported by Alvesson, who believes that personal contact and networking is an important part in organizations to get individuals to communicate with each other, successfully.\textsuperscript{203} According to Nonaka and Tee, the best way to learn implicit knowledge is through practical experience, which is something that Volvo Cars is working intently on.\textsuperscript{204} However, as aforementioned by Alavi and Leidner, is that knowledge is first preserved when it is captured, processed and documented.\textsuperscript{205}

In addition to the above programs Volvo Cars also has formal coaching programs for leaders at different levels, as well as, mentors for employees to share their experiences. Where the interaction between the employees, team leader, and supervisors can be described as natural mentoring relationships. The personal familiarity of the employees allowed natural informal knowledge sharing activities. This contributed to the dissemination of implicit knowledge between colleagues. Respondents meant that there was always some individual within the organization who had the knowledge. The main matter was therefore about networking.

Sharing of knowledge also took place due to the fact that there were formally elected individuals within the groups who were responsible for specific areas of expertise

\textsuperscript{202} Jashapara, 2005
\textsuperscript{203} Alvesson, 2004
\textsuperscript{204} Nonaka & Tee, 2001
\textsuperscript{205} Alavi & Leidner, 2001
(QCDISME-L), as well as individuals within the organization that were experts within specific areas. This enabled the employees to know who to turn to, if uncertainty arose. Alvesson and Svenningsson argue that a company's ability to solve problems very much depends on knowledge workers and their ability to work together in order to build a collective knowledge base.\(^{206}\) This is especially clear within Volvo Cars in their approach to use each other when it comes to problem solving.

Another observation was that depending upon the complexity of the problem, it becomes more difficult to teach a solution. One reason for the increased difficulty is because knowledge within the higher levels of the organization often is silent knowledge. According to Dombrowski et al it requires more time and effort to convert implicit knowledge into explicit.\(^{207}\) Volvo Cars has made a good trade-off in regards to this at the administrative level, and only for recurring problems has proper documentation been made. In doing so the system is not overloaded with redundant information. This is supported by what Ghauri and Grønhaug as well as Davenport and Prusak say that redundant information can be bad for organizations.\(^{208}\)

In addition, the severity of teaching correlate with what Argyris says that the problem solving is important in organizations, but that many people define problem solving with learning. This then leads to organizations focusing on correcting the errors but not looking for deeper knowledge or root cause analysis within the organization.\(^{209}\) Volvo Cars has a systematic approach to solving problems utilizing Lean methods such as root cause analysis (5 why) up to Six Sigma techniques in order to find the root cause and thereby the deeper knowledge to the problem. Although, as mentioned by several interviewees, there are issues when trying to access old information and within obsolete databases perhaps more focus needs to be on knowledge management and documentation. Deeper surveys should be done in the organization as mentioned by Argyris, critically examine their own behavior and perhaps try to realize that the way in which problems are solved at times can be a problem in itself.\(^{210}\)

Volvo has access to databases, intranets and information sheets and thus access to the explicit knowledge. According to Alavi and Leidner, one of the most important aspects of explicit knowledge is that information should be easy to search for, and that information is only useful

\(^{206}\) Alvesson & Sveningsson, 2007
\(^{207}\) Dombrowski, Mielke, & Engel, 2012
\(^{208}\) Davenport & Prusak, 1998; Ghauri & Grønhaug, 2005
\(^{209}\) Argyris, 2008
\(^{210}\) ibid
if it helps respondents in their daily work. The conclusion that can be drawn from respondents is that the explicit knowledge is widespread at Volvo Cars and that they are working hard to spread knowledge to the employees in many different ways.

Volvo Cars uses the organizational culture as a means for knowledge management by encouraging social gatherings where they organize parties, kick-offs, courses and common coffee breaks. These social gatherings contribute to affinity. The sessions also allow for staff to get to know one other and create trust, which in turn means that they are more willing to share their knowledge. As evidenced by Nonaka and Tee’s argument that the most important prerequisite for employees to be willing to convey knowledge is an open atmosphere as well as loyalty to the organization, this creates willingness to share knowledge.\textsuperscript{211} The empirical data also shows that most of the discussions at coffee breaks, courses and other social gatherings are about work. This is confirmed by Davenport and Prusak, who argue that discussions largely are about teamwork, since this is what the employees primarily have in common.\textsuperscript{212} In addition, commitment and motivation among employees, team leaders, supervisors, superintendents and management encourage informal meetings between employees. This creates an organizational culture that strives to have employees work towards the same goal as well as the same norms and values, which also creates a sense of belonging among employees and a non-threatening work environment. Employees can then help each other and share their knowledge. The fact that they have experts who help novices means that they have a culture that in the best way is trying to transfer the implicit knowledge that might otherwise be difficult to convey. According to Davenport and Prusak, it is very important to encourage employees to come up with ideas and thoughts by themselves about how knowledge is gathered and transmitted, as well as it is a very important element that promotes knowledge sharing.\textsuperscript{213} In addition, Senge emphasizes that it is essential that leaders convey a shared vision and common goals at all levels of the organization to create a shared vision, which creates a belonging and a shared commitment.\textsuperscript{214}

Turban and Aronson and Tiegland and Wasko argue that individuals often keep the knowledge to themselves without sharing it.\textsuperscript{215} This was something that was not supported by this study since knowledge sharing took place in all parts of the organization frequently and voluntarily. The study showed that the senior production managers felt that knowledge-

\textsuperscript{211} Nonaka & Tee, 2001
\textsuperscript{212} Davenport & Prusak, 1998
\textsuperscript{213} ibid
\textsuperscript{214} Senge, 2006
\textsuperscript{215} Turban & Aronson, 2001; Teigland & Wasko, 2003
sharing frequency increased in line with the position the employees had within the organization. They meant that knowledge sharing was more frequent among production managers, than among other employees in the team. Interview participants who were younger indicated that the junior employees were hungrier for knowledge than the senior employees. Interview participants therefore felt that the junior roles were more responsive to receive knowledge and thus took note of knowledge to a greater extent.

Alavi and Leidner argue that there are certain criteria that must be met to promote knowledge transfer, with or without the help of IT.\(^\text{216}\) The majority of respondents think that the organization understands and value the source of knowledge, because sharing their knowledge makes them feel appreciated. There are only a few cases where they do not get the appreciation or feedback to share their knowledge in a way they had expected.

Respondents explained that the work they did with sharing knowledge was not reflected in their salaries, but the impression from the interviews was that it did not really seem to matter. The impression was that the motivation to share knowledge was high. Only a few respondents thought that transfer of knowledge through Intranets, databases and other IT solutions was troublesome. This was mainly due to the fact that they did not feel comfortable using certain technical equipment or expressing themselves in writing. There were clear signs that the respondents were in fact willing to share their knowledge and expertise but the existing communication channels were perceived as static and outdated. Lack of resources, according Fard and Selseleh, limit the sharing of knowledge.\(^\text{217}\) It should be mentioned that there has been a great development at Volvo Cars in recent years when it comes to IT-based solutions for communication. Some of the shortcomings of the transfer may be due to lack of knowledge about how these new solutions work, which in part can be proven by the fact that several respondents acknowledged the need for a discussion forum, but did not know that this already existed. Alavi and Leidner write that good communication channels are very important to efficiently spread knowledge.\(^\text{218}\)

In addition to the old communication channels of email and telephone, today we also have intranets, groupware (common calendars and appointment booking), data warehousing, and information portals that are directly intended to promote and communicate knowledge. This is evidenced by Turban and Aronsson who argue that if these technological aids are used

\(^{216}\) Alavi & Leidner, 2001  
\(^{217}\) Fard & Selseleh, 2010  
\(^{218}\) Alavi & Leidner, 2001
efficiently by the organization they have a competitive advantage against other organizations, as well as reducing the loss of intellectual capital and enabling access to external information. This in turn increases productivity as access to this information becomes more readily available.\textsuperscript{219} And this statement is supported by Fard and Selseleh, which states that for effective knowledge management, an organization must prioritize the ability to share knowledge.\textsuperscript{220}

The organization's knowledge transfer and dissemination is heavily influenced by information widely being disseminated via a push model. The respondents describe that this is one of the main reasons why information often does not end up in the right place or that it is sent to the right people. Telleen argues that if management and information managers were to embrace a pull model that this would contribute to interest, involvement and commitment increasing among employees.\textsuperscript{221}

Respondents point out that they are aware that there is a balance of how information is disseminated and that certain information is required to be "pushed" out into the organization, but not everything. Knowledge management tools had been excellent to let the user find the information and knowledge that both interest him and help him in his work. Respondents believe this also had saved both time and resources.

