



Implementation and Evaluation of 5S

A Case Study at Lantmännen Maskin

MASTER'S THESIS

Authors

Niklas Schrewelius || Mechanical Engineering

Erik Widén || Mechanical Engineering

Supervisor

Dag Näslund || Lund University Faculty of Engineering
& University of North Florida

Examiner

Jan Olhager || Lund University Faculty of Engineering

Lund University
Department of Industrial Management and Logistics
Division of Engineering Logistics

Date 2022-06-13

Acknowledgements

We would like to thank Lantmännen Maskin AB and our company supervisor Ebba Roos for giving us the opportunity of writing our thesis for them and for lending us their support and knowledge along the way. Special thanks to the participants of our study who took the time to show us around and participate in the interview and a survey. Finally, thanks to our supervisor Dag Näslund for the support, feedback and help along the way.

Lund, June 2022

Niklas & Erik

Abstract

This thesis contains an analysis of critical success factors and barriers for SMEs within the agriculture machinery service sector. It will also answer the questions of how to measure the success of an implementation. It was performed as a case study and aims to deliver a implementation framework for 5S to Lantmännen Maskin AB.

The analysis was performed as a thematic study where pattern matching was used on two different sets of data. The first gathered through a literature review and the second through interviews with ten site managers at different locations. The qualitative data collection was complemented with a quantitative survey where the different critical success factors and barriers were scored according to importance.

The literature review resulted in 21 critical success factors and 17 barriers while the interviews yielded 19 critical success factors and 16 barriers. Comparing frequency, importance and model specific aspects the following factors appeared to be especially important.

Critical success factors

- Management commitment
- Management support
- Employee engagement
- Organizational culture
- Communication
- Training and education

Barriers

- Lack of management commitment
- Lack of employee engagement
- Resistance to change
- Poor communication
- Lack of evaluation and follow up

Six different milestones and tollgates for the 5S implementation were identified, these range from prior to beginning the implementation until after. The recommendation considers the iterative nature of 5S and is repeatable. Using literature and the results from analyzing critical success factors and barriers, a combination of methods for capturing and measuring different important aspects of the business are recommended. Evaluating these aspects together indicates if the desired results of the initiative are achieved, and thus whether the project is successful or not.

Contents

1	Introduction	1
1.1	Background	1
1.2	Problem Formulation	2
1.3	Purpose	3
1.4	Research Questions	3
1.5	Delimitation	3
1.6	Report Outline	3
2	Methodology	5
2.1	Project Approach	5
2.2	Research Strategy	5
2.2.1	Methodology	6
2.2.2	Research Design	6
2.2.3	Case Design & Unit of Analysis	7
2.2.4	Data Collection Approach	8
2.2.5	Data Collection Method	8
2.3	Literature Review	8
2.3.1	Evaluating Sources	8
2.3.2	Citation Search	9
2.3.3	Block Search	9
2.3.4	Our Approach	9
2.4	Data Collection	11
2.4.1	Interviews	12
2.4.2	Survey	12
2.4.3	Our Approach	12
2.5	Analysis	13
2.5.1	Analytical Strategies	13
2.5.2	Thematic Analysis	14
2.5.3	Pattern Matching	14
2.5.4	Our Approach	14
2.6	Trustworthiness	15
2.6.1	Establishing Validity	15
2.6.2	Triangulation	16
2.6.3	Our Approach	16
3	Frame of Reference	18
3.1	Organizational Change	18
3.2	Lean	19
3.3	5S	20
3.3.1	Why 5S?	20
3.3.2	Work Process	20
3.3.3	Seiri - Sort	21
3.3.4	Seiton - Structure	21
3.3.5	Seiso - Shine	21
3.3.6	Seiketsu - Standardize	22
3.3.7	Shitsuke - Sustain	22
3.4	Barriers and Critical Success Factors	23
3.4.1	Managerial	28

3.4.2	Organization	29
3.4.3	Workforce	29
3.4.4	Financial	30
3.4.5	Information	30
3.5	Performance Evaluation	31
3.5.1	Prior	31
3.5.2	During	33
3.5.3	After	33
4	Empirics	37
4.1	Company Description	37
4.1.1	Lantmännen	37
4.1.2	Lantmännen Maskin	37
4.2	Barriers & CSF	39
4.2.1	Managerial	43
4.2.2	Organization	43
4.2.3	Workforce	43
4.2.4	Financial	44
4.2.5	Information	44
4.3	Performance Evaluation	44
5	Analysis	48
5.1	Barriers	48
5.1.1	Managerial	48
5.1.2	Organization	48
5.1.3	Workforce	49
5.1.4	Financial	50
5.1.5	Information	50
5.1.6	Discussion and Implications	50
5.2	Critical Success Factors	51
5.2.1	Managerial	51
5.2.2	Organization	52
5.2.3	Workforce	52
5.2.4	Financial	53
5.2.5	Information	53
5.2.6	Discussion and Implications	54
5.3	Performance Evaluation	54
5.3.1	Prior	55
5.3.2	During	55
5.3.3	After	55
6	Conclusion	58
6.1	Answering the Research Questions	58
6.2	Fulfillment of Purpose	59
6.3	Contributions	59
6.4	Limitations	60
6.5	Future Research	60
7	Appendix	I

List of Figures

1	Illustration of the cyclical view of 5S (S. Sharma, Shukla, and B. Sharma 2019).	2
2	The project outline as well as the milestones and deliverables inspired by Eriksson and Lilliesköld (2010).	5
3	Research strategy options, the chosen approaches can be seen in black.	6
4	Types of case studies (Yin 2014, p. 50).	7
5	Approach of literature review.	10
6	The four phases of qualitative analysis according to Höst, Regnell, and Runeson (2006).	13
7	The six phases of a thematic analysis according to Braun and Clarke (2006).	14
8	The different phases of the approach used in this thesis.	15
9	The three levels of change in this thesis.	18
10	Frequency of occurrence for the barriers in literature	28
11	Frequency of occurrence for the CSFs literature	28
12	The main stages of an organizational change initiative.	31
13	The process enablers and enterprise capabilities in the process and enterprise maturity model by Hammer (2007).	32
14	Conceptual framework for understanding change purpose (Näslund and Norrman 2022, p. 20).	33
15	Difference levels that KPIs can be used at, adapted from APQC survey (Stan et al. 2018, p. 2)	36
16	The organizational structure of Lantmännen (LM 2022b).	37
17	Organizational structure of Lantmännen Maskin.	38
18	The scoring of the different barriers and challenges from the survey.	40
19	The frequency of the different barriers and challenges from the interviews, sorted in the same order as in Figure 18 to show discrepancies between importance and frequency.	41
20	The scoring of the different critical success factors from the survey.	42
21	The frequency of the different critical success factors from the interviews, sorted in the same order as in Figure 20 to show discrepancies between importance and frequency.	43

List of Tables

1	Explanation of the five steps in 5S.	2
2	Research strategies and which factors to consider when choosing (Yin 2014, p. 9).	7
3	Characteristics of the different variables in case design (Yin 2014).	8
4	The search terms used in the in the block search.	11
5	List of interviews performed.	13
6	Different types of validity and during which stage it is established (Yin 2014).	16
7	Sources used in literature search of barriers and CSFs. It is also illustrated if the article contains barriers or CSFs and if it focuses on organizational change, lean or 5S.	24
8	Frequency of barriers mentioned in searched literature. Articles corresponding to article number can be seen in Table 7. A brief explanation of each factor is also included.	26
9	Frequency of critical success factors mentioned in searched literature. Articles corresponding to article number can be seen in Table 7. A brief explanation of each factor is also included.	27
10	Categories and indicators used to evaluate 5S sustainability efforts (Setiawan et al. 2021)	35
11	The frequency and scoring of the different barriers and challenges from the data collection as well as a brief description of the different factors.	39
12	The frequency and scoring of the different critical success factors from the data collection as well as a brief description of the different factors.	42
13	The frequency of answers for the different LMM KPIs expected to be affected by a 5S implementation.	46

Appendices

Interview Guide - English	I
Interview Guide - Swedish	III
Interview A - Summary (Pilot)	V
Interview B - Summary	VI
Interview C - Summary	VII
Interview D - Summary	VIII
Interview E - Summary	IX
Interview F - Summary	X
Interview G - Summary	XII
Interview H - Summary	XIII
Interview I - Summary	XIV
Interview J - Summary	XV
Factors mentioned in the different interviews	XVI
Scoring of the different factors from survey	XVII
KPIs mentioned in the different interviews	XVIII

Abbreviations

- CSF - Critical Success Factor
- HQ - Headquarters
- KPI - Key Performance Indicator
- LM - Lantmännen
- LMKI - Lantmännen Maskin customer satisfaction index
- LMM - Lantmännen Maskin
- RQ - Research Question
- SME - Small and Medium-sized Enterprises

1 Introduction

In this chapter the thesis is introduced. Describing the background and why the thesis is needed for LMM and what is to be achieved. Through this the purpose and research questions are formulated and presented along the delimitations and the project outline

1.1 Background

In an increasingly competitive market, cost reductions and efficiency are key to remaining relevant (Randhawa and Ahuja 2017; Alkhoraif, Rashid, and McLaughlin 2019; Sanchez and Blanco 2014; Baker and Maddux 2005). This calls for continuous improvements throughout all stages of the operation, ranging from small changes to large scale projects for organizational change (Alkhoraif, Rashid, and McLaughlin 2019). Continuous improvement initiatives originates from manufacturing, but nowadays new methodologies have made it applicable in all industries (Bhuiyan and Baghel 2005). According to Cambridge Business English Dictionary (2022b) organizational change is defined as: “a process in which a large company or organization changes its working methods or aims, for example in order to develop and deal with new situations or markets”. The objectives for a organizational change is to enhance competitiveness, there are different approaches for a company to employ such an initiative, implementing new software systems, doing acquisitions, or improving operational processes are some examples (Hammer 2004). This paper will focus on the latter, where Lantmännen Maskin (LMM) has decided to implement a 5S policy at their sites.

Lantmännen is a Swedish agriculture cooperative first started in 1880 (LM 2022a). Lantmännen (LM) are owned by 19 000 Swedish farmers and are leading actors within agriculture, machines, bioenergy, and food products (ibid.). Lantmännen Maskin are one out of three parts of the agriculture sector (LM 2022b). Their headquarters (HQ) are located in Malmö and this is also where the central warehouse is located (LMM 2022), which supplies over 50 different locations throughout Sweden. LMM’s goals with the 5S implementation is to increase the safety and efficiency, decrease the tied up capital and give the different locations a more united look. To maximize the gains from the project this thesis will act as a pre-study focusing on the circumstances for LMM’s locations and what factors to take into consideration. This will be done through answering the research questions formulated for this thesis.

5S is a principle of lean manufacturing where the objective is to achieve a clean and organized workplace. This contributes to reducing waste and defects as well as improving the safety and sustainability of the workplace (S. Sharma, Shukla, and B. Sharma 2019) and a successful implementation can be a sustainable competitive advantage in industry (Ramdass 2014). The name 5S originates from the five Japanese words that are used to describe the method and all begin with the letter S (S. Sharma, Shukla, and B. Sharma 2019) seen in Table 1.

Table 1: Explanation of the five steps in 5S.

Japanese	English	Description
Seiri	Sort	Selecting the relevant items and amount for a specific task and/or area and removing the unnecessary items, thus keeping the workplace clear and easy to operate.
Seiton	Set in order	Arrange the workplace according to the operation and use labels to designate and mark a location for each tool.
Seiso	Shine	Keep the workplace clean to avoid unnecessary defects and to provide a safe and healthy work environment.
Seiketsu	Standardize	Standardize process according to the aforementioned steps to enable easier execution for operators.
Shitsuke	Sustain	Sustain the improvement through continuous improvements and self-audits as well as working towards making 5S a part of the work culture.

Any type of business can benefit and reap the rewards of a successfully implemented 5S strategy, regardless if it operates with the service, manufacturing or another sector (Chaneski 2009). 5S is a repetitive method that builds on itself to maintain the progress made and to facilitate continuous improvement (Ohlsson 2015), the iterative process are illustrated in Figure 1.

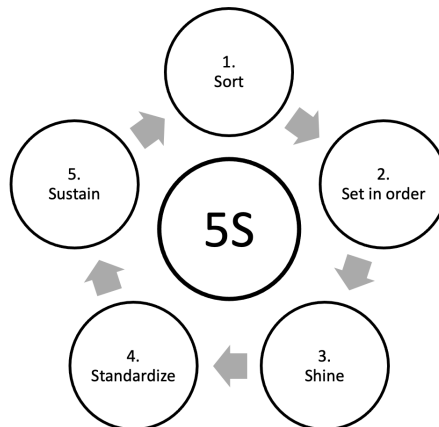


Figure 1: Illustration of the cyclical view of 5S (S. Sharma, Shukla, and B. Sharma 2019).

1.2 Problem Formulation

When employing any method or strategy for organizational change it is important to understand how to increase the probability of success (Moosa and Sajid 2010), identifying critical success factors (CSF) and barriers is a method for this (Cândido and Santos 2015; McKinsey & Company 2015). Since the aim for the pre-study is to maximize the chances for a successful implementation, therefore 5S, lean and organizational change will be investigated. Another challenge to be considered is the varying conditions between different LMM locations with for example geographical location and 5S maturity and see if the barriers and CSFs are affected by those. Variations in conditions between research objects are an investigated area by for example Netland (2016), Hu et al. (2015), and Knol et al. (2018).

Another aspect when determining success rate for a project is the definition of success as it is a subjective term. Success for a 5S project may be when achieved a structured and safe work place, but to what extent? and to what cost? Therefore it is important to determine the targets of the project and how to get there (Bhasin 2012), and that is also an aspect included in this thesis.

The challenge lies in creating a framework that is standardized while still able to take these different aspects into consideration. Dixon-Woods and Martin (2016) among others states that there is no exact model that fits all and instead it is important to adapt the methodology after the specific circumstances. The recommendation includes important barriers and CSFs, which results can be expected and how they can be measured and evaluated.

1.3 Purpose

The purpose of the project is to perform a prestudy and develop a recommendation for the implementation and evaluation of a 5S system in LMMs' different warehouses and workshops throughout Sweden.

1.4 Research Questions

In order to formulate the recommendation, the following research questions (RQ) needs to be considered:

RQ1: What are the most prominent barriers and challenges of organizational change and more specific Lean (5S)?

RQ2: What are the most prominent critical success factors and drivers for organizational change and more specific Lean (5S)?

RQ3: How can LMM know if the change initiative was successful?

1.5 Delimitation

This thesis will focus on processes within the organization, external aspects such as up and downstream suppliers, environmental trends and regulations are not included in the study. These aspects are not considered as they are outside the scope of LMMs' 5S implementation.

1.6 Report Outline

Introduction

In this chapter the thesis is introduced. Describing the background and why the thesis is needed for LMM and what is to be achieved. Through this the purpose and research questions are formulated and presented along the delimitations and the project outline.

Methodology

In this chapter the methodology and methods used in this thesis are presented. Including how the methods were selected and applied as well as how they work.

Subjects discussed include literature review, data collection, analysis and trustworthiness.

Frame of Reference

In this chapter the findings of the literature review are presented with the intention of providing a solid basis for answering the research questions of this thesis. First of, information regarding different levels of organizational change and 5S is shown. Followed by a literature search of barriers and CSFs, this includes frequency of occurrence in literature as well as importance. Following this is theory and methods on performance evaluation throughout different stages of a project.

Empirical

This chapter presents the different CSFs and barriers identified through the interviews along with a description of how they are defined. The results of the scoring survey is also presented in a table and graphs along with the frequency. Trends and special mentions for the different categories of barriers and CSFs are discussed. Following this, information regarding the company, their KPIs and current performance evaluation models is presented.

Analysis

This chapter will present the analysis which has been conducted according to the steps described in the method. The results and discussion of the pattern matching and coding of the CSFs and barriers can be seen as well as implications and conclusions. Following this is performance evaluation throughout the different stages are discussed and compared to theory. This chapter lays the foundation for answering the research questions.

Conclusion

In this chapter the answers to the research questions are presented. Presenting the most prominent barriers and CSFs identified through the analysis and a brief comparison. Following this the recommended milestones and tollgates for the project is shown. Finally, a recommendation of tools for evaluating the performance and how to determine success is presented.

2 Methodology

In this chapter the methodology and methods used in this thesis are presented. Including how the methods were selected and applied as well as how they work. Subjects discussed include literature review, data collection, analysis and trustworthiness.

2.1 Project Approach

This project followed the structure seen in Figure 2 which is based on the structure developed by Eriksson and Lilliesköld (2010). The project started with an idea that was followed up by a pre-study to further develop the idea and investigate its value and feasibility (ibid.). This was the first milestone of the project where the purpose and research questions were formulated and the project plan was delivered.

The main study consists of three parts; start, execution, and closing. During the start stage a planning report was developed, this contains a work breakdown structure and Gantt chart. The start stage is concluded with the delivery of the planning report. The bulk of the project lies within the execution stage, this contains the literature review, data collection and analysis. How this stage was designed and performed can be seen through section 2.2 to 2.6. The delivery of the recommended framework compiled through data collection and analysis marks the end of the execution stage. The final stage, closing, consists of finalizing the report and preparing the presentation.

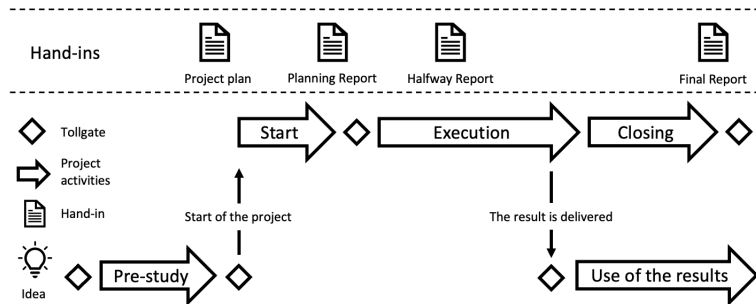


Figure 2: The project outline as well as the milestones and deliverables inspired by Eriksson and Lilliesköld (2010).

2.2 Research Strategy

Depending on the objectives and the characteristics of the research, different approaches on how to perform the study needs to be considered (Olhager 2022a). Based on books by Höst, Regnell, and Runeson (2006), Yin (2014), and Robson and McCartan (2016) the following variables were decided to be included when designing the research strategy.

- Methodology
- Research design
- Case design
- Unit of analysis
- Data collection approach
- Data collection method

Different approaches that were chosen for the different variables can be seen in Figure 3 and how the choices were made is further described below in section 2.2.1 through 2.2.5.

Methodology	Descriptive	Exploratory	Explanatory	Problem solving		
Research design	Survey	Case study	Experiment	Action research		
Case design	Single-case design		Multiple-case designs			
Unit of analysis	Holistic		Embedded			
Data collection approach	Quantitative		Qualitative			
Data collection method	Survey	Documentation	Interviews	Direct observation	Participant observation	Archival records

Figure 3: Research strategy options, the chosen approaches can be seen in black.

2.2.1 Methodology

This project used an exploratory approach throughout the project. Determining which methodology to use depends on the characteristics as well as the aim of the thesis (Höst, Regnell, and Runeson 2006). Different sites were investigated to understand the best way of implementing 5S into their operations and to receive that knowledge, an in-depth understanding of the current situation is required. To obtain in-depth understanding of a phenomenon such as this Höst, Regnell, and Runeson (ibid.) recommends an exploratory study while Yin (2003) indicates that an exploratory study is the preferred method when a social phenomenon is the object of the study.

2.2.2 Research Design

Regarding the method of the project, a case study was decided appropriate. When deciding the research method the aim of the thesis should be considered and the purpose is to avoid choosing an incorrect method rather than providing the correct one (Yin 2014). In this process the following three characteristics are considered: form of research question, requires control of behavioral events and focuses on contemporary events, this can be seen in Table 2 (ibid., p.9).

As this thesis focused on research questions of the nature why and how, with contemporary events as well as some level of control over the behavioral events while not being required, this indicates that a case study is an appropriate choice. A case study is also an appropriate method if the variables of the phenomenon is not set (Meredith 1998) or if the phenomenon is not readily distinguishable from its context (Yin 2003).

Table 2: Research strategies and which factors to consider when choosing (Yin 2014, p. 9).

Method	Form of Research Question	Requires Control of Behavioral Events?	Focuses on Contemporary Events?
Experiment	How, why?	Yes	Yes
Survey	Who, what, where how many, how much?	No	Yes
Archival analysis	Who, what, where how many, how much?	No	Yes/No
History	How, why?	No	No
Case study	How, why?	No	Yes

2.2.3 Case Design & Unit of Analysis

A critical step when performing a case study is to define the correct unit of analysis and whether it is a single or multiple case design (Yin 2014). The design of case studies can vary and there is no need to have a formal design, but a well applied case study research design can make the case study stronger and easier to execute (ibid.). In Figure 4 the different case research designs are presented where the variables are number of case designs, and number of units.

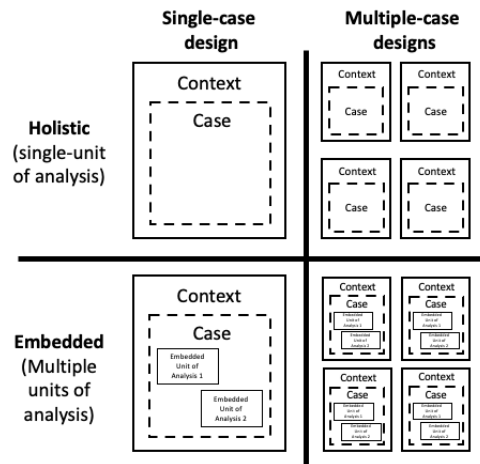


Figure 4: Types of case studies (Yin 2014, p. 50).

Depending on the nature of the study, different configurations are suitable. In Table 3 below Yin (ibid.) have outlined which design to choose given the characteristics of the project. As this thesis has one unit of analysis, a 5S implementation at LMM, that spans across a single organization it was decided that holistic single case approach was the preferred method. Through identifying strengths and weaknesses of the chosen setup known weaknesses can be avoided. Single case studies provide greater depth to the research while at the same time reducing the generalization and increases the risk of bias (Voss, Tsikriktsis, and Frohlich 2002).

Table 3: Characteristics of the different variables in case design (Yin 2014).

Case Design	When should it be used?
Embedded	Several units of analysis (either multiple or single case study), the focus is on one or several sub-units. If the objective is to strengthen the external validity of the case study.
Holistic	If the global nature of an organization or program is the focus of the study, no sub-units are possible to identify.
Single-case	If the objective is to evaluate and compare different studies, get an all-embracing view of the studied phenomena. If several organizations are subject for the study.
Multi-cases	When focus is only on one organization or program. Preferred if the study tests a theory, if the case is representative of a certain phenomenon or if the study is longitudinal. It may be more vulnerable due to difficulties in generalization, efforts to avoid misrepresentation should be taken.

2.2.4 Data Collection Approach

This thesis uses mainly qualitative data collection methods as the aim is to gain an in-depth understanding of certain theories and processes rather than quantifiable data. It will however, be complemented by a quantitative method.

2.2.5 Data Collection Method

In this study its been decided to use interviews and a survey. There is no general best method, instead the data collection methods should be selected depending on the circumstances for the study and which information is sought (Robson and McCartan 2016). Everything that affects the phenomenon could be relevant data as conclusions drawn from the study are closely related to the context (Voss, Tsiriktsis, and Frohlich 2002) but the practicality of taking too many aspects into consideration also have to be accounted for (Robson and McCartan 2016). How the data collection is performed can be seen in section 2.4.1 and 2.4.2.

2.3 Literature Review

A literature review is an important step in the research process as it serves to fulfill multiple purposes. First of, it validates the need of the study as well as ensuring that the researcher has the required knowledge (Rowley and Slack 2004). Furthermore it facilitates theory building and understanding of relevant concepts (ibid.). It is useful when designing the project and when analyzing the results, it is also a powerful tool for increasing the trustworthiness of the results (ibid.). Multiple different methods and techniques may be used to ensure a high quality literature review, the methods used in this thesis are discussed further below.

2.3.1 Evaluating Sources

During the literature review there is an abundance of sources ranging from course literature and scientific journals to conferences and web pages. The quality and trustworthiness of the information provided through different sources varies greatly and this poses a real problem in determining which sources to use (ibid.). For scholarly articles and journal publications this can be done through using trusted databases that perform quality checks and only allows

publications of a certain standard (Höst, Regnell, and Runeson 2006). When using databases that does not control the quality or when using web sources the reliability has to be confirmed using other methods.

When evaluating a book Rowley and Slack (2004) recommend considering the following: is it a known author with experience in the field, is the publication up to date, is the publisher well known within the field, does it reference to other relevant literature and finally is it clearly structured and well written? Using literature provided by university resources such as librarians and teachers to identify well known and relevant books is another method (Höst, Regnell, and Runeson 2006).