Soolimans and Spooner five key points were tested on the organization to analyze if they met the requirements to support the organizational knowledge management\textsuperscript{222}:

(1) **Social gatherings of staff.** Volvo Cars considers it relevant and important to have regular social gatherings. They have shared coffee breaks, arranged parties and other assimilations.

(2) **The office layout.** On the administrative side, the majority of the employees are located in an open plan office and only a few have separate rooms. They also have access to several common rooms where they have both formal and informal meetings. Management also encourages informal meetings.

(3) **Trust between employees of the firm.** The employees have trust in their coworkers and do not believe that they pose any threat to the individual.

(4) **Learning and mistake handling.** There is no punishment at Volvo Cars in case the

\textsuperscript{219} Turban & Aronson, 2001
\textsuperscript{220} Fard & Selseleh, 2010
\textsuperscript{221} Telleen, 1996
\textsuperscript{222} Soliman & Spooner, 2000
employees would have done anything wrong. They encourage their staff to share their mistakes, to a certain extent, but management has a hard time bringing their own up. All employees also agreed that mistakes, to a certain extent, were brought up for ventilation as well as in order to help assist the one in need.

(5) Senior management involvement and support. Senior managers are involved in the work, and guide the younger novices.

5.1.1. Knowledge Management Systems

Employees at Volvo Cars accumulate, to a certain extent, their knowledge in databases and also share their knowledge. Technologies such as intranets and databases have been shown to play an important role in knowledge sharing, according to Jashapara. An interviewee pointed out that the employees could readily share knowledge to each other, without documenting the knowledge, as long as the knowledge was relatively new. However, after a while the information was forgotten and therefore was it important to document the information. The study confirms Nunes et al findings, where they believe organizations need to utilize and document the existing knowledge before it disappears. The interviewee meant that if the information was documented it would also be available in the future. This is attested by Nonaka and Tee claim that the explicit knowledge is the most enduring.

Employees do not partake in the knowledge from databases in a great extent. Reasons for this were mostly that the databases were not sufficiently structured to be satisfactory. A recurring problem in knowledge sharing was inadequate databases and search engines. A common reason why documentation was so low was the lack of time and the lack of good programs. This is confirmed by the Lindkvist study where the lack of time was a barrier to knowledge sharing. Lindkvist further argues that it is therefore important that organizations enable employees to spend time documenting and discussing knowledge. Furthermore, as mentioned the databases were not sufficiently structured to be used easily. This can accord Alavi and Leidner lead to that employee fails to see the benefits of the IT-system and how it can improve their work.

223 Jashapara, 2005
224 Nunes, Annansingh, & Eaglestone, 2006
225 Nonaka & Tee, 2001
226 Lindkvist, 2001
227 Alavi & Leidner, 2001
As evident from previous statements, the interviewees showed that employees did not prefer to share knowledge through databases. Initially, the interviewees revealed a negative attitude for the need and use of databases. This is because it was considered to be too time consuming, difficult to use and inefficient. Thus is emphasized by Fard and Selseleh, technical solutions should enable easier access for employees in the organization to share knowledge, but as Alavi and Leidner stress, it is crucial to keep the IT system organized and updated in order for employees to see its benefits and how it can improve their work. However, as the interviews progressed, the interviewees changed their perception of the significance of databases. As their reasoning went, information can be forgotten and employees may leave the organization with valuable information. Interviewees started suggesting how databases could be improved and be used more efficiently. The attitude was changed from rejecting databases to seeing the benefits of them. As the interviewees were given time to reflect on the significance of the database for sharing knowledge, one could argue that their new position would be more valid, because they had more time to think than in the initial stage.

It emerged during the interviews that knowledge databases, intranets and other databases were widely used to gain insights about who performed a particular function so that one could contact that person in order to acquire more knowledge. Instead of employees utilizing the knowledge stored in databases, the database was used as a directory to search for coworkers who had relevant knowledge and then to search that person out for face-to-face interaction. Interviewees stated that the main reason for this was that the reports were difficult to understand and lacked structure, therefore it was easier to simply look up the person who wrote the report and have it explained. This statement is confirmed by Heide et al who argue that under the right conditions, an IT system will create a knowledge base that employees can use for hints and advice, which might also increase the communication within the company so that new ideas and thoughts are discussed and developed.

Knowledge sharing is done primarily through informal methods such as networks. It was found in the study that networks made it possible for employees to learn about what others within the organization worked on and whom they could contact. Networks became informal areas of knowledge. Although Volvo Cars is a very large organization, the flatness of the organization and the structural division of the departments, as well as its proximity to the staff enables coworkers to have personal knowledge of several employees and thus knowledge of

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228 Fard & Selseleh, 2010; Alavi & Leidner, 2001
229 Heide, Johansson, & Simonsson, 2005
who possessed what information. It became apparent that knowledge sharing was done primarily through the interaction between individuals. Individuals preferred a dialogue when it came to knowledge sharing, which was lacking in computer systems. The empirical data showed that the interviewees preferred a face-to-face contact to understand the core of the knowledge. Interviewees valued face-to-face knowledge sharing more because it showed a greater whole and soul in the matter than a report was considered to provide. As Soliman and Spooner emphasize, it is an essential for a successfully transfer of knowledge to have a personal relationship and integration between individuals. In addition, as mentioned above by Alavi and Leidner, that if a structural misery prevails, it is difficult to understand the importance of an IT system.\

5.1.2. BARRIERS WHEN TRANSFERRING KNOWLEDGE

Barriers in knowledge management that could be found in the daily work could be compared with the barriers that Lindkvist talks about in his dissertation. One of the barriers in the daily work at Volvo Cars was the language. English is used in many systems and in some cases this could be seen as a barrier. Mainly because of the inadequate English skills of some of the employees, there are misunderstandings that could lead to poorly formulated documents. It can be regarded as a loss of knowledge both in the formulation of the document as well as in the interpretation of said document.

Another barrier to knowledge management is sometimes the willingness to share knowledge. As Davenport and Prusak argue, people are not always willing to share their knowledge unless they get something in return. According to respondents, this is not how the organizational culture at Volvo Cars operates. Rather, knowledge sharing occurred in all parts of the organization voluntarily and frequently.

Interviewees pointed out that it was time consuming and unnecessary to share knowledge in a database if the ability to retrieve knowledge was impaired. The study has shown that it is about creating good database retrieval systems to motivate employees to share their knowledge. This statement is confirmed by Heide et al who argue that under the right conditions, an IT system will create a knowledge base that employees can use for hints and advice, which might also increase the communication within the company so that new ideas

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230 Soliman & Spooner, 2000; Alavi & Leidner, 2001
231 Lindkvist, 2001
232 ibid
233 Davenport & Prusak, 1998
and thoughts are discussed and developed.\textsuperscript{234} Emphasized by Fard and Selseleh, technical solutions should enable easier access for employees in the organization to share knowledge but as Alavi and Leidner stress it is crucial to keep the IT system organized and updated in order for employees to see its benefits and how it can improve their work.\textsuperscript{235}

One of the biggest barriers to knowledge transfer that respondents talked about was the excessive writing of documents that were not really needed. According to Ghauri and Grønhaug this leads to an organization that will drown in an information and data overflow.\textsuperscript{236} Even Davenport and Prusak point out that even though the knowledge is stored within an organization, there is no guarantee that it will be used properly and thus can be considered to be redundant because the important information is lost among the unimportant.\textsuperscript{237} The previous statement is confirmed by Ghauri and Gronhaug who argue that too much data and information leads to redundancy, and the only solution is to sort out irrelevant information and data.\textsuperscript{238}

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\textsuperscript{234} Heide, Johansson, & Simonsson, 2005 \\
\textsuperscript{235} Alavi & Leidner, 2001; Fard & Selseleh, 2010 \\
\textsuperscript{236} Ghauri & Grønhaug, 2005 \\
\textsuperscript{237} Davenport & Prusak, 1998 \\
\textsuperscript{238} Ghauri & Grønhaug, 2005
\end{flushleft}
5.2. A LEARNING ORGANIZATION

An organizational culture that promotes the sharing of knowledge is a success factor at Volvo Cars. Several interviewees described the open organizational culture as a prerequisite for successful knowledge sharing, where employees voluntarily share knowledge. According to Teng and Song an open culture has a huge impact on getting employees to share knowledge with each other, since the sharing of knowledge in large part is about building trust.\(^\text{239}\) Mason and Pauleen argue that organizational culture, in some cases, may be an obstacle in the process of knowledge sharing, this is when trust- and confidence issues occur within the company.\(^\text{240}\) The interviewees described the culture of the organization was one where everyone in the organization wanted to help each other to improve and evolve. Senge emphasizes that experienced colleagues and managers have a huge responsibility to create a culture where lessons learned are a natural part of everyday life.\(^\text{241}\) This is strengthened by the interviews conducted, that employees feel that this is something that is encouraged and a part of the organization. Jashapara argues that organizational culture affects both the relationships and trust between colleagues and cooperative cultures are more favorable to the sharing of knowledge than competitive cultures.\(^\text{242}\) The theoretical material clearly shows that it is essential to promote an open organizational culture where sharing of knowledge takes place voluntarily. The empirical data showed that knowledge sharing was influenced by how involved employees were in relationships within the organization. Wasko and Faraj support this finding where the individual's participation in the network affects knowledge sharing.\(^\text{243}\)

The more relationships and the larger the networks employees have within the organization, the more involved individuals are in the process of knowledge sharing. Even Soliman and Spooner point out that an open culture is a factor that enables effective information- and knowledge flow within the network.\(^\text{244}\) This is also confirmed by the interviews conducted. With an open culture, such as that of Volvo Cars, it is easy to get in touch with colleagues to share knowledge. Teng and Song support this statement that an open culture contributes to ease internal communication, which in turn can generate increased confidence and trust.\(^\text{245}\)

\(^{239}\) Teng & Song, 2011  
\(^{240}\) Mason & Pauleen, 2003  
\(^{241}\) Senge, 2006  
\(^{242}\) Jashapara, 2005  
\(^{243}\) Wasko & Faraj, 2005  
\(^{244}\) Soliman & Spooner, 2000  
\(^{245}\) Teng & Song, 2011
Boonstra argues that the organization can develop a culture where employees learn to contribute knowledge in order to share the kinship. He further argues that a small number of employees can maintain this standard. At Volvo Cars, there is a controlled recruitment of employees towards those who are willing to participate in the sharing of knowledge. The study's empirical material showed that culture, to some extent, could be controlled by management through the recruitment of knowledge-hungry employees who were driven to share knowledge. In this way, management could influence cultural development so it promoted the sharing of knowledge, which the organization strived to do. It is largely about the trust that Mason and Pauleen as well as Jashapara pointed out being of such great importance. Creating trust and good relationships between employees promotes an organizational culture where knowledge sharing takes place naturally and voluntarily.

The majority of the surveyed employees pointed out that the biggest motivation to share knowledge was because it was funny. Teng and Song argue that voluntary knowledge sharing is the knowledge that an individual shares without first being requested by someone. Voluntary knowledge sharing is simplified by an open communication and more culturally imbedded relationships, such as solidarity. Employees at Volvo Cars had the notion that it was easier for everyone if they worked together at knowledge sharing. Soliman and Spooner argue that the motivation to contribute may be because some see their knowledge as a public good belonging to the employees within the organization. This view is associated with compassion to the organization that creates a sense of obligation to share their knowledge. Lin found that the behavior of knowledge sharing is motivated by the persons desire to help others and contribute to the organization. One of the motivations to share knowledge was an opportunity to bring up their own challenges as well as to hear others.

Lin argues that the employees' attitude to the sharing of knowledge may be affected by their behavioral intentions. Motivation associated with the employees' intentions to knowledge sharing, included the mutual benefits to both parties and the satisfaction of helping others. Several employees were motivated by being part of an individuals’ maturation and seeing them grow and develop. Being part of a colleagues’ knowledge development was related to another important motivation for employees to share their knowledge, which was to see a

246 Boonstra, 2004
247 Mason & Pauleen, 2003; Jashapara, 2005
248 Teng & Song, 2011
249 Soliman & Spooner, 2000
250 Lin, 2007
251 ibid
clear effect of knowledge sharing. How well this turned out, closely correlated to the recipient's interest to receive knowledge. If recipient's interest was low it would limit knowledge sharing. The Turban and Aronson as well as the Soliman and Spooner studies confirm this, which argues that a lack of absorption capacity of the recipient inhibits both the effectiveness and the frequency of knowledge sharing. Seeing how the knowledge was used and how it affects the environment at work was a contributing motivation to sharing knowledge. The empirical results also revealed that employees at Volvo Cars were motivated to share knowledge for various purposes but mainly a non-monetary reason. This confirms Wang and Noes argument that employees share knowledge for different reasons.  

Bhasin and Burcher argue that the support from management is critical for knowledge management to be successful. This is confirmed by the interviews conducted in this thesis. Respondents point out that a strong support from management is required to work with knowledge in order for it to have an impact at Volvo Cars. Nevertheless, as several respondents claim is that individuals also have a major responsibility for knowledge transfer because the organization is so decentralized. Furthermore, Mason and Pauleen point out that management affects critical aspects such as organizational culture, since it has a central role in the development of trust and support for a knowledge-sharing culture. In order to encourage knowledge sharing, management can stimulate intentions that meet these encouraging forces. Wang and Noe argue that the main limitation for the sharing of knowledge is the lack of incentives. They recommend rewards- and recognition incentives to stimulate the sharing of knowledge. Volvo Cars has depending on factory, area and level in the organization reward- and recognition incentives where employees can be mentioned in the factory's newsletters and / or get a diploma and pastries. These systems were implemented to stimulate knowledge sharing within the company. The incentives create participation among employees to be involved in knowledge work, by creating well-defined goals for knowledge sharing. The organization thereby countered the protective behavior of knowledge that Jashapara speaks of, by including goals for knowledge sharing in the reward system. Jashapara argues that employees can form a protective knowledge behavior if the company has a reward system implemented. Furthermore, Jashapara emphasizes that a reward system can make employees afraid of being exploited, leading to more defensive personal behaviors.

252 Wang & Noe, 2010  
253 Bhasin & Burcher, 2006  
254 Mason & Pauleen, 2003  
255 Wang & Noe, 2010
about sharing their knowledge.\textsuperscript{256} Davenport and Prusak suggest that both financial and non-financial rewards and recognition incentives are important means to create a knowledge sharing culture. Studies show that trivial rewards may initially increase participation among employees, but that commitment is difficult to maintain over time.\textsuperscript{257} Wang and Noe as well as Riege believe that a reward- and recognition incentive of a knowledge-sharing behavior should be integrated with the organization's performance and compensation program.\textsuperscript{258} Respondents have difficulties seeing how to measure knowledge, and the problem lies with how to link knowledge sharing behavior to the compensation system, Riege describes.\textsuperscript{259} A major part of the knowledge transfer at Volvo Cars consists of implicit knowledge and takes place through informal forums. Consequently, it is problematic to initially measure knowledge transfer, let alone how to then reward it.