2.3.2 Citation Search

The method citation pearl growing was used as a tool for finding and evaluating potential literature and papers. This is done by initially finding one or few high quality papers regarding the concerned field of study, these can then be used to find more relevant literature on the topic through the use of its citations (Olhager 2022b). This can either be done backwards, by looking at citations used in the current paper, or forward, where later published papers that has used the current paper as a source are generated (Hansson 2019). Used in combination it allows the user to find relevant up to date papers as well as frequently cited older literature.

2.3.3 Block Search

Block search is a method for structuring and performing an organized literature search to find relevant publications. Through the use of BOOLEAN logic operators AND, OR and NOT search terms are combined to find more nuanced search results (Lund University 2021). This allows for results containing certain words to be excluded (NOT), requiring a combination of two or more words (AND) or containing at least one of the search terms (OR). This can be used in combination with quotation marks, which when used requires the entire encapsulated phrase to generate a hit. An asterisk symbolizes any character and can be used as suffix to include hits that are either singular or plural. A prerequisite for obtaining good results from a block search is a well performed preparatory work where search terms and possible combinations or exclusions that are central to the research questions are identified (Robson and McCartan 2016).

2.3.4 Our Approach

Two literature reviews were performed where the majority of the data was collected in the initial stage while the second one were complementary and aimed to answer questions that arose later on. These literature reviews were performed in several steps, initially articles were skimmed to determine the relevance. Relevant articles were read through and summarized while the literature review preceded. Once sufficient amount of articles were collected they were read through thoroughly and key findings were distilled. This process was done regardless of method used to find literature.

This thesis used the three aforementioned methods, seen in section 2.3.1 through 2.3.3, for finding and evaluating data in the literature review. Evaluation of

sources were continuously performed while an iterative process of citation pearl growing and block search was performed, this is illustrated in Figure 5.

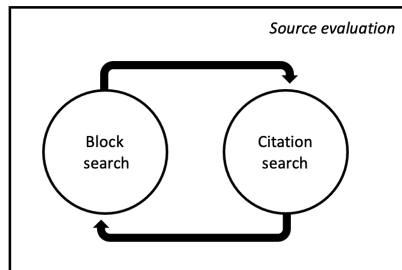


Figure 5: Approach of literature review.

Citation pearl growing was initially performed from articles originating from two different sources, one from course literature provided in the courses Business Process Management and Supply Chain Management given at Lund University, Faculty of Engineering while the other grew from articles found through the block search.

The block search used academic articles retrieved from the database *Web of science* which provide quality assurance of the works published (Olhager 2022b). The search terms and combinations were determined based on the thesis RQs and are presented below.

- "Organizational change"
- "Organisational change"
- Lean
- 5S
- "Success factor*"
- Challenges
- Barriers
- SME
- "Service industry"
- Evaluation
- KPI

Through the use of the search terms above the primary target for the literature reviews is the RQs 1, 2 and 3. The assumption that the different sites within LMM can be included in the sectors SME and service made those search terms relevant as well. Different spellings of "organizational" were used to eliminate the risk of missing articles due to spelling and the term "service industry" had to be more specific since the number of hits on service was too large.

In Table 4 terms used as well as the results such as amount of articles found, scanned, relevant and used can be seen. Relevant articles refers to papers that were deemed relevant in the initial scan while used articles are the ones that were deemed useful after the thorough read through and used in the report. In addition to this literature other papers found through citation pearl growing are used in the literature review. The reason for some articles being excluded after the read through could be that they were too specific to another area, such as

lean tools, environmental or technical aspects, or that they were not accessible through university resources.

Table 4: The search terms used in the in the block search.

Search Terms	Hits	Scanned	Relevant	Used
Success factor* AND Lean OR 5S	519	25	11	8
Success factor* AND "Organizational Change" OR "Organisational Change"	139	25	9	7
Challenges OR Barriers AND Lean OR 5S	7057	25	13	11
Challenges OR Barriers AND "Organizational Change" OR "Organisational Change"	2376	25	2	0
SME AND Lean OR 5S	234	25	8	2
"Service industry" AND Lean OR 5S	59	25	5	2
Evaluation AND KPI	588	20	5	3
Evaluation AND SME	1336	20	4	2

Books were found using university library resources. These were mainly academic literature focused on research methodology and project design but some of the books were on the subject of 5S implementation on a professional level. Those books are: *Effektivare med 5S-metoden* by Garmer (2016), *Lyckas med 5S* by Olofsson (2013), and *5S För Alla* by Ohlsson (2015) that provides a detailed description of the different steps of a 5S implementation as well as common pitfalls and mistakes. While there are many sources that provide such implementation guides, a crucial step for success in any implementation is to adapt it to the companies prerequisites (Dixon-Woods and Martin 2016).

2.4 Data Collection

The purpose of data collection is to collect data that can be used to develop new theories or support an already existing hypothesis (Voss, Tsikriktsis, and Frohlich 2002). Typically two main forms of data is discussed, qualitative and quantitative. Quantitative data refers to data that is quantifiable, it is often presented as statistics and used for numerical analysis (Nationalencyklopedin 2022b). However, this thesis uses mainly qualitative data collected through interviews, but a short survey will also be used to complement the qualitative data with quantitative data. Qualitative data collection methods are generally more time consuming than quantitative methods and aim to gather more in depth information regarding actions as well as the purpose, thus the amount of participants are usually lower for qualitative research (Nationalencyklopedin 2022a).

Given the time consuming nature of qualitative data collection methods, planning and design becomes important to maximize the use of resources available. Appropriate sample sizes should be determined to ensure that enough data

is gathered while still avoiding excessive data saturation, i.e further sampling yields no additional data (Moser and Korstjens 2018a). Generally this can be hard to do in advance as the quality of the data may vary depending on method as well as participant and has to be evaluated by the researchers as the data collection proceeds (ibid.). Improving the quality of the data collected will naturally lead to faster data saturation and less resources spent. This can be done through choosing an appropriate sampling method according to the aim of the study (Palinkas et al. 2015).

2.4.1 Interviews

Commonly interviews are divided into three categories that provide different levels of depth: structured, semi structured, and unstructured interviews (Robson and McCartan 2016). These differ in the amount of interviewer participation and the strictness of how rigorously the prepared interview guide is followed (ibid.). An interview consists of four segments context, general questions, main questions, and summary (Höst, Regnell, and Runeson 2006). The data can be recorded either through live transcription during the interview or, if the interviewee allows it, it can be recorded and transcribed later.

2.4.2 Survey

A survey is a quantitative method that allows the researcher to collect data in the same manner from different persons through a questionnaire (ibid.). Surveys can be divided in four segments, self completion, face-to-face, telephone and internet versions (Robson and McCartan 2016). When performed in a written format it is an especially time efficient method (Höst, Regnell, and Runeson 2006) and it is a powerful tool for finding out how a group think or feel about a phenomena (Robson and McCartan 2016).

2.4.3 Our Approach

Data collection through interviews was performed according to the semi structured format, which opposed to the structured format allows for the researcher to adapt the prepared questions and to ask follow up questions (Olhager 2022b). In line with the recommendation of Kallio et al. (2016) a pilot interview was initially performed to evaluate and potentially redesign questions if necessary. Ten interviews were performed in Swedish according to the interview guide, seen in English as well as Swedish in Appendix at page I and III, on the subjects seen in Table 5. This project opted for purposeful sampling, i.e the subjects of data collection are chosen deliberately based on their knowledge on the subject (Robson and McCartan 2016), where the subjects were chosen to cover a variety of different locations and reflect different aspects of the organization such as position and region. The use of audio recordings were performed when participants allowed it and otherwise one researcher asked questions while the other transcribed. Using the answers from the interviews a survey was constructed where the applicants were asked to rank all the aspects they and their peers mentioned in order of importance.

Table 5: List of interviews performed.

Location	Position	Region	Date	Recorded	Method
A (Pilot)	Store and spare parts manager/Site manager	South	2022-03-17	Yes	On site
B	Workshop manager	South	2022-04-05	Yes	On site
C	Store and spare parts manager	South	2022-04-05	Yes	On site
D	Store and spare parts manager/Site manager	South	2022-04-06	No	On site
E	Store and spare parts manager	South	2022-04-08	Yes	On site
F	Site manager	West	2022-04-11	Yes	On site
G	Site manager	West	2022-04-11	Yes	On site
H	Site manager	East	2022-04-22	Yes	Digital
I	Site manager	Svea	2022-04-25	Yes	Digital
J	Site manager	North	2022-04-25	Yes	Digital

2.5 Analysis

The first aspect to take into consideration when it comes to analysis is what type of analysis method is appropriate based on the data collected, either qualitative or quantitative (Höst, Regnell, and Runeson 2006). As this thesis uses mainly qualitative data the analysis should use a qualitative method. During a qualitative analysis, the existence and frequency of specific words or descriptions are the objects of the analysis (ibid.). There are three different approaches to qualitative analysis according to Robson and McCartan (2016); Quasi-statistical approaches, thematic coding approach, and grounded theory approach. Which one to use is dependent on the characteristics of the data and study in general and therefore it is important to have a strategy as a guideline (Yin 2014).

In general the qualitative analysis is based on the four main steps; data collection, coding, grouping, and conclusion, seen in Figure 6 (Höst, Regnell, and Runeson 2006). The method is often of flexible nature and therefore the process can be seen as an iterative process (ibid.).

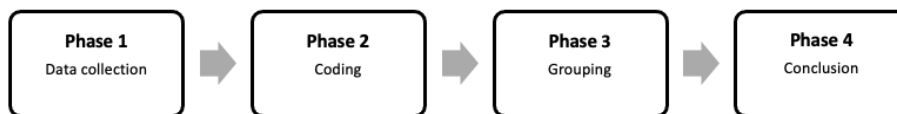


Figure 6: The four phases of qualitative analysis according to Höst, Regnell, and Runeson (2006).

2.5.1 Analytical Strategies

Yin (2014) outlines a number of strategies that can be used when analyzing data, these can be combined in any fashion but it is recommended to consider which to use when designing the data collection to ensure that the collected data will be relevant. Relying on theoretical propositions is a method that relies on forming a hypothesis based on research questions and literature review

and designing a data collection that gathers appropriate data to either confirm or deny the proposed theory (Yin 2014).

2.5.2 Thematic Analysis

Thematic analysis can be seen as similar, or in close relation, to the thematic coding approach that Robson and McCartan (2016) brought up as one of the main approaches for qualitative analysis. The main goal of thematic analysis is to identify and analyze patterns but there is no set way of performing the method (Braun and Clarke 2006). Instead, one large benefit of the analysis method is that it is flexible and iterative (ibid.). Before performing the thematic analysis a couple of decisions have to be made (ibid.). Among those, one question is what could be considered a theme, where a theme is a group of coded data with the same label (Robson and McCartan 2016). Other decisions to be made are the expected depth and width of the analysis and if the analysis is inductive or theoretical (Braun and Clarke 2006).

The framework for the analysis process according to Braun and Clarke (ibid.) is related to the steps presented by Höst, Regnell, and Runeson (2006) but is a bit more adapted to the specific method. In Figure 7 the six different phases according to Braun and Clarke (2006) can be seen and just like the approach according to Höst, Regnell, and Runeson (2006), the process is iterative.

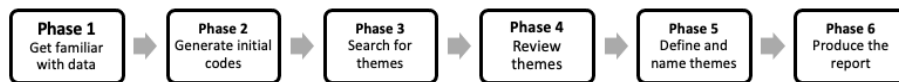


Figure 7: The six phases of a thematic analysis according to Braun and Clarke (2006).

2.5.3 Pattern Matching

Pattern matching is a technique where a hypothesised pattern of a phenomenon is compared to patterns identified through analyzing collected data to determine whether they match or not (Hak and Dul 2010). A matching pattern is used as a way of confirming or strengthening the hypothesis while non-matching patterns weakens it (Yin 2014). Pattern matching can be designed in different ways depending on the nature of the phenomenon and the nature of the variables in the study (ibid.). An important difference between pattern matching and pattern recognition is that the hypothesised pattern needs to be established prior to and aims to confirm existing theory rather than build new (Hak and Dul 2010).

2.5.4 Our Approach

This thesis used a combination of the mentioned approaches above, drawing inspiration from the different steps and techniques mentioned throughout literature a slightly modified version suited for this scenario was constructed. Relying on theoretical propositions was the strategy that was decided upon. In line with this strategy, a hypothesis was constructed based on an initial analysis performed during the literature review. Using the hypothesis to construct

the interview guide, another iteration of this process was performed with data collected through interviews. The identified themes were then compared. Essentially performing two iterations of the frameworks presented by Höst, Regnell, and Runeson (2006) and Braun and Clarke (2006), this can be seen in Figure 8. The thematic analysis that was performed were influenced by the pattern matching method described both by Yin (2014) and Hak and Dul (2010).