Nonaka and Tee argues that the prevailing culture influences the perception of knowledge management and its processes. If the culture does not support knowledge transfer there is a major risk that work with lessons learned will be nonexistent.\textsuperscript{260} The culture at Volvo Cars is perceived as open which is a good starting point for effective knowledge sharing. However, according to some respondents, the current knowledge transfer is not of a sufficiently high enough priority among all employees, which means that there is not an optimum knowledge sharing culture. None of the respondents see any obstacles sharing their own experiences to colleagues, but they argue that there must exist a knowledge need in order for knowledge sharing to take place. At present, someone must seek knowledge for knowledge transfer to occur, while preemptive knowledge sharing does not occur extensively. Several respondents perceive a greater focus on the value of knowledge transfer at Volvo Cars in recent years, but the interest in this topic varies between the organization's employees.

Tripathi et al, believe that organizations should question whether they could afford not to work with knowledge management. Furthermore, they believe that with an appropriate knowledge management system, over the long term efficiency can be increased, costs be kept down and revenues improved. The authors point out that this should suffice as a motivating factor for the organization to work with the transfer of lessons learned, both through written- and oral communication.\textsuperscript{261} During the case study, an evident fear was observed for costs

\begin{footnotesize}
\begin{itemize}
\item \textsuperscript{256} Jashapara, 2005
\item \textsuperscript{257} Davenport & Prusak, 1998
\item \textsuperscript{258} Wang & Noe, 2010; Riege, 2005
\item \textsuperscript{259} Riege, 2005
\item \textsuperscript{260} Nonaka & Tee, 2001
\item \textsuperscript{261} Tripathi, Singh, & Tripathi, 2011
\end{itemize}
\end{footnotesize}
relating to knowledge management.

The reason for this might be because the perception of knowledge management among management and employees is currently mostly associated with the IT system, documentation of lessons learned and administration of lessons learned. Knowledge management at Volvo Cars is today mostly asset-driven instead of demand-driven, making the benefits of knowledge management questionable. To change this image, knowledge management should be linked to the actual needs of the users. If the knowledge management system meets user needs, a clear incentive to use the system is created.
5.3. Lean

Reorganization can be a strategic choice. In a reorganization, future goals are created to thus try to maximize the future utility. Another reason for reorganization is that one is forced to take action against changes in external conditions. At Volvo Cars, this can be exemplified by the increased competition from competitors as well as an increase in expectations to take action when problems arise. Therefore they implement new models to show that they are trying to stay competitive as well as minimizing problems.  

5.3.1. Motives for Implementing Lean

The implementation of Lean, according to theory, is usually because the organization wants to streamline its organization and shorten lead times and thereby become more flexible so as to give customers better service. This is achieved by removing the activities that are non-value adding in the organization, improve flows using Lean tools and establishing standards when it comes to work routines. A prevalent mindset of all interviewees is that one of the most important difference between Lean and previous change projects is in Lean all employees are fully involved. To the greatest extent, the initiatives come from the employees and are not imposed by management or administrators.

5.3.2. The Importance of Anchoring Lean within the Organization

Each employee receives greater responsibility to implement change and the others know whom to turn to when it comes to suggesting and implementing new methods. Respondents explain that there is now a common approach to the business and that it is therefore easier to implement improvements.

Work with Lean and the change process that this provides, gives a broader support throughout the organization and therefore it is easier to continue working in the right direction. Bhasin and Burcher also stress the importance of a top-down control of Lean with a clear strategic leadership that knows where one is going with the implementation. It is management who has committed to implement Lean in the organization and it is from management that change is based. Before the decision was taken to implement Lean, relevant knowledge was gathered and disseminated within the organization. As work with Lean has progressed, leaders have taken it upon themselves to practice go to Gemba. They are visible out in the factories and

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262 Jacobsson, 1994  
263 Womack och Jones, 2003  
264 Bhasin & Burcher, 2006
they communicate the Lean philosophy to employees. Go to Gemba provides an opportunity for the leaders to learn what works and what does not as well as what employees feel is important to improve. And as Scherrer-Rathje et al point out, a top-down approach is based on change within the whole organizational culture, system and thinking. Management is responsible for strategic direction (top-down) and improvement work managed by employees (bottom-up). Therefore, management's total commitment is required, in order for this to work.\(^{265}\) A step in the strategic governance at Volvo Cars is their semi-annual revision of VCMS. A full out implementation of this started in 2007. VCMS is as mentioned earlier based on the best of all factories (TPM) and input from Ford Production System and other Lean methods. In working with VCMS they have on several occasions taken help from consultants. Japan Management Association Consultants (JMAC\(^{266}\)) was during a period in 2010 consulted and involved in training in standardized and local Volvo Cars Torslanda (VCT) work as well as some work in Gent, Belgium. In 2012 Volvo Cars decided to review the entire VCMS based on a SWOT analysis. At the direction of Christer Nord a project called Volvo Car Manufacturing (VCM) 2020 was established. Three different consulting firms were brought in to review VCMS. This review resulted in the identification of three different areas of improvement by two of the consulting companies, Celerant Consulting (nowadays know as Hitachi Consulting\(^ {267}\)) and McKinsey\(^ {268}\). The areas of improvement were:

1. Lean Leadership
2. Design for Lean (bottom plate in the Volvo Cars Lean Approach see figure 4)
3. Some structural changes

The third point, Volvo Cars went from 15 principles to 5. 15 principles were considered too much to easily remember. By reducing the number of principles to 5, but keeping the content of the original principles in the details, the understanding and communication with employees was strengthened.

Celerant Consulting came to advise on point 1 and 2 while McKinsey advised on point 3.

Dombrowski et al point out that a critical success factor in the implementation of Lean is employees must trust management, and management will have to demonstrate that the change will give results both efficiency-wise as well as financially. In addition, each employee must

\(^{265}\) Scherrer-Rathje, Boyle, & Deflorin, 2009  
\(^{266}\) JMAC Scandinavia, 2015  
\(^{267}\) Hitachi Consulting, 2015  
\(^{268}\) Mckinsey&Company, 2015
be allowed the time needed to complete projects. According to several respondents this change has generated a very positive spirit and a sense of responsibility. Under previous management and change projects these basic features were missing. This reasoning suggests that Lean transformation projects provide employees with ways and means to implement changes. Respondents point out that one of the biggest benefits of Lean is that one does not force change, but rather builds on successful practices and procedures as well as inspires employees themselves to make suggestions for change. Lean is not about changes being determined by management and subsequently implemented by employees. By ensuring that all employees are involved in the work to create improvements, they become engaged and motivated. As soon as employees see that their suggestions for improvement are utilized, they become even more interested in change and the work done involving Lean. This is in accordance with what Bhasin and Burcher point out, namely that it is employees who should be pushing for change and change should mainly come from a bottom-up approach. When responsibility is moved from management down to the individual, an organization is built up based on learning - a learning organization.

According to respondents, Lean is not to be seen as a short-term plan but rather as a philosophy that must mature and slowly grow among employees. The philosophy is based on a common mindset and values. This agrees with the basic idea that claims that Lean is not simply one of applying a number of tools but rather a lengthy process. The system must be implemented using a top-down approach, but built from the bottom-up and have the support of the entire organization. It is not as easy as just taking a tool out of the box. Lean is a learning system from which the customers benefit by higher security, shorter lead times and greater understanding of their business. Bhasin and Burcher explains that based on experience, the adaptation of Lean and its tools is a critical challenge and the success largely depends on the understanding that Lean is a system and not just a toolbox.

In all factories at Volvo Cars, Lean has spread throughout the organization and employees and leaders at various levels are familiar with the philosophy, therefore, one could call Lean a type of work standard. With Lean as a work standard, there are incentives for working with Lean according to its philosophy. Because of employee's increased influence, it is conceivable

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269 Dombrowski, Mielke, & Engel, 2012
270 Bhasin & Burcher, 2006
271 Scherrer-Rathje, Boyle, & Deflorin, 2009
272 Liker, 2010
273 Bhasin & Burcher, 2006
274 ibid
that there is a greater reciprocity towards the organization as a whole, leading to higher motivation. This could lead to increased responsibility making employees feel a moral obligation to carry out a good job.

5.3.3. **IMPLEMENTATION OF LEAN**

One factor that strongly influences the success of a model's implementation is commitment from management. The implementation of Lean should, according to Scherrer-Rathje et al, be led by senior management but also points out that in order to solve any problems in the organization, leaders should be present among employees. However, leaders should not manage but rather guide them in the right direction. The **top-down** approach is based on change within the whole organizational culture, system and thinking. For long term success management's total commitment is required. Management is responsible for strategic direction (top-down) and improvement work managed by employees (bottom-up).\(^{275}\) All factories have more or less embraced this reasoning, where visual boards and managers of specific area of interests have been implemented. The employees are also involved in the thinking that is behind *The Toyota Way*\(^ {276}\), which is based on the high degree of participation among employees and that they are involved early on in the processes that are going on in the organization.

When the implementation of Lean takes place, it is common practice to bring in a consultant or other third party to help carry out the work. Some have limited practical experience in the specific industry but bring valuable insights into a Lean approach. Most of the leaders at the administrative level and also some at factories all have a background working practically in the organization. Those leaders who have worked themselves up at Volvo Cars or in similar organizations may have a large impact on the fact that they have personally chosen to become involved, this applies both to the implementation of Lean but also the work that is done daily in working with the Lean philosophy. Those who are involved in the implementation of Lean were previously active at Volvo Cars, which can be a big success factor in the implementation work. It is important that those who best know the organization are the ones leading the change. Involving consultants at an early stage may have contributed to new perspectives not being overlooked as is common when working on improvements over a long time horizon.\(^ {277}\)

\(^{275}\) Scherrer-Rathje, Boyle, & Deflorin, 2009  
\(^{276}\) Liker, 2009  
\(^{277}\) Radnor & Walley, 2008
According to the Lean philosophy, organizations should reduce the activities that do not contribute any value. The model is first to identify and then eliminate these non-value adding processes within Lean, which are based on five main principles. One of the principles that Volvo Cars has devoted energy towards is to try to improve the flow. This has resulted in employees currently work more in interdisciplinary teams than previously, when it was common that each group kept to themselves. Interdisciplinary teams are an important prerequisite for the success of Lean work.

The basic idea about continuous improvement, Kaizen, plays an important role in the implementation of Lean philosophy. The idea of Kaizen is heavily adopted at Volvo Cars. The various teams are working with Kaizen in much the same way, where employees are the primary tool for identifying problems and then discussing solutions to resolve them. However, the Lean philosophy emphasizes that it is not only principles that can be used to aid in the visualization and the elimination of non-value adding activities. There are also other tools that the organization can utilize. The Lean tools are connected in a manner that when one tool is used a need for other tools arise to control the effects that the first tool gave rise to. Volvo Cars has identified this intricate relationship and they have carefully selected the tools they have implemented to achieve synergies among them.

Lean philosophy is originally designed to work in the manufacturing industry with sequential tasking and when it then is converted for use in an administrative environment, there may be problems. Volvo Cars has chosen to use a very cautious approach and only use tools that can be easily implemented and that have been proven to work. Moreover, they have on several occasions chosen to test these tools to a lesser extent in order to ensure that they function in the Volvo Cars organization. However, this approach has led to some problems where some parts of the organization still are not Lean based. This causes problems, for example when it comes to ordering where the business has not fully embraced a just-in-time philosophy. This manifests itself in large raw material stocks in some of the factories. Occasionally, it also tends to cause problems because not all workers share the same view on how the organization should work or that it should work with improvement work. These problems are mainly associated with the administrative side of the organization. Volvo Cars is working hard on implementing the Lean philosophy throughout the organization.

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278 Womack & Jones, 2003
279 ibid
280 ibid
5.3.4. **Effects of Lean**

Initially, discussions have been made regarding measures that Volvo Cars has taken to sort out their problems and also their actions. This section will focus on their achievements.

Volvo Cars show successful results in improving the safety and quality of its production. By reviewing the activities that the organization revolves around, they have managed to reduce non-value adding activities and have been able to concentrate on providing better quality and safety. Through better control of tools, machinery and important documents, employees have been able to concentrate more on work and less on unnecessary running-around. However, it may be a simplification of reality to only look at the elimination of the activities that are non-value adding as the only effect that brought forth this result. In addition, employees’ motivation for efficiency should be factored in as an underlying factor. Employees have played an essential role in streamlining operations and thus employees work environments come in as a factor in the assessment. All respondents argue that employees contributed to a better work environment. Even if the stress level has not decreased in relative terms due to the increased workload, the new approach has enabled better structure. Lean aims at a leveled flow with better structure and procedures, which should lead to reduced stress through a more even pace. It can be indicated that this is the case, when employees point out that they are now doing more actual work and it is more structured than before.

To conclude, the Lean philosophy is a tool in the quest to become more efficient. The fact that Volvo Cars carefully consider what tools to implement depending on whether they should belong to the administrative- or industrial part of the organization, the input- versus the output effect should provide a good result in the future. The fact of the matter is, given that they are not stressing to implement new tools suggests that they will achieve good results and get more followers. Volvo Cars Manufacturing Systems will develop and grow like other models have when they first were implemented in the organization.
5.4. SUMMARY OF ANALYSIS

Here follows a short summary of the above analysis.

5.4.1. KNOWLEDGE MANAGEMENT

The result from the conducted analysis indicates that through formal meetings knowledge was primarily disseminated through reports while implicit knowledge was shared via, verbal statements, metaphors and documentation. In addition, the sharing of knowledge was also achieved through other informal methods such as networks. In the study it was found that networks enabled employees to learn about what others within the organization worked with and whom they could contact. The networks worked as informal areas of expertise. The reason for this was that individuals preferred a dialogue when it came to knowledge sharing, and that dialogue is lacking in information systems.

At Volvo Cars the open atmosphere is perceived as the most important prerequisite for employees to be willing to convey knowledge as well as loyalty to the organization. Two ways Volvo Cars work with Knowledge management is through their Volvo Car Academy and the concept of Train-The-Trainer. Training held at the Volvo Cars Academy is appreciated and highly effective. The trainings help employees get to know coworkers from different parts of the organization, which is beneficial for networking as well as learning the methodologies and practices utilized at Volvo Cars. The concept of Train-The-Trainer is based on that education and training starts from VCMS experts to the highest management and cascades through management all the way down through the organization. And the basic reason behind this concept is shown by the following comment:

If the leaders lack knowledge and understanding for why we are implementing change management, they can not train and motivate their employees. Decisions and change must be anchored from the top if we expect our employees to act as we teach.

5.4.1.1. KNOWLEDGE MANAGEMENT SYSTEMS

The result from the conducted analysis indicates that the databases are not sufficiently structured to be user friendly with inadequate databases and search engines leading to difficulties acquiring the correct information. In addition, instead of employees utilizing the knowledge stored in databases, the database was used as a directory to search for coworkers who had relevant knowledge and then to search that person out for face-to-face interaction.
Interviewees stated that the main reason for this was that the reports were difficult to understand and lacked structure, therefore it was easier to simply look up the person who wrote the report and have it explained.

5.4.1.2. Barriers when transferring knowledge

One of the biggest limitations of knowledge sharing within the organization is the limited time that is devoted to documentation and monitoring. Furthermore, an inadequate knowledge database creates limitations for knowledge sharing, since the desired knowledge in many cases is not researchable. A recurring problem is a badly structured database with unfavorable structure, which makes it difficult to find old documented knowledge. Another big barrier is language; the inadequate English skills of some of the employees, there are misunderstandings that could lead to poorly formulated documents. It can be regarded as a loss of knowledge both in the formulation of the document as well as in the interpretation of said document.
5.4.2. A LEARNING ORGANIZATION

The result from the conducted analysis indicates that it is essential to promote an open organizational culture where sharing of knowledge takes place voluntarily. Knowledge sharing is influenced by how involved employees were in relationships within the organization. Teng and The majority of the surveyed employees pointed out that the biggest motivation to share knowledge was because it was funny.