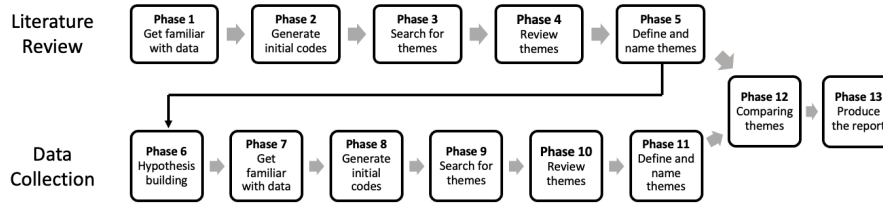


Figure 8: The different phases of the approach used in this thesis.

2.6 Trustworthiness

For any research project or study the aspect of trustworthiness is paramount as the results mean little if sufficient means to establish trustworthy results does not exist. Establishing trustworthiness can be done in many different ways and is phrased differently depending on the literature, however, core principles such as transparency, validity, establishing a chain of evidence and credibility is a common theme that can be seen throughout Höst, Regnell, and Runeson (2006), Moser and Korstjens (2018b), Palinkas et al. (2015), and Yin (2014).

2.6.1 Establishing Validity

Four different types of validity are displayed in Table 6, as can be seen these are established during different stages of the project. Establishing validity is a continuous process and it is important to work with it in all stages and consider the different categories to verify the quality of the research design (Yin 2014). The tests aim to evaluate different aspects of the design: construct validity establishes operational measures for the study, internal validity aims to establish a connection between two events (only applicable for explanatory studies, not exploratory), external validity determines the degree of generalization that can be reached while reliability shows the repeatability of the project (ibid., p. 34).

Table 6: Different types of validity and during which stage it is established (Yin 2014).

Tests	Case study tactic	Phase of research in which tactic occurs
Construct validity	<ul style="list-style-type: none"> • Use multiple sources of evidence • Establish chain of evidence • Have key informants review draft case study report 	<ul style="list-style-type: none"> • Data collection • Data collection • Composition
Internal validity	<ul style="list-style-type: none"> • Do pattern matching • Do explanation building • Address rival explanations • Use logic models 	<ul style="list-style-type: none"> • Data analysis • Data analysis • Data analysis • Data analysis
External validity	<ul style="list-style-type: none"> • Use theory in single-case studies • Use replication logic in multiple-case studies 	<ul style="list-style-type: none"> • Research design • Research design
Reliability	<ul style="list-style-type: none"> • Use case study protocol • Develop case study database 	<ul style="list-style-type: none"> • Data collection • Data collection

2.6.2 Triangulation

Using multiple different sources or methods to approach a problem is called triangulation, the idea is that ending up with the same results despite taking a different path increases the trustworthiness (Robson and McCartan 2016). Triangulation is generally split into the following three categories (Moser and Korstjens 2018b):

- *Data Triangulation* is done through collecting the same data under different circumstances such as locations or individuals.
- *Investigator triangulation* means to use multiple researchers to perform and compare results yielded through the analysis.
- *Method triangulation* refers to the use of different methods of data collection, for example surveys, observations or interviews.

2.6.3 Our Approach

This thesis used selected tests outlined by Yin (2014) that were deemed fitting for the thesis and it also uses triangulation. Based on the approach shown in Table 6, the following tactics were used to validate the different tests.

Construct Validity - All of the three tactics brought up in the model was taken into consideration. Firstly, multiple sources of evidence was used during the data collection phase i.e interviews and survey. Secondly, a chain of evidence was established through clear documentation of the data collection and subsequent steps leading to a conclusion. Lastly, all the interviewees were asked to confirm their answers by email once it had been transcribed.

Internal validity - Pattern matching was performed through comparing identified patterns in data compiled through interviews with expected answers collected through a literature review.

External validity - A literature review was performed and up to date theories are presented in the report.

Reliability - A case study protocol was established to set a structure for how the case was to be performed, including amongst other things an interview guide.

Two forms of triangulation were used, those were data and investigator triangulation. Data triangulation was achieved through performing interviews at different locations and with interviewees holding different positions within the company, through this the same data were collected but from different points of view. Investigator triangulation was done through the researchers going through the audio recordings as well as analyzing the collected data separately prior to discussing it together. Despite different methods being employed, method triangulation was not used as the data collected were intended for slightly different purposes.

3 Frame of Reference

In this chapter the findings of the literature review are presented with the intention of providing a solid basis for answering the research questions of this thesis. First of, information regarding different levels of organizational change and 5S is shown. Followed by a literature search of barriers and CSFs, this includes frequency of occurrence in literature as well as importance. Following this is theory and methods on performance evaluation throughout different stages of a project.

3.1 Organizational Change

Organizational change is the process of an organization changing its working methods or aims in order to remain competitive. This section will discuss organizational change on a broad level. As seen in Figure 9 organizational change encompasses other philosophies such as lean which in turn contains tools such as 5S. Other approaches to organizational change include implementing software systems, acquisitions or continuous improvement initiatives such as Agile, Six Sigma or lean (Hammer 2004).

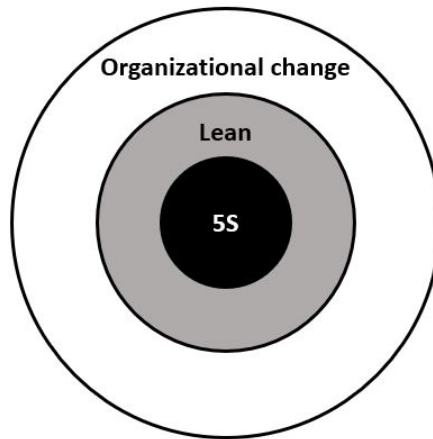


Figure 9: The three levels of change in this thesis.

The objectives for a organizational change is to enhance competitiveness through improving aspects such as increased productivity, improved quality, and greater customer satisfaction (Baker and Maddux 2005). Hammer (2007) has seen companies within almost any type of business succeed with redesigning their business and greatly improve performance within key areas. Meanwhile, he has seen hundreds of companies fail to successfully implement change initiatives.

History shows that organizational change initiatives have had remarkably high failure rates, Kaplan and Norton (2001) for instance, presents failure rates between 70-90 % and in a literature review done by Cândido and Santos (2015) this number ranges from 8-90 % depending on the complexity and other variables while Bhasin (2012) indicates that less than 10 % of initiated lean implementations in the UK are considered successful. Based on the occurrence of the

high failure rates it is important to identify the issues for such implementations (McLean, Antony, and Dahlgaard 2017). Thus, diligently identifying and working with CSFs and barriers is believed to potentially increase the success rate of such projects to as much as 79 % (McKinsey & Company 2015).

In the past operations that have been the object for improvements have been associated with manufacturing but today it can appear in any part of an organization (Baker and Maddux 2005) and the focus have moved from tangibles assets towards also include intangible assets (Kaplan and Norton 2001). When deciding which initiatives should be started and where it should be implemented an important aspect to consider is that it is aligned with the corporations business strategy (ibid.). Aligning the purpose of change initiatives with the corporate strategy allows for everyone to strive towards the same goals which amplifies the results of the project (Shapiro 1977). Furthermore, when everyone shares a common goal the risk of creating functional silos and dissension is decreased as well as the cooperation within the organization is enhanced (Rummler and Brache 1991).

3.2 Lean

A philosophy that is widely employed across the globe is lean, or lean production, which was first introduced by the Japanese car manufacturer Toyota (Durakovic et al. 2018). The term lean thinking was first introduced in *The Machine That Changed The World* by Womack, Jones and Roos in 1990 (H. R. Leite and Vieira 2015). Initially, lean philosophies were primarily used within the manufacturing industries but is now used widely within other sectors as well (Womack, J. P. and Jones, D. T. 2005). Core principles for lean manufacturing is the removal of non-value-adding activities and reduction of waste in all shapes and forms. These principles are called Muda (wastefulness), Mura (irregularity) & Muri (excessiveness) (Do, D. 2022). Muda, which means waste, aims to remove the eight different types of waste seen below (H. R. Leite and Vieira 2015).

- Overproduction
- Inventories
- Waiting time
- Motion
- Unnecessary transportation
- Defects
- Unnecessary processing
- Misuse of intellectual capital

Mura, irregularity, refers to variations or unevenness that contributes to inefficiencies and inevitably leads to waste (Do, D. 2022). This includes, but is not limited to uneven workload, uneven capacity between workstations, and variations in demand (H. R. Leite and Vieira 2015). Muri, which stands for excessiveness or overburden, can be one result of Mura where unevenness in workload or demand periodically leads to excessive workloads (Do, D. 2022). As this causes unnecessary strain on employees and machinery which leads to breakdowns and failures this should be avoided (Abu et al. 2019).

Lean manufacturing could be considered an umbrella term that covers many other principles such as Just-in-Time, Kanban, Poka-Yoke, and 5S (Durakovic et al. 2018). This thesis is about the 5S method and its possibilities and barriers

and will not consider other lean philosophies. Benefits of lean include reduced production costs, improved efficiency, improved quality, higher customer satisfaction and more (Abu et al. 2019). While lean practices are applicable in all areas the usefulness and effect of the different tools may vary depending on circumstances. Rymaszewska (2014) argues that lean should be a good fit for SMEs due to the reduced complexity of interaction because of the size of the company and quicker decision making process. Despite a lack of fixed standards for lean in service, H. R. Leite and Vieira (2015) claims that significant improvements can be seen regarding economic and financial results as well as employees behaviour.

3.3 5S

3.3.1 Why 5S?

Why does one chose to implement 5S? Randhawa and Ahuja (2017) has identified the following seven manufacturing related areas of improvement for 5S: production-related, quality and continuous improvement, cost optimizations, employee-related, effective workspace, and safety-related. There are many benefits, both direct and indirect, related to a variety of areas. To a certain degree these benefits can be seen in all aspects of S, K, L, E, M (Safety, Quality, Delivery, Finance and Employees) (Ohlsson 2015).

A clean and organized workplace have reduced risks of tripping or slipping on dirt and liquids that are found on the floor (Olofsson 2013). In addition it is easier to detect defects or errors that could lead to hazardous situations (ibid.). If there were to be an accident, less clutter and good order ensures that safety equipment and emergency exits are accessible (Ohlsson 2015).

A dirty and unorganized workplace will inevitably affect the quality of the process (ibid.). With 5S, the likelihood of processes being contaminated by dirt are reduced and deviations in quality are easier to detect (ibid.). The accessibility of machines and services are increased as less time is spent on break downs, maintenance or looking for tools (Olofsson 2013). 5S contributes to improvement of many efficiency related measurements, for example higher utilization of resources such as staff and machinery as well as more efficient warehouse usage (Ohlsson 2015).

Working in a clean work environment that the employees can be proud of in combination with an environment where the employees feel that they can be a part of an improvement increases the motivation and morale (Olofsson 2013). The increased morale also enables the organization to be better prepared for additional improvement initiatives in the future (ibid.). Another positive outcome of a clean and structured work place is that the waste from the operations are taken care of which is good in an environmental perspective (ibid.).

3.3.2 Work Process

Prior to initiating the 5S implementation, one needs to make a plan that considers a variety of factors such as risks, time allocation and scheduling (Ohlsson 2015). Some of these will briefly be discussed before giving an general outline of an implementation. One important aspect to consider is who is in charge of the

project, the 5S coordinator can be appointed either from within the company or through hiring an external project leader (Ohlsson 2015). Regardless of whom is appointed it is important that sufficient amount of time is allotted for the 5S work, otherwise the implementation might fail before it even begun. Another important step is to involve management, educating them in the benefits of 5S and making sure they understand the value of leading by example (Olofsson 2013).

3.3.3 Seiri - Sort

The first stage of 5S is Seiri, or Sort in English, during this initial stage the aim is to go through the facilities and for each item determine whether it is needed, unsure or not needed (Garmer 2016; Ohlsson 2015; Olofsson 2013). Items that are not needed are discarded while items that are unsure are further evaluated and potentially removed in future 5S iterations of this step. Proper execution of this lays the foundation for a successful implementation as the initial reduction of clutter facilitates the following steps (Ohlsson 2015).

One useful method is to take pictures before and after the initial sorting, both to use as a reference to see the improvement but also as a benchmark of the expected standard. Immediate improvements that can be seen from the sorting is a more organized workplace where less time is wasted looking for items and improved safety as less potentially dangerous situations arise due to misplaced items (ibid.). Another benefit is improved quality as potential breakdowns and defects are easier to identify (ibid.).

3.3.4 Seiton - Structure

Seiton is the second step and it stands for Structure. During this stage the workplace is structured and each item gets a designated location, frequently used items will be placed close by while items used seldom will be located further away (Garmer 2016; Olofsson 2013; Ohlsson 2015). When a location has been dedicated for an item visualisation through labels or marking is a powerful tool to ensure there is no confusion about which item belongs where. This process builds on the work performed in Seiri, Sort, which is why it is so important to ensure a high standard has been reached before moving on to this step (Garmer 2016).

Structure further emphasises the benefits gained through Seiri by reducing time waste associated with looking for misplaced or missing items, improves safety as stray items are reduced as well as through visualisation highlighting if any items are missing (Olofsson 2013). A well structured workplace also radiates professionalism and competence (Ohlsson 2015).

3.3.5 Seiso - Shine

Once the workplace has been cleared of unnecessary items and the remaining has been organized, it is time for the third S, Seiso or Shine. In this stage an initial, one time, thorough cleaning is performed while later steps aim to establish standards to maintain this level of cleanliness. Determining which department has responsibility for the different areas and evaluating the performance of already established routines, such as external cleaning services, for

cleaning is an important first step (Ohlsson 2015). Ohlsson (ibid.) recommends deciding on a uniform standard for the entire facility and allotting time with clearly defined tasks prior to the initial cleaning to improve the chance of success. A common pitfall in this stage is including too much, for example it needs to be clearly defined whether machine cleaning is part of 5S or part of machine maintenance and upkeep, this can result in over commitment and getting stuck in this stage (Garmer 2016). Starting small and including more areas in future loops is always a possibility.

A clean workplace is enjoyable for everyone, both the employees who have to work in it and for customers or visitors. Similar to the benefits from Seiton, safety, quality and professionalism are also acquired through keeping it clean and tidy. Visualisation through pictures of the expected standard of cleanliness and avoiding personal responsibilities is recommended (Ohlsson 2015).

3.3.6 Seiketsu - Standardize

Now the workplace is organized and clean and it is time for the fourth stage, Seiketsu or Standardize. It is quite common that 5S initiatives end here and that the workplace slowly but surely turn back to the way it was before (Olofsson 2013). This stage aims to prevent this through establishing standards and routines for the operation to maintain the progress made through stage one to three (Garmer 2016; Olofsson 2013; Ohlsson 2015). This includes everything from daily to monthly or even annual routines for cleaning, inventory, sorting, and so on.

Using tools such as checklists for daily and weekly activities or 5S boards where activities are displayed can help during this stage. Olofsson (2013) warns against the common pitfall of giving personal responsibility, this will likely work for a while but once staff is replaced or goes on leave their tasks are likely to be overlooked.

3.3.7 Shitsuke - Sustain

The final stage of 5S is Shitsuke or Sustain. Once routines and standards are established the final stage of the 5S loop is to make sure that they are followed (Garmer 2016; Olofsson 2013; Ohlsson 2015), as a routine that is not followed does no good for anyone. Different methods may be used during this step, some of them are revisions where the different routines and standards are regularly checked, positive reinforcement and rewards when certain milestones are reached and bringing in visitors to show of how well a certain department has performed (Ohlsson 2015). The method mentioned last can be useful both to inspire departments performing well and other parts of the organization who are struggling as they can more clearly see the benefits of 5S.

3.4 Barriers and Critical Success Factors

This section regarding barriers and CSFs aims to provide a insights gathered from the literature review regarding research question 1 & 2 seen below. It contains general information about the topics as well as summaries of frequently identified barriers and CSFs found through the literature review.

RQ1: What are the most prominent barriers and challenges of organizational change and more specific Lean (5S)?

RQ2: What are the most prominent critical success factors and drivers for organizational change and more specific Lean (5S)?

Cambridge Business English Dictionary (2022a) defines critical success factors as “one of the most important things that a company or organization must do well in order for its business or work to be successful”. While barriers are described by Antomarioni et al. (2021) as factors preventing a company to achieve the expected results for a certain process. Based on this, a correlation between barriers and success factors can often be seen as the CSF can sometimes be considered the solution to a barrier. Table 7 contains the different sources that were used throughout the literature search of CSFs and barriers for organizational change, lean and 5S. These were obtained through the literature search seen in Table 4, or through citation pearl growing. In total 30 papers were used, 22 contained CSFs and 15 contained barriers, some contained both CSFs and barriers which is why the sum exceeds 30. The number of articles were considered sufficient since the results were becoming saturated as new factors were becoming increasingly rare. The articles also had different focus, either organizational change in general, lean, or 5S and the distribution among those were 7 for organizational change, 18 for lean and 5 for 5S. All of this can be seen in Table 7.

Table 7: Sources used in literature search of barriers and CSFs. It is also illustrated if the article contains barriers or CSFs and if it focuses on organizational change, lean or 5S.

Article number	Author	Barrier	CSF	Org. change	Lean	5S
1	(Bhamu and Singh Sangwan 2014)					
2	(Knol et al. 2018)					
3	(Netland 2016)					
4	(Ibrahim, Christian, and Abdessamad 2017)					
5	(Elkhairi, Fedouaki, and El Alami 2019)					
6	(Sandrita, Roma, and Darius 2021)					
7	(Zuliyanti, Venkateswarlu, and Dirk 2017)					
8	(Achanga et al. 2006)					
9	(Yamchello et al. 2014)					
10	(Antonio and Kusumastuti 2019)					
11	(Zargun and Al-Ashaab 2014)					
12	(Sambasivan and Fei 2008)					
13	(Antony et al. 2021)					
14	(Vahid, Hanifa, and Gerald 2019)					
15	(Näslund 2013)					
16	(Abu et al. 2019)					
17	(Rajesh, Bhupender, and Sunil 2017)					
18	(Ranjith, Ganesh, and Rajendran 2021)					
19	(Singh, Rastogi, and R. Sharma 2014)					
20	(Errida and Lotfi 2021)					
21	(Long, Looijen, and Blok 2018)					
22	(Sony and Naik 2020)					
23	(H. Leite, Radnor, and Bateman 2022)					
24	(Randhawa and Ahuja 2017)					
25	(Setiawan et al. 2021)					
26	(Antomarioni et al. 2021)					
27	(Senthil K. and Vinodh 2020)					
28	(Bayhan, Demirkesen, and Jayamanne 2019)					
29	(DeSanctis et al. 2018)					
30	(Näslund and Kale 2020)					

Three separate literature searches for barriers and CSFs on organizational change, lean and 5S were performed and the results compared. The conclusion drawn from the different searches was that the general themes were similar in all the levels of change which is in line with Näslund (2013) who investigated CSFs for different change methods. Key takeaways from this review were that the CSFs for different change methods are the same, with only slight variations no matter the change method, the CSFs tend to be constant over time and the organizational approach toward change seems to be more critical rather than factors for the specific method (ibid.). Based on the finding from the literature search for the CSFs and barriers combined with the finding of Näslund (ibid.), the three tables were compiled into one table.

Another aspect that was considered was if the practical differences between different companies were an important factor, or as in this thesis, if the different attributes of sites affects the CSFs and barriers. Type of industry or number of employees could be an example of such practical differences and Chaneski (2009) argues that lean is applicable in all industries based on four examples from widely different industries and Randhawa and Ahuja (2017) stresses that 5S can be implemented in most sectors and can be implemented in various

organizations due to its simplicity. Netland (2016) has done a study where the aim was to investigate if contingencies had any effect on CSFs when implementing lean focused on the four areas: corporation, factory size, stage of lean implementation, and national culture. The conclusion from the study was, in contrast to contingency theory that suggests that different context requires different managerial actions, that it was just a few statistically significant variations in the four areas and therefore a general list of CSFs were arguably useful (ibid.). Other research within a similar area is Knol et al. (2018) who investigated which CSFs that was critical at which stage of lean implementation and found that the CSFs were dependent on maturity and Hu et al. (2015) who studied the implementation of lean in SMEs and found enablers and inhibitors based on organizational size.

The most relevant and frequently appearing barriers can be seen in Table 8. In the column *Barriers*, the different barriers are presented, and in the column *Article number*, the number represent the corresponding number for the article in Table 7. The factors were determined through following the upper part of Figure 8. Firstly, the different barriers found in the articles were coded and secondly the codes were compared and combined into themes. Those themes were then defined and named to the factors visualized in Table 7. To be considered a theme the barrier had to be mentioned at least twice, otherwise the factor was disregarded. The existing factors were then divided into five categories: managerial, organization, workforce, financial, and information, to make it more comprehensible.

Table 8: Frequency of barriers mentioned in searched literature. Articles corresponding to article number can be seen in Table 7. A brief explanation of each factor is also included.

Category	Barriers	Article number	Description
Managerial	Lack of management commitment	1, 5, 6, 7, 16, 17, 18, 19, 23, 24, 26, 27, 28, 29	Lack of management commitment and engagement in projects leading to poor follow through
	Lack of leadership	6, 17, 18, 24	Lack of skilled leaders that motivate their peers may lead to reduced employee commitment
	Insufficient top management support	6, 7, 16, 23, 26, 28	Failing to support middle managers throughout the projects resulting in poor implementation
Organization	Lack of strategic perspective	5, 17, 18, 23, 28	No clear links between the change method and the organization's strategy
	Lack of planning	1, 5, 7, 17, 18, 24, 26, 28	Missing a well defined plan for the implementation and follow up which may lead to an organization that fall back to old habits
	Lack of vision	1, 17, 18, 23, 24, 26, 28	No proper vision of what is to be achieved and why, resulting in a lack of direction of the project
	Lack of teamwork	17, 18, 28	Difficulties in creating a sense of "us" and working together as a team can cause tension and difficulties
Workforce	Resistance to change	5, 6, 7, 16, 17, 18, 19, 20, 23, 24, 26, 28, 29	Organization that are comfortable with current settings and methods and are not open for initiatives and influences
	Lack of training and education	1, 16, 17, 18, 19, 26, 29	No availability of courses to gain more knowledge and experience for the change method
	Lack of skills, knowledge and expertise	1, 5, 6, 16, 23, 26, 27, 28	The knowledge within the organization regarding the change method is insufficient which can lead to misinterpretation of the method
	Misunderstanding of concepts	1, 5, 7, 16, 17, 18, 19, 23, 24, 27, 28	A misunderstanding of concepts can result in staff not understanding why a project is performed as well as the benefits. Lack of motivation and resistance toward the project may be the result.
	Lack of employee commitment	16, 17, 18, 23, 24, 29	Failure to engage employees results in a lack of commitment and hamper the chance of success
Financial	Insufficient economic funding	5, 16, 17, 18, 23, 26, 28, 29	Not providing enough economic funding for a given project severely hampers the chance of success
	Lack of human resources	16, 23, 29	Lack of human resources for support or education has the potential to slow down the implementation
	Lack of IT resources	6, 16, 29	Not providing enough IT resources to support tools and methods may yield poor results
	Lack of time	16, 24	Not allocating a sufficient amount of time for a project can lead to poor implementation or neglect
Information	Lack of communication	1, 6, 7, 17, 18, 19, 23, 24, 26, 28	Lacking communication within the organization can result in a multitude of problems, among others are misunderstandings, difficulties in decision making and a slower learning process

The most relevant and frequently appearing CSFs can be seen in Table 9. The CSFs identified went through the same process as described for barriers according to the upper part in Figure 8. The CSFs were also categorized into the same five categories as the barriers.

Table 9: Frequency of critical success factors mentioned in searched literature. Articles corresponding to article number can be seen in Table 7. A brief explanation of each factor is also included.