The support from management is critical for knowledge management to be successful. In an attempt to encourage knowledge sharing, management implemented reward- and recognition incentives where employees are mentioned in the factory's newsletters and / or get a diploma and pastries. The incentives create participation among employees to be involved in knowledge work, by creating well-defined goals for knowledge sharing. The organization thereby countered the protective behavior of knowledge that Jashapara speaks of, by including goals for knowledge sharing in the reward system.

The empirical data showed that the majority of the interviewed employees were driven by other motives for sharing knowledge than purely monetary incentives. The leading motivation to share knowledge was because it was fun and to be able to share your own challenges and hear about others.

*I like to share my knowledge and enable it to spread as much as possible. [...] If people see change in their everyday life this will inspire more people to share knowledge and the result will be a better work environment. [...]
5.4.3. Lean

The result from the conducted analysis indicates that Lean tools and methods are widely used at Volvo Cars, but the culture has not entirely permeated the entire organization.

A prevalent mindset at Volvo Cars is that one of the most important differences between Lean and previous change projects is that in Lean all employees are fully involved. To the greatest extent, the initiatives come from the employees and are not imposed by management or administrators. Each employee receives greater responsibility to implement change and the others know whom to turn to when it comes to suggesting and implementing new methods. Respondents explain that there is now a common approach to the business and that it is therefore easier to implement improvements.

*The good thing about the Lean approach at Volvo Cars is that it has been built on thought out routines and procedures. We are not forced into anything, we are given good reasons and leaders are describing the pros and cons with the change.*

As work with Lean has progressed, leaders have taken it upon themselves to practice go to Gemba. They are visible out in the factories and they communicate the Lean philosophy to employees. Go to Gemba provides an opportunity for the leaders to learn what works and what does not as well as what employees feel is important to improve. It is management who has committed to implement Lean in the organization and it is from management that change should be based. Management is responsible for strategic direction (top-down) while improvement work is managed by employees (bottom-up). For long term success management's total commitment is required.

It is the belief of Volvo Cars employees that Lean is a good approach, because it gives a consistent work procedure that new employees easily can follow.

*The good thing about Lean is that we get a better track on the situation and do not waste so much with our capital, we minimize buffers, gets shorter lead times to customers, we do not risk large volumes of quality deviations and so on.*
6. Conclusion

In this final chapter the conclusions that have been drawn with regard to the study are presented. The chapter breakdown follows the same structure as the empirical and analysis chapter, the chapter concludes with a consideration of how knowledge management within a Lean organization could be developed in the future.

6.1. Knowledge Management

The study showed that the sharing of knowledge took place through informal methods such as meetings and personal contacts. Knowledge was primarily done through relationships and personal communication. Knowledge management took on a role of dialogues rather than monologues. It was considered to be more rewarding to gain knowledge shared face-to-face because it showed a greater whole and soul in the matter than a report or course was considered to provide. The study found that employees want to share expertise in a natural environment and the best organizational practices to do this, that stimulates knowledge management and sharing of knowledge, is to provide opportunities for people to talk and share knowledge, experience and tips.

Employees initially rejected databases as a method for sharing knowledge. This because databases were considered difficult to use, time consuming and inefficient. However, as the interviews progressed, the interviewees changed their perception of databases, to instead see the benefits of them. For knowledge to be shared efficiently by computer systems they should have simplicity to them, be developed so knowledge is stored for easy retrieval so when employees use them they can see the benefits of them. If clear objectives and measurements for knowledge management and knowledge sharing are established, rewards- and recognition incentives can be used to further entice employee participation. A strong motive for knowledge management and knowledge sharing was to see ones knowledge being reused. Once again a functioning computer system built on simplicity, retrieval capabilities and ease of storage was requested. To achieve the full effect of knowledge sharing, it is therefore important that this is addressed. In order to encourage and streamline the sharing of knowledge it is important for management to establish motives that meet the company's organizational goals.

Another motive for employees to share knowledge was that it was fun and challenging. It was about the happiness of watching others grow and develop as well as to develop oneself.
CONCLUSION

Sometimes, the knowledge sharing behavior was warranted by altruistic reasons of the one sharing the knowledge, a desire to help others and contribute to the organization. The survey found that organizational culture was an important part in knowledge sharing. In order to stimulate knowledge management and knowledge sharing an open organizational culture was needed, where the emphasis was on relationships and trust. The study showed that cultures, such as the one at Volvo Cars, which were developed to stimulate knowledge sharing, helped employees share knowledge on their own initiative, which is a success factor for any competitive company in today’s globalized work environment.

The study found, in contrast to previous research, that individuals share knowledge frequently and on a voluntary basis through personal communication with each other. This disproves the notion that individuals share knowledge for the sole benefit of themselves, that is, for selfish reasons. As previously stated, one of the problems of knowledge management and knowledge sharing is the sharing of knowledge to databases, which employees do not prefer to do. To ensure that organizations do not lose knowledge, it is essential to get people to realize the long-term significance of knowledge. The study showed that through reflection employees changed their opinion, and came to see them as a benefit rather than a problem. In realizing their significance as well as their meaning, an increase in use and storage can be achieved. The study showed that it was the mindset rather than the structure, which was the main obstacle. Upon reflection, an understanding of databases as a mean to ensure the organization's structural capital was recognized. The results demonstrated that the organization would benefit from establishing incentives that allow employees to spend more time sharing knowledge to knowledge databases. This is because one of the major boundaries for sharing of knowledge in the organization was the limited time. The study shows that a system that rewards employees for the amount of knowledge they share, could stimulate knowledge management and knowledge sharing.
CONCLUSION

6.2. A LEARNING ORGANIZATION

The scientific material used in this work is clearly consistent with the fact that organizational culture has a very large impact on knowledge management and sharing of knowledge. And that the leading theme with greatest and most attention is the motivation and confidence between employees. A thoughtful reflection is how and why organizational culture influences knowledge sharing. The conclusion of this paper is that organizational culture influences knowledge sharing because it affects the people. Employees are individuals who socially interact with each other and whose behavior is dependent on the context they are in. In addition, one always has to count organizational culture as a major influencing factor.

In this paper, a lot of different articles have been used to provide both diversity and perspectives of the study. These articles may all have different perspectives, different definitions and are based on different theories but the essence is that they all finally seem to arrive at the same result and conclusion, although with different viewpoints and perspectives. Regardless of whether the focus is on management style, rewards or communication it is about the individual. An organizational culture contributes much but it also has a major impact on its employees. The common denominator that drives employee behavior within organizations is their motivation, this manifests itself in how and to whom they share their knowledge. It is unavoidable that the individual is the center whether it is professionally or privately related. The theory clearly shows that organizational culture is in direct correlation with how willing people are to share their knowledge. Knowledge behavior is thus a correlation between the impact that culture has on the social environment regardless of whether it is confidence, motivation, communication or structure.

Organizational structures and cultures that counteract knowledge sharing through putting up barriers for employees create an unfavorable environment for knowledge management. Therefore it is extremely important that employees have confidence for the other members of the group in order to have the desire and courage to share knowledge. Moreover, it is important that there is support throughout the organization with a management that stands behind the improvement work. As a conclusion to the above reasoning, in order for a improvement work to be effective it requires several success factors and the common denominator, of the factors mentioned above, is the motivation among employees. Well-motivated employees who feel that there are incentives for working with improvement work. Motivation is the driving force for our actions and behaviors, which in turn can be prevented

96 (112)
or enabled by other more structural obstacles.