Category	CSF	Article number	Description
Managerial	Management commitment	1, 3, 4, 5, 6, 7, 8, 9, 10, 11, 13, 14, 20, 22, 24, 25, 28, 30	Top and middle management is committed to the initiative and are actively engaged in the work
	Leadership	1, 2, 3, 5, 6, 7, 8, 20, 25, 28	Good leadership skills amongst managers to motivate and engage staff
	Management support	1, 2, 3, 4, 6, 10, 11, 15, 30	Management is available to lend managers their support with follow-ups, managerial challenges and more
	Project management skills	4, 15, 22	Availability of personnel with good skills and experience within project management
	Resistance & Change management	20, 22, 25	Working towards managing a culture of resistance to change amongst employees
Organization	Organizational strategy	3, 4, 6, 7, 8, 12, 15, 22, 28, 30	The change method is aligned with the company's business strategy to gain a more business focus
	Long term planning	3, 8, 13, 24	Establishing a long term plan on how to implement and maintain change
	Use of tools and methods	3, 7, 28	Application of available methods and tools for the specific method
	External support	1, 3, 28	Bringing in external experts to facilitate the implementation
	Clear vision	20, 21, 24, 30	Having a clear vision of what is to be achieved as well as how and why
	Supply chain integration	1, 2, 3, 4, 28	Involvement of up and downstream suppliers to improve processes along the supply chain
	Team concept/teamwork	3, 6, 10, 24	Establishing a team concept and working together, both within the group and the company. Obtaining a mindset of working as "we" rather than "us" and "them"
Workforce	Organizational culture	1, 2, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 15, 25, 28, 30	Organization with an open mind for projects that are ready to adapt their culture based on new influences and initiatives
	Employee participation	1, 3, 4, 6, 7, 22, 24, 28	Engaging employees in all stages of the project
	Training and education	1, 2, 3, 4, 5, 6, 9, 13, 15, 25, 28, 30	Training and education of staff from shop floor to top floor in relevant tools and methods
	Skills, knowledge and expertise	4, 5, 6, 7, 8, 25, 28, 30	Skilled personnel with knowledge and expertise within the field
Financial	Resource allocation	1, 3, 6, 7, 8, 28	Allocating sufficient resources in terms of human, financial and technical capital
	Reward systems	1, 3, 4, 24, 25, 28, 30	Rewarding excellence throughout the process, both individual and as a group
	Profitability	21, 28	Understanding the long term benefits and profitability of the project despite initial costs
Information	Communication	1, 2, 3, 4, 5, 6, 10, 20, 24, 28, 30	Clear communication between different actors associated with the project
	Sharing vision and goals	1, 20, 24, 30	Sharing what is to be achieved and why with middle managers and employees that are affected by the initiative

Based on Table 8 and 9 the frequency of occurrence for the different factors were sorted from highest to lowest and then graphically presented in Figure 10 and 11. In Figure 10 it can be seen that the most frequently mentioned barriers are lack of management commitment, resistance to change and misunderstanding of concepts. Not many articles provide a comprehensive list of rankings, two articles that did were Errida and Lotfi (2021) and Bayhan, Demirkesen, and Jayamanne (2019) who presented lists containing the most important barriers for lean. A more comprehensive presentation of the different aspects are presented in section 3.4.1 through 3.4.5.

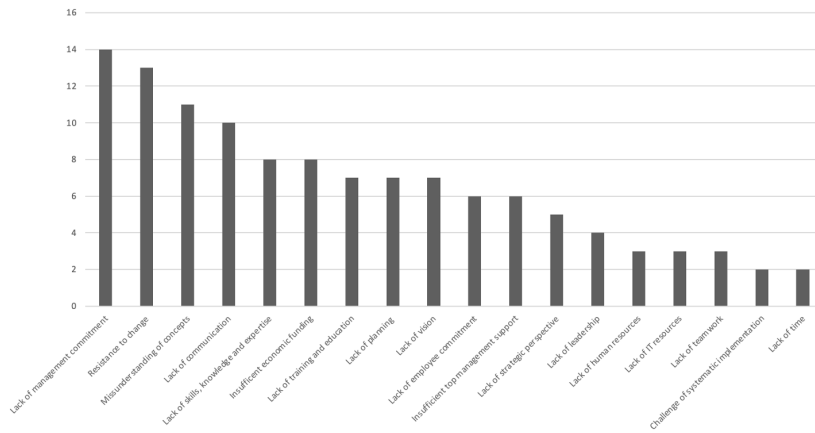


Figure 10: Frequency of occurrence for the barriers in literature

In Figure 11 it can be seen that the most frequently mentioned CSFs are management commitment, organizational culture and training and education. Similar to the barriers not many articles that ranked the importance of the different factors were found. Three articles that were used and contains rankings are Netland (2016), Bayhan, Demirkesen, and Jayamanne (2019), and Errida and Lotfi (2021). A further description of the results from the literature review can be found in section 3.4.1 through 3.4.5.

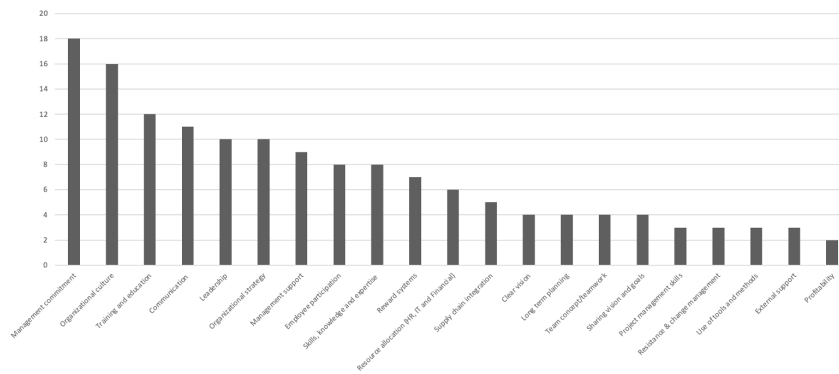


Figure 11: Frequency of occurrence for the CSFs literature

3.4.1 Managerial

The first main category identified was managerial, this contains factors that are closely linked to managements actions and leadership styles and how they affect the business. As seen in Table 8 and 9 as well as Figure 10 and 11 literature shows a correlation between the most frequently mentioned barriers and success factors such as management commitment, management support and leadership.

Throughout the different articles managerial aspects were one of the most frequently recurring and often ranked of high importance. Randhawa and Ahuja

(2017) identifies management commitment and support as the most important CSFs for 5S implementations with the corresponding barriers. On a more general level of organizational change the same CSFs have been identified as one of the most critical (Näslund 2013; Errida and Lotfi 2021; Netland 2016; Achanga et al. 2006). Meanwhile, Bayhan, Demirkesen, and Jayamanne (2019) and Senthil K. and Vinodh (2020) finds that lack of management commitment and support are amongst the most prominent barriers. The interaction between management and the organization is thus a crucial part of any project and should be considered when undergoing change projects.

Furthermore, it is likely that if an organization performs well within the managerial aspects that this will also affect the performance in some of the other areas as a result of good leadership and management skills, Näslund (2013) argues that strategic alignment, project management and training, amongst others, could be influenced by managerial performance.

3.4.2 Organization

The second category found in the search for CSF and barriers were organization and it includes aspects connected to the organization such as its strategy, planning, and their interaction with internal and external actors. The most commonly appearing factors from the organization category touches upon strategy and planning and the way the company shape their operation after it. Kaplan and Norton (2001) highlights the importance of becoming a strategy-focused organization to be able to succeed with organizational change. Another important aspect for organizational strategy is to eliminate silo thinking and try to focus on processes rather than functions (Shapiro 1977; Rummler and Brache 1991; Baker and Maddux 2005).

As seen in Figure 10 the most common barriers within the organization category are lack of strategic perspective and lack of planning and it also correlates to the most frequent CSF, organizational strategy, seen in Figure 11. Errida and Lotfi (2021) stresses the importance of a clear and shared vision and strategy and argues that acceptance of strategy and vision among the employees and various stakeholders are prerequisite for a successful change. On the same topic, Netland (2016) argues that the management must have a long term plan and follow it up to be successful and includes aspects such as set and follow up targets and develop a vision and roadmap in that expression.

3.4.3 Workforce

The third category identified consists of aspects concerning the workforce and employees, such as mindset, experiences and skills. Together with managerial aspects this is the most frequently occurring category, see Figure 10 and 11. For all CSFs there is a clear corresponding barrier while there is one barrier, misunderstanding of concepts, that lacks a corresponding CSF. Misunderstanding of concepts could however be a result of another barrier, namely lack of training and education.

Workforce related factors are not only frequently occurring but they are also of high importance. We further considered two sub-categories related to the workforce, knowledge and skill related aspects and mindset related aspects. A

major threat to a successful implementation is lack of knowledge within the workforce (Baker and Maddux 2005). Garvin, Edmondson, and Gino (2019) emphasizes the importance of training and becoming a learning organization where the three building blocks should be considered: a supportive environment, concrete learning processes, and leadership that reinforces learning. Once again a connection between the managerial aspects discussed above and other CSFs and barriers can be seen. As lack of skills, knowledge and expertise is one of the most prominent barriers it stands to reason that it would naturally also be a CSF of high importance. Netland (2016) highlights the importance of education and training and ranks education of employees as the third most important CSF and education of managers as the fourth most important.

Mindset related aspects refers to factors that are a result of the employees or organizations mindset. One example is the barrier resistance to change, which means that the employees are opposed to change for one reason or another, for example it could be old habits, contentment or from lack of trust in managements decisions and capabilities. A positive organizational culture that is open and positive towards projects and new ideas is the corresponding CSF to resistance to change. Organizational culture is considered one of the most important factors for a successful project (Achanga et al. 2006; Näslund 2013). Investing resources in education and training of personnel, involving the employees as well as having managers that are engaged in the project has been shown to improve the organizational culture and reduce the resistance to change (Errida and Lotfi 2021).

3.4.4 Financial

The fourth category we found were the financial aspects, here a slight discrepancy between the barriers and CSFs can be seen. While barriers mainly focuses on providing insufficient amount of resources, be it financial, human or other, for a task the CSFs focuses more on providing sufficient and also including incentives for the company or the employees, see profitability or reward systems. The frequency of factors within this category appearing in literature is slightly less than the three categories discussed above.

Elkhairi, Fedouaki, and El Alami (2019), Zuliyanti, Venkateswarlu, and Dirk (2017), and Achanga et al. (2006) have studied lean implementation in SMEs and found that allocating economic resources can be an issue for the companies since an implementation means a large economic risk and there are no guarantees for immediate returns. Netland (2016) also brings up resource allocation as a CSF but argues that the most important financial aspect is the allocation of human resources that is ranked as the eighth most important followed by the investment of time and money, ranked 18th. Reward systems are also rated as an important factors but Netland (ibid.) argues that it is mostly valued in the early stage of the implementation and reward systems must be handle with caution since it is sensitive to contingencies.

3.4.5 Information

The final category is information which consists of factors related to sharing and communicating information between employees as well as different parts

of the organization. This category is the one consisting of the least amount of different barriers and CSFs. However, the few factors that are listed are typically determined to be of high importance. Bayhan, Demirkesen, and Jayamanne (2019) ranks the three different communication aspects as the third, fourth and seventh most prominent barriers while communicate, inform and discuss are ranked as the fifth most important CSF by Netland (2016).

Communication is a key factor that relates to other barriers such as resistance to change, as it is a detrimental part of resistance management and getting individuals on board before and during projects (Errida and Lotfi 2021). Communication is also closely tied to the management since listening to employees and explaining why it is needed is important, and Netland (2016) for example has classified communication as a CSF together with management commitment.

3.5 Performance Evaluation

This section aims to provide insights and data gathered to provide a basis for answering RQ3 seen below. Initially some general theory on performance evaluations and benchmarking is provided followed by how it can be used throughout the three different stages of a project: prior, during and after.

RQ3: How can LMM know if the change initiative was successful?

Depending on aspects such as which part of the process, chosen improvement method, and organizational structure the method for performance evaluation may differ (Raval, Kant, and Shankar 2019). Lewin (1947) discusses three different stages of organizational change initiative: unfreeze, change and freeze, which has inspired the approach used in this thesis, these processes are referred to as prior, during and after and can be seen in Figure 12. At the stage prior to launching the initiative one crucial part is the change readiness of the organization (Näslund and Norrman 2022). Once the organization has reached sufficient maturity the implementation should begin and performance evaluation during this stage needs to be adapted to the chosen method or model. The final stage after the implementation is finished is to ensure the longevity of the project (Lewin 1947). Establishing decisive milestones for when to proceed from one stage to the next is a good method to ensure the readiness of the organization.

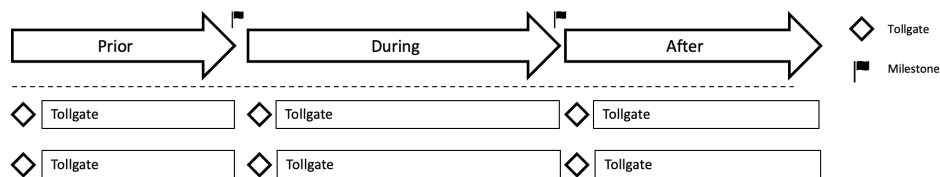


Figure 12: The main stages of an organizational change initiative.

3.5.1 Prior

Before beginning an implementation of an organizational change initiative the maturity level of the organization, the organizations change readiness, should be at a certain level that indicates that the organization has the attributes for

a successful implementation (Self, Armenakis, and Schraeder 2007). Change readiness can be divided in different ways, for instance Hammer (2007) has identified two types of characteristics to determine if companies are mature enough to deliver on a higher level over time; process enablers and enterprise capabilities, seen in Figure 13. The process enablers are focusing on individual processes and include design, performers, owner, infrastructure and metrics while the enterprise capabilities are focusing on the organization as a whole and include the aspects leadership, culture, expertise and governance. The enterprise capabilities intend to measure whether the organization is ready to support a transformation. To be able to evaluate those aspects the process and enterprise maturity model was developed where four degrees of maturity are presented for each aspect and then graded according to how well the company complies with the maturity level (ibid.).

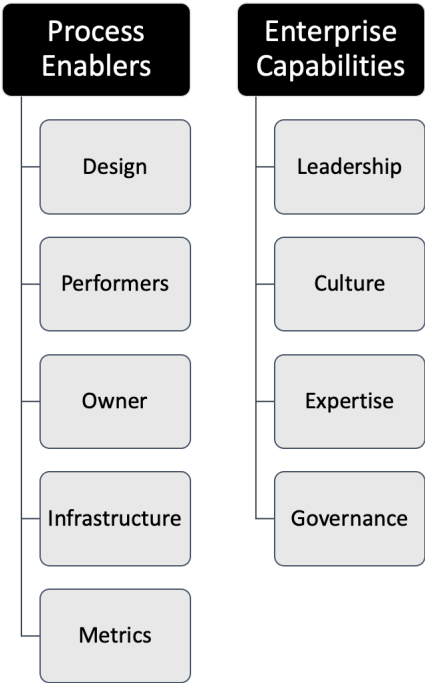


Figure 13: The process enablers and enterprise capabilities in the process and enterprise maturity model by Hammer (2007).

Näslund and Norrman (2022) have in a longitudinal study identified a lack of progress within change readiness in different projects and created a conceptual framework for understanding the change purpose while also highlights the importance of it being accepted by different stakeholders throughout the project. This framework outlines things that needs to be considered when designing the change purpose as well as actions that can be used to further the acceptance within the organization. As seen in Figure 14 the change purpose contains six important aspects, it should be relevant, justified, urgent with explicit goals, a clear scope and a clear destination. The four factors along the arrow are

enablers for gaining acceptance for the change purpose.

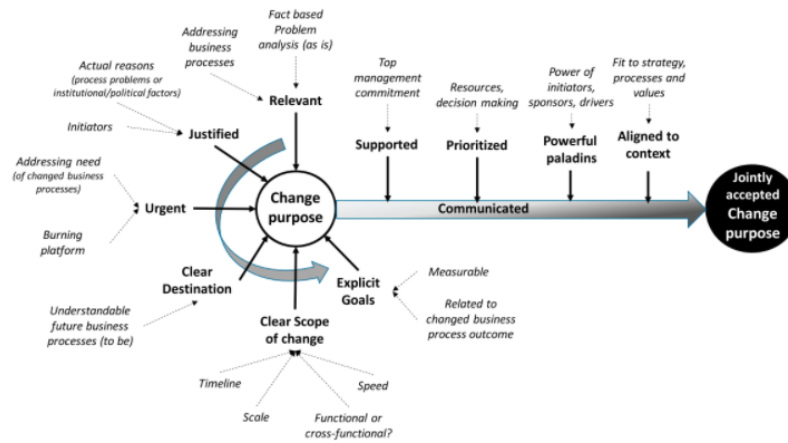


Figure 14: Conceptual framework for understanding change purpose (Näslund and Norrman 2022, p. 20).

3.5.2 During

During the implementation stage evaluation of the performance and steps has to be designed and done according to the chosen change model. As this thesis is about the 5S model, this section will focus on how to evaluate the ongoing work of a 5S implementation. Information regarding 5S and the different steps are more in depth explained in section 3.3. Implementation of the different stages of 5S should be performed one at a time without any overlap of the different stages (Ohlsson 2015). This creates natural tollgates for when to proceed and sub-milestones within the during stage.

A central part for 5S during this stage is determining when to move on, i.e. which aspects are to be a part of the aforementioned tollgates and what level of proficiency is to be achieved. Ohlsson (2015) and Olofsson (2013) emphasizes the importance of limiting the scope of the initial loop as to make it manageable, it is always possible to further improve the process in future iterations. Setting a high, but achievable standard, is also preferable seeing as striving for perfection can take excessive amounts of time leading to demoralization and getting stuck (Ohlsson 2015). Defining these tollgates is something that should be done for all steps together with the employees participating in the 5S initiative (ibid.). In combination with continuously following up on the progress of tasks this provides a clear picture on how well the project is progressing and in which areas problems are arising.

3.5.3 After

The final phase of the evaluation is the after stage, this is an important step for the preservation of improvements that have been achieved throughout the project (Setiawan et al. 2021). The final stage of the 5S model, sustain, is

focused around this stage of a project and it includes methods for following up on, auditing and evaluating results and how well routines and standards are being met even after the project is finished (Ohlsson 2015; Olofsson 2013). Not all philosophies or projects naturally incorporates a method for long term follow up and other methods of varying complexity can be used to evaluate the performance. When determining which approach to use aspects such as size, field and method should be considered (Raval, Kant, and Shankar 2019).

5S Specific Tools

Two evaluation models specific for 5S implementations were investigated. The first is an entropy based approach developed by Ranjith, Ganesh, and Rajendran (2021). This approach uses both quantitative and qualitative measures of entropy, i.e the measure of chaos or lack of order, and how different aspects of this are related to each of the different stages of 5S. The following seven aspects are the factors considered: vision, perceiver, tacit factors, ambience, space, entity and S-E relations. It also provides a guide on how to quantify the entropy levels and 5S maturity. The second framework investigated was developed by Setiawan et al. (2021) where five different categories and 16 indicators for evaluating 5S sustainability is outlined. Through considering and evaluating the performance of these indicators the intention is to evaluate how well the company is performing within the different categories, where it should aim to improve as well as determining how well changes made during the implementation has been maintained. These are two models used for evaluating different aspects of 5S. Both focus on specific 5S aspects and on the performance of the 5S implementation and not on operational or financial performance.

Table 10: Categories and indicators used to evaluate 5S sustainability efforts (Setiawan et al. 2021)

Step	Dimensions	Indicators
1	5S Knowledge	1. Socialization of the 5S program
		2. Need assessment for early step 5S program
		3. Identifying of stakeholder supporting
		4. Considering the benefit in 5S practices
2	5S Commitment	1. Engaging leaders, managers and employees
		2. Building mindset of 5S thinking and knowledge sharing
		3. Building awareness 5S value shared and motivation
3	5S Strategy	1. Engage workforce for 5S planning
		2. Running Plan-Do-Study-Action (PDSA) for 5S program
		3. Validate cost and benefit
		4. Developing learning and training system
4	5S Technical support	1. Introduce new tools and technology
		2. Introduce reward system
5	5S management and control system	1. Control progress through integrated management system (IMS)
		2. The base practice sharing
		3. Creating 5S culture

Regarding performance evaluation specifically for SMEs, Hvolby and Thorstenson (2001) argues that there tends to be a resistance to implementing advanced performance evaluation systems as well as a lack of human resources for developing and maintaining such systems. Existing evaluation methods in SMEs typically focuses on operational and financial performance. In addition leadership at SMEs generally does not possess the same knowledge and expertise regarding performance evaluation methods as on bigger companies, thus clear and easy to use methods and tools are often needed (Villa et al. 2019)

Benchmarking & KPIs

An easy tool to use is benchmarking and KPIs of relevant indicators. Typically improvement initiatives strive towards improving certain aspects of a business, determining appropriate KPIs in relation to these goals is a method for evaluating the performance (Behn 2003). This can be done for all levels of the company considering everything from team performance to operational level or even organizational level as seen in Figure 15 (Stan et al. 2018). Determining good KPIs is an important step, either existing KPIs can be used or new ones can be developed if new aspects needs to be considered (Calabro, Lonetti, and

Marchetti 2015). Deciding what is a good KPI can be hard, but one way of doing it is considering SMART, that is Specific, Measurable, Achievable, Relevant and Time-Bound (Ishak, Fong, and Shin 2019). This essentially means that a good KPI is easy to understand and measure while at the same time being relevant to the purpose and possible to reach within a set time frame. Another aspect to consider for good KPIs is that they should be aligned with the organizational strategy or the goals of the current initiative as well as with personal goals and rewards systems (ibid.).

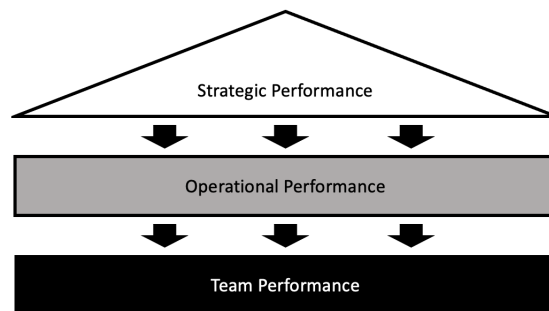


Figure 15: Difference levels that KPIs can be used at, adapted from APQC survey (Stan et al. 2018, p. 2)

Continuous improvement projects such as 5S tend to improve productivity related aspects (Shah and Ward 2003) such as labour productivity, throughput time, employee behaviour, quality and manufacturing specific aspects such as cycle time or manufacturing costs (Todorovic and Cupic 2017). However, other categories of KPIs such as profitability, personal, operational, cultural and so on can be considered as well (Calabro, Lonetti, and Marchetti 2015). Todorovic and Cupic (2017) found that the effect 5S has on profitability related KPIs are indirect, mainly through efficiency and productivity, but also other internal and external factors. It is important that KPIs are not only used to measure the performance, but also to identify areas of improvement and what use it as an indicator of what can be improved (Ghalayini and Noble 1996). Furthermore, Antomarioni et al. (2021) discusses how success is perceived by management as a result of management participation. It is apparent that managers who are engaged and actively participating in a project gains a higher level of understanding for challenges and problems that occur along the way but also of the success and improvement that were achieved (ibid.).

4 Empirics

This chapter presents the different CSFs and barriers identified through the interviews along with a description of how they are defined. The results of the scoring survey is also presented in a table and graphs along with the frequency. Trends and special mentions for the different categories of barriers and CSFs are discussed. Following this, information regarding the company, their KPIs and current performance evaluation models is presented.

4.1 Company Description

4.1.1 Lantmännen

Lantmännen is a Swedish agriculture cooperative founded in 1880. It is owned by roughly 19 000 Swedish farmers and is one of the leading actors in northern Europe when it comes to agriculture, machines, bioenergy, and food products (LM 2022a). Lantmännen has over 10 000 employees and operates in over 20 countries with an annual turnover exceeding 40 billion SEK (ibid.). Their purpose is to support a thriving Swedish agriculture and enable long term sustainability and profitability for local farmers, this is emphasised in their mission statement: "From field to fork" (ibid.). Lantmännen consists of the three sectors and two business areas seen in Figure 16.

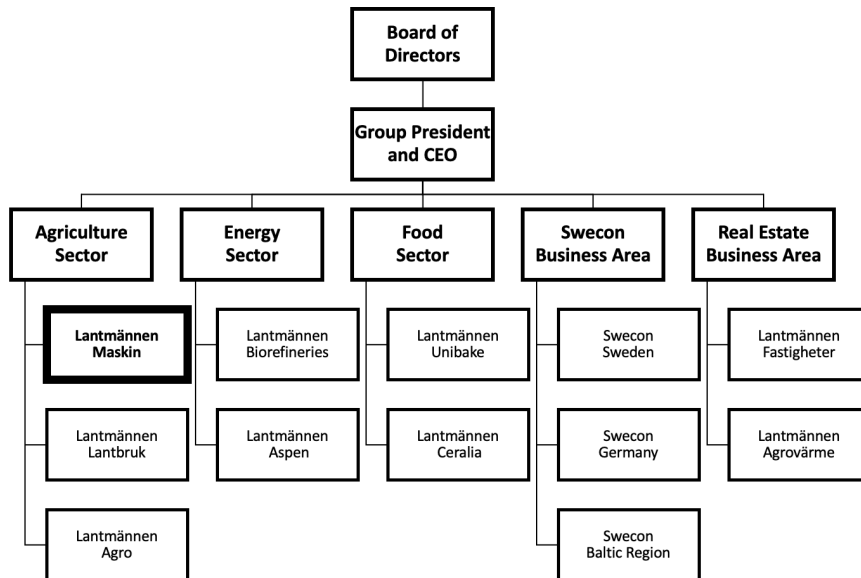


Figure 16: The organizational structure of Lantmännen (LM 2022b).

4.1.2 Lantmännen Maskin

LMM is a part of the agriculture sector, where they provide a wide variety of agriculture machinery and tools as well as service and maintenance. Their headquarters (HQ) are located in Malmö and this is also where the central warehouse

is located (LMM 2022), which supplies over 50 different locations throughout Sweden. The following information is regarding the after sales market, i.e service and maintenance. The different LMM locations consists of a workshop and an adjoining spare part warehouse, the majority also have a shop. These locations are further divided into five regions: north, east, west, south and svea. At each location there is a site manager responsible for the entire location and then there are a store manager, spare part manager, and work shop manager responsible for each area. In Figure 17 the organisational structure for an arbitrary LMM location can be seen.