Another success factor is leadership, especially in such a competitive and professional industry as the car industry. An enthusiastic and motivated leader contributes to a positive attitude and a commitment among employees, with a willingness to acquire new knowledge. These attributes are crucial in order to drive improvement work forward. The above success factors played an essential role in the improvement work process that was carried out at Volvo Cars. In addition, they lead to a solution that will be long lasting - provided that the momentum continues to be strong and fulfilling.

Knowledge sharing and organizational culture are both extremely complex areas, especially due to so many different perspectives to consider, such as psychosocial, physiological, structural as well as problematic. The contemporary theoretical context emphasizes a representation where it seems to be a lot of confusion among both theorists and users of knowledge management at how these factors are interrelated. This is reflected in the selected scientific articles that give a clear indication of the fragmentation and confusion among both active knowledge management people as well as in the academic world around knowledge sharing and organizational culture. In the selected articles there are almost as many mixtures of definitions, theoretical frameworks, conceptual explanations and perspectives as there are authors. If this is based on the influence that knowledge management seems to have in many different disciplines I can only speculate on. However, it is clear that knowledge management occurs in a variety of disciplines.
**CONCLUSION**

6.3. **Lean**

Based on this thesis the logical conclusion is that there is much to be gained from Lean and by using Lean theories on how to manage knowledge and information. There are many ways that one can improve the efficiency of knowledge and information within the organization. The various methods and tools available for Lean can to a certain extent be applied to knowledge management, information, and sharing of these but the tools are originally made for a production context. Applying the theory of the *pull* on knowledge can after analyzing the results in this study be complex, because knowledge and information flows in several directions in a way that products in a production line do not. Since one tries to get away from wait time, queuing and inventory in Lean, a suggestion to create a buffer for information kept the standalone hard drives that Volvo Cars have set up for the employees at the different factories but integrate them with a new system that facilitates searches and automated storing.

From the theory described in this thesis one can draw the conclusion that the culture and philosophy is very important for working in the organization. The culture and philosophy are according to Liker the foundation stone of which the organization is based on, and the philosophy shines through the whole organization. A cornerstone that Lean is based on is the respect for people, and that they provide the most important part of the organization, knowledge. The performance of an organization is dependent on the data, information and knowledge they provide. A Lean organization will be strengthened by a firm knowledge management system because advantageous information will be gathered in a strategic way. Lean as a strategy is one of constant change. By using knowledge management and applied change management these changes can be met through first identifying the need, then implementing necessary changes, managing and countering potential hiccups and finally evaluating the success or failure of it. In order to be successful in implementing the change, knowledge management will help provide the knowledge to overcome the resistance and achieve acceptance and commitment of the employees. Through Lean, knowledge is created and changes are made to the production line. Therefore, Lean cannot manage on its own, as a single system, it is dependent on both knowledge management and change management in order to address all aspects of an implementation. Before, during and after an implementation.
CONCLUSION

6.3.1. EFFECTS OF LEAN

This study has shown positive effects in terms of efficiency and quality at Volvo Cars. None of our interviewees believed that the results did not live up to the high expectations. Availability has increased by shorter waiting times as well as better quality, which is positive for Volvo customers. The employees have been involved and given responsibility, which has created dedication and a better work environment. The new approach has encouraged employees to think creatively and come up with suggestions to improve their work environment.

All factories and part of the administrative divisions have been made aware of the importance of an effective organization. Waste leads to extra work for employees and reduced time in production, creating frustration and mistakes, which can cause accidents. Although the underlying intention may differ, Lean work has freed up time, which can be spent improving the organization even further.

Factors that substantially affect a successful implementation include employee commitment, willingness and employee positive attitude to improvement work and change. Without these traits, it is very difficult if not impossible to implement any project regardless of size or complexity.

The improvement work Volvo Cars undertook with implementing a Lean based organization could be said to have increased awareness between strategic and operational level. The operational level is now responsible for the most of the everyday improvement work but reports and communicates results and further steps to the strategic level. This has previously been reported in studies as a general gap in improvement work. Improvement work is being implemented where conclusions and experience are being drawn. The conclusion of the study is that Lean has far from solved all of the problems but it has provided a method for a common direction and purpose. In addition, Lean needed to be modified to work in the administrative part of the organization. With the implementation of Lean and its philosophy many problems in the respective departments have been noted and then solved. However, this may mean that new problems arise due to changes, which mean that one always has to stay on top of things and the work with improvement work is a never ending process.
6.4. SUGGESTION FOR FURTHER RESEARCH

I believe there is more research needed that examines the actual knowledge sharing behavior. Especially, behavior related to knowledge sharing to databases. A suggestion for future research is therefore to study the reward system in relation to knowledge sharing through knowledge databases. This is interesting because the employee's attitude to the databases tend to affect the use. It would enrich the research field if studies were made that analyzed the relationships concerning participation from a receiver and a contributor of knowledge, their approach to knowledge management and sharing of knowledge as well as their contribution frequency. This leads into another area of interest, what are the actual motivating factors and social aspects from a psychological perspective. They seem to have a huge impact on organizational culture and knowledge sharing.

Taking into account that today's industries are becoming increasingly international and the world that we live in is becoming more and more global, it may also be of interest to examine national differences in organizational culture and how this in turn affects knowledge sharing. In addition, national culture's impact on organizational culture and knowledge sharing is considered a relevant research topic.

A difference from previous organizations and the ones of today is the mix of genders. Gender should be investigated as a possible variable that affects the way we share knowledge and what motivates us to do so. Does the mixture of male and female employees affect knowledge sharing? In a world of ever more equality does the distribution of men and women impact organizational culture and its knowledge sharing?

In literature it is emphasized how important it is to take advantage of the implicit knowledge. However, there is very little research on how the implicit knowledge can be effectively converted into explicit. Previous research has shown that the explicit knowledge is long lasting, so this can be both an interesting and a necessary future research topic. Effective sharing of implicit knowledge is still a problematic topic.

In conclusion, future research should look into how the concept of knowledge management is applied; today it is mostly considered a management tool but a more in depth definition could make it more valid and acceptable as an academic discipline. By making the field of knowledge management more distinct and clear a more genuine understanding of the problems and difficulties a company face could be addressed.
BIBLIOGRAPHY


BIBLIOGRAPHY


APPENDIX 1 - PRESENTATION

DO YOU WANT TO MAKE A DIFFERENCE?

BACKGROUND

Hi my name is Martin Skogmalm and I am writing my bachelor thesis within the program of engineering, with the specialization industrial management at Linnaeus University. The thesis will highlight how companies share and work with knowledge within Lean-based organizations, where the aim is to increase understanding and to contribute with knowledge about knowledge management.

WHY IS THIS RELEVANT FOR YOU?

By participating in this work, YOU can help to improve conditions for learning at Volvo Cars.

In most organizations, there is a lot of knowledge and creativity that is not taken advantage of. It is therefore important that there is an easy way to exchange information with each other. Through YOUR participation, I hope to identify and take advantage of your knowledge, so that knowledge can be shared, grow and develop at Volvo.

Volvo strives to be a learning organization, which is characterized by the creation of space and opportunities for employees to engage in dialogue and share knowledge and experiences with each other. The purpose of the study is through interviews find out what can be improved and what Volvo should work on in the future.

In the final phase of the study results will be presented to management at Volvo Cars. At this presentation recommendations will be offered and a description of risks associated with the current approach. YOUR comments and will be kept confidential.
APPENDIX 2 - INTERVIEW GUIDE

I am writing my bachelor thesis at Linnaeus University, with a specialization in industrial management. The study will highlight how companies share and work with knowledge within Lean organizations, where the purpose is to increase understanding and contribute knowledge about knowledge management.

✓ Do I have your permission to record this interview?
✓ Your participation is voluntary, you can stop at any time or choose not to answer
✓ You can ask follow-up questions and for clarification
✓ Your participation will be anonymous, all personal information will be treated confidential

Background Questions

• How would you describe your current profession?
• How much work experience do you have?
• How does a normal working day look like for you, briefly?

Main Questions

• How do your knowledge / experience help you in your work?
  o How do you take part of the organizational knowledge in your work?
  o How do you share your knowledge with the organization?
    ▪ How much of the knowledge exchange are you doing on your own initiative?
    ▪ What motivates you personally to share your knowledge?
• Do you have any procedures (methods / tools) for how you share and exchange knowledge / experience?
  o What do you think of the user friendliness of these methods / tools?
• Do you have formal strategies given by management, such as goals and guidelines for how knowledge should be managed?
  o Do you feel that you are encouraged to share knowledge and experiences between employees?
  o Are all employees within the organization involved in the work of knowledge sharing?
  o Do you see any restrictions/limitations on the sharing of knowledge in / to the organization?
  o How do you think sharing and exchange of knowledge could be improved within the organization?
• How is your trust towards the organization?
  o Do you dare tell others about your mistakes without being afraid that you will be "punished"?
  o Is management supportive / involved in the work with knowledge management?
• How is the stress level?
  o Is there time to exchange knowledge with others?
• Are there formal and/or local and/or regional meetings?

Concluding Questions

• Do you have any final comments / questions or anything you want to add?
• Do I have your permission to contact you again if I have any additional questions?
• Do you want to take part of the study when it is completed?
APPENDIX 3 - LEAN SPECIFIC QUESTIONS

General Lean Questions

1. How should learning be conducted in the organization?
2. How do you get employees involved in the process of change?
3. How and why was the decision to introduce Lean made and where did the decision originate?
4. How was the decision anchored?
5. What were critical points and difficulties in the implementation of Lean?
6. How did employees view the implementation of Lean?
7. Were employees’ educated/trained in Lean?
8. How was resistance from the employees dealt with?
9. Did you take help from any external party in the implementation? If yes, which one and why?

Practical Lean work

1. How is the Lean work carried on today?
2. If you look at differences between today and before, what is the most distinctive difference?
3. To what extent has Lean been implemented within the organization?
4. Is Lean used in all functions / sections in the organization?
5. How do you work with continuous improvements?
APPENDIX 4 - GENERAL QUESTIONS

- Is there a bonus system to encourage the dissemination of information?
- What does the office environment look like?
  - Any common rooms?
- Are there any start-off activities?
- At formal meetings are there seniors (experts) present in each group?
- Are mistakes documented, in order to learn from them?
- Would you say that the current atmosphere is a good one for the organization?
- What technologies (tools) do you use?
  - Search engines?
  - Groupware? (Computer software for cooperation in groups.)
  - Information Portals?
  - Data warehouse? (Also called enterprise data warehouse, a compilation of information from multiple sources, carried out in such a way that it facilitates an advanced analysis of the data. The compilation also has such a structure, and is provided with such means, that the analysis can be performed without more in-depth IT knowledge.)
  - Any other?
- What formal methods do you use?
  - Knowledge Databases?
  - Internal meetings?
  - Internal training?
  - Competence development activities?
  - Mentors?
- What informal methods do you use
  - Network among colleagues?
  - Would you say that relationships affect the ones you ask; phrased differently, does it feel easier to ask a friend than a total stranger at the company?
- Is documentation done in:
  - Projects?
  - In everyday work?
  - In training/education?

Limitations

- Does knowledge databases have all the information you require?
  - If no: Can you specify what is missing?
- Is the structure of searchable information good?
- The personal networks that employees have, is the information discussed documented?
- Does information / training, etc. take place in English or any other languages?
  - Could this be perceived as a limitation?
Knowledge - Implicit & Explicit

- Are there a lot of work related discussions on breaks? Or other types of breaks:
  - Organized informal meetings; coffee break, after work, etc.?
- Do you have formal, local and regional meetings?
  - How often?
  - Who participates?
- Do you have group meetings?
  - How often?
  - Is someone with more experience participating in these meetings (seniors / experts)
- Does the database contain a personal presentation page where your qualifications and experiences are documented?
  - If yes: Are these competencies searchable by others within the company?
  - If no: Would that be beneficial?
  - If yes: Why?
- Do you have an uploaded resume or equivalent on the company webpage?
  - If yes: Why?
  - If yes: Is this searchable by others within the company?
  - If no: Would that be beneficial?

Knowledge Management Systems

- Is technology important in order to disseminate knowledge?
- Is there a system for dissemination of knowledge?
  - Is it possible to search for old projects / jobs?
    - If yes:
      - Where?
      - What is saved?
      - Which forums? Several?
      - Is the folder structure based on any established theory?
- Intranet? (Tools)
  - Are old jobs saved?
    - If yes: Why?
    - What information do you have access to?
    - Time, Cost, Quality, Scope, Risks, Benefits?
- Forums? (Tools)
  - Unified throughout the organization?
  - If Yes: Is the content adjustable depending on where in the organization one works, that is, are news locational dependent?
  - Is there a forum where employees can ask work-related questions that other employees can answer?
- Is there a Volvo share tools (online)?
  - A platform for peer sharing of information?
- Are there customer satisfaction surveys conducted?
  - Types of surveys?
APPENDIX 4

- Is there a central database for this?
- What is measured?
- Is there a target of how many of these studies should be conducted?
  - Above a certain price?
  - Special customers?

• Are there experience meetings?
  - Who are doing these? All?
  - Who is going through all these experiences and ensures that they are updated online and kept up to date?

• Are problem solving methods common?
  - Is the method and solutions documented?
  - Or it is seen as a learning process?

A Learning organization

• Is management supportive / involved in the process of knowledge management?
  - Have they established a vision and goals for this work?
  - Is knowledge management discussed as a concept, or in which terms is it discussed and used?

• Do you know what kind of knowledge should be entered into the systems or disseminated?
  - Has it been specified?
  - Have you been trained on how and where information should be stored?
  - Is it discussed in the business plan?
  - Is it seen as ones own responsibility to share knowledge?

• How did the recruitment process look like? (HR)
  - Was there an agenda behind whom to recruit?
    - Were like-minded people recruited?
      - Should they possess the same norms and values?
      - How important is it that they are thirsty to gain new knowledge?

• Is there a mentality that one supports "puts in that extra hour" for the organization?
  - Is there a give and take to this mentality, does the organization give back as much as the employees give?
  - Loyalty?

• How has the acquisition of Volvo from other owners influenced the culture?

• How do you feel about relationships with your colleagues, are they a key for solving the tasks?
  - If yes: Why?

• How is knowledge and expertise valued in the company?

• Have you experienced that if you give knowledge you gain knowledge?
  - If yes: Why?
  - If no: What does it depend on?
    - Or does it not depend on that?
  - Is it for other reasons?
APPENDIX 4

- Is knowledge freely given with no agenda of getting knowledge retuned
- Is it fun to share knowledge?
- Have leaders at various levels spoken about their mistakes to get discussions going?
- Is there a discussion at the company about ones mistakes or is it mostly about success?
  - If mistakes are told does the whole truth come out or are mistakes blamed on mitigating circumstances?
- Would you say that the structure at Volvo Cars is decentralized?
  - Any part of the Volvo Cars where this is true/not true?
- Are there courses/trainings given?
  - Purpose?
  - Internal / external?
  - For whom?
- Do you have any mentoring programs?
  - If yes: Which ones are involved?
    - How long does one have this?
  - If no: Would it be beneficial?
    - Why?
- Is there an introductory package for new employees?
  - If yes: What does it contain?
  - If no: Would it be beneficial to have one?
    - Why?
- Do you use project work structure
  - Where and by whom?
- What source of information is used most frequently?
  - The importance of newspapers, trade publications etc.?
  - Is there a distinction between levels - operational and strategic?
  - The importance of the intranet and the Internet?
  - Mail-groups, it is something that is used?
- Have different technologies to share knowledge been tested? (IT)
  - If yes: What worked best?
  - Why?
  - Why did you renew it?
  - Were the goals, objectives and vision made clear when they were published?