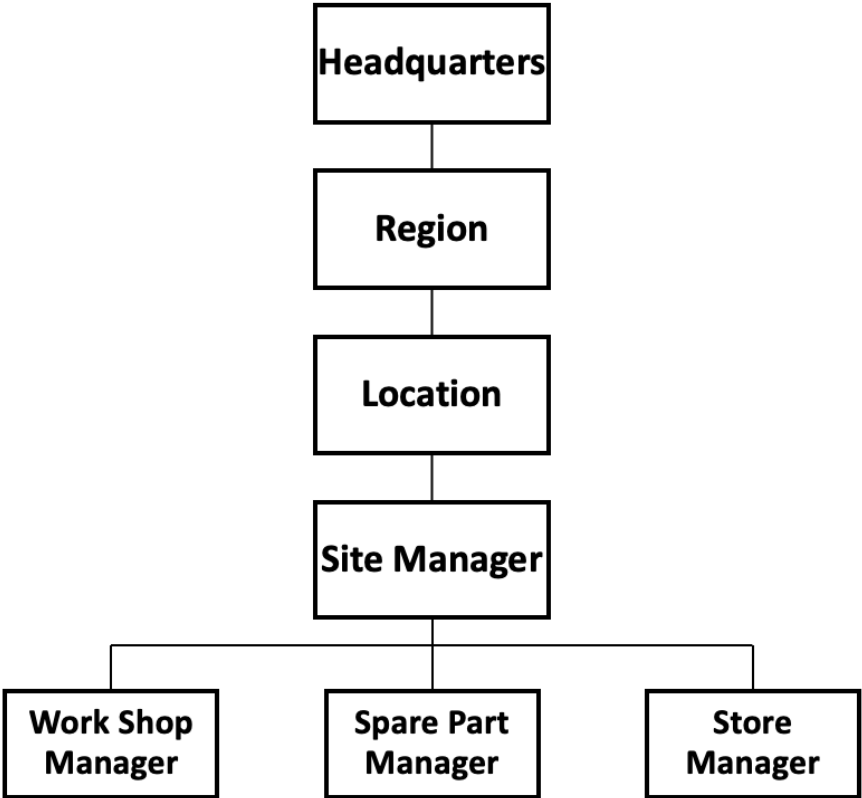


Figure 17: Organizational structure of Lantmännen Maskin.

The typical size of a location is between 2-15 mechanics and a few working within the warehouse, shop, and sales. In combination with the degree of autonomy, the different locations will be considered small and medium-sized enterprises (SMEs) despite the fact that LMM as a whole can not. The main function of the different sites is the workshop where repairs and services are made on demand, thus it will also be considered a part of the service industry rather than manufacturing. As a result of the Swedish climate and the nature of the agriculture business the workload throughout the year is strongly affected by the harvest seasons, this is further emphasized by variations due to geographic location and weather factors.

4.2 Barriers & CSF

Through the interviews performed at different sites in accordance with the interview guide, Appendix page I, a series of CSFs and barriers were collected. Based on the findings from the literature review that the CSFs from different change methods are the same with slight variations in section 3.4, in combination with an uncertainty on which level of knowledge the respondents had for 5S in advance, the questions were decided to refer to change initiatives in general rather than 5S specific aspects. After the interviews all the interviewees were asked to confirm whether the transcript was correct and to fill out the scoring survey. Out of those, none had any objections to the transcripts and the interpretations and eight filled out the survey. The interview summaries and tables showing the raw data for frequency and scoring can be seen in Appendix at page V through XVIII.

All the barriers mentioned as well as the frequency they were mentioned can be seen in Table 11. This also shows the average importance, on a scale from 1 (not important) to 5 (very important), of each factor according to the participants ranking through the survey. It was decided to use the same main categories for the collected answers as for literature review, seen in section 3.4, partly due to the similarities but also to make it easier to comprehend for the reader.

Table 11: The frequency and scoring of the different barriers and challenges from the data collection as well as a brief description of the different factors.

Category	Barriers	Frequency	Scoring	Description
Managerial	Lack of management commitment	1	4.75	Lack of management commitment and engagement in projects leading to poor follow through
	Poor leadership	1	4.625	Lack of skilled leaders that motivate their peers may lead to reduced employee commitment
Organization	Lack of clear vision	2	4.625	No proper vision of what is to be achieved and why, resulting in a lack of direction of the project
	Poorly designed scope and milestones	3	4.375	Not clearly defining the scope and milestones can lead to excessive workloads and lack of motivation and progress
	Poor preparation and planning	1	4.75	Missing a well defined plan for the implementation which may lead to an organization that fall back to old habits
	Functional silos	2	4.25	Lack of cooperation among the departments on the site, may lead to tension within the site
	Lack of evaluation and follow up	3	4.375	Not establishing routines for evaluation and follow up can lead to the initial progress being lost as the organization relapses into old habits
	Low scenario adaption	1	4.75	Not considering the conditions on a location and adapting the plan accordingly
Workforce	Not engaging employees	6	4.75	Failure to engage employees results in a lack of commitment and hamper the chance of success
	Resistance to change	7	4.875	Organization that are comfortable with current settings and methods and are not open for initiatives and influences
	Lack of knowledge	1	4.75	The knowledge within the organization regarding the change method is insufficient which can lead to misinterpretation of the method
	Employee turnover	1	4	Employee turnover can be a challenge if the knowledge is bound to the individual worker and not spread in the organization
Financial	Insufficient time allocation	2	4.625	Not allocating a sufficient amount of time for a project can lead to poor implementation or neglect
	Insufficient resource allocation	1	4.75	Not providing enough economic funding for a given project severely hampers the chance of success
Information	Poor communication	4	4.75	Lacking communication within the organization can result in a multitude of problems, among others are misunderstandings, difficulties in decision making and a slower learning process
	Lack of information sharing	3	4.75	Not sharing the information throughout the whole organization may lead to a lack of understanding of the purpose and methods

Based on the results from Table 11 the frequency and importance of barriers are graphically presented in Figure 18 & 19. Figure 18 is sorted based on importance and the most prominent barrier according to the interviewees was resistance to change followed by eighth barriers ranked equally important.

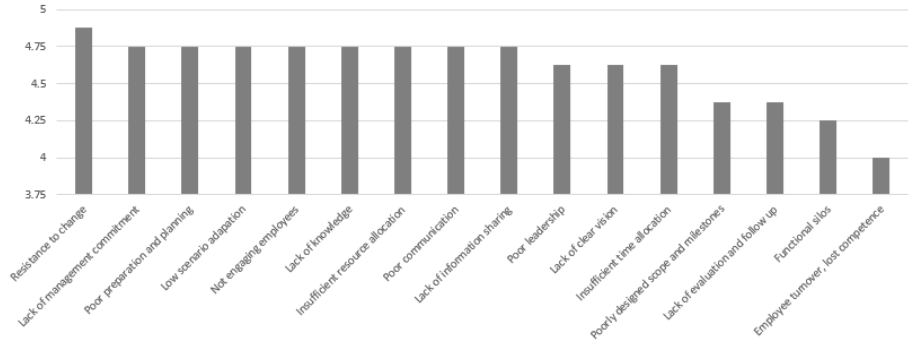


Figure 18: The scoring of the different barriers and challenges from the survey.

In Figure 19 the order from Figure 18 is kept to facilitate for the reader when comparing the two graphs. What can be seen in Figure 19 is that resistance to change is not only considered the most important barrier but it is also the most frequently mentioned during the interviews. The second most mentioned barrier is not engaging employees which is in line with its scoring. In section 4.2.1 through 4.2.5 the barriers are further discussed.

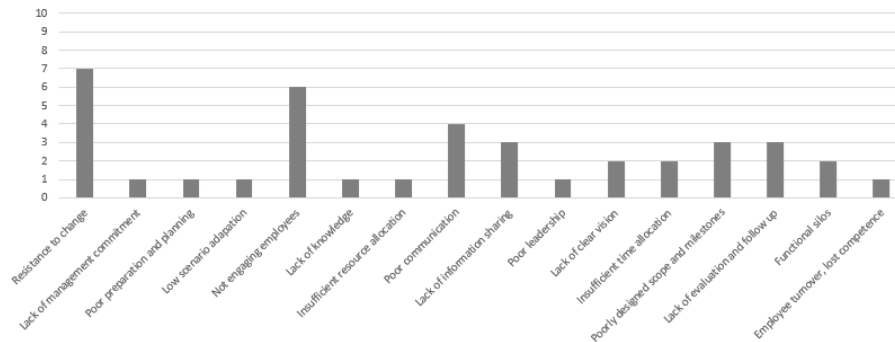


Figure 19: The frequency of the different barriers and challenges from the interviews, sorted in the same order as in Figure 18 to show discrepancies between importance and frequency.

In a similar manner as for the barriers the different CSFs, their occurrence and scoring are presented in Table 12.

Table 12: The frequency and scoring of the different critical success factors from the data collection as well as a brief description of the different factors.

Category	CSF	Frequency	Scoring	Description
Managerial	Management commitment	2	4.625	Top and middle management is committed to the initiative and are actively engaged in the work
	Management support	2	4.5	Management is available to lend managers their support with follow-ups, managerial challenges and more
Organization	Thorough preparation and planning	2	4.875	Developing a clear plan for the project and thoroughly preparing different steps
	Clear vision and goals	6	4.75	Having a clear vision of what is to be achieved as well as how and why
	Evaluation and follow up	3	4.5	Establishing routines and standards for how to evaluate the project as well as following up on the evaluation
	Establish routines and standards	1	4.75	Establishing routines and standards during the project
	Scenario adaptation	1	4.75	Adapting the project to different scenarios and sites
	Achievable goals and milestones	2	4.625	Establishing achievable goals and milestones, delimitations to the initial project
	Clearly defined roles	2	4.375	Defining clear roles and responsibilities for the project
	Provide material, framework and templates	1	4.5	Provide material such as templates or frameworks for the staff to make it easier to proceed with the project
	Planning for seasonality	1	4.5	Planning for seasonal variations of workload
	Teamwork	1	4.625	Establishing a team concept and working together, both within the group and the company. Obtaining a mindset of working as "we" rather than "us" and "them"
Crossfunctional cooperation on site	1	4.375	Cooperation between the different departments on a site	
Workforce	Engaging employees	9	5	Involving and engaging the employees in the project
	Training and education	1	4.75	Training and educating staff in relevant methods and tools
Financial	Resource allocation	2	4.75	Allocating sufficient resources in terms of human, financial and technical capital
Information	Communication	3	4.875	Clear communication between different actors associated with the the project
	Share vision and goals	6	4.625	Sharing what is to be achieved and why with middle managers and employees that are affected by the initiative
	Perceptiveness	1	4.875	Listening to employees' feedback and opinions when designing the different steps

From the results in Table 12 the frequency and importance of CSFs are graphically presented in Figure 20 & 21. Figure 20 is sorted based on importance and the four most prominent CSFs according to the interviewees were engaging employees, which was ranked as very important to all of the respondents, followed by thorough preparation and planning, communication, and perceptiveness on shared second.

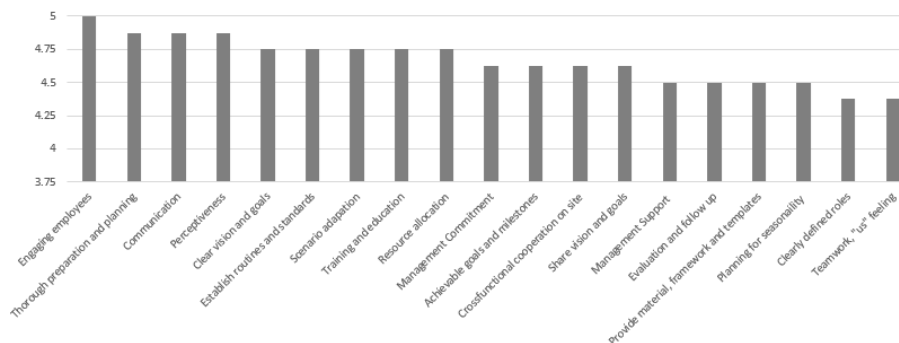


Figure 20: The scoring of the different critical success factors from the survey.

In Figure 21 the order is the same to the order in Figure 20 to make it easier for the reader to compare. In Figure 21 it can be seen that engaging employees is the most frequently mentioned CSF which is aligned with the considered importance. Two other frequently mentioned CSFs are clear vision and goals and share vision and goals. In section 4.2.1 through 4.2.5 the CSFs are further discussed.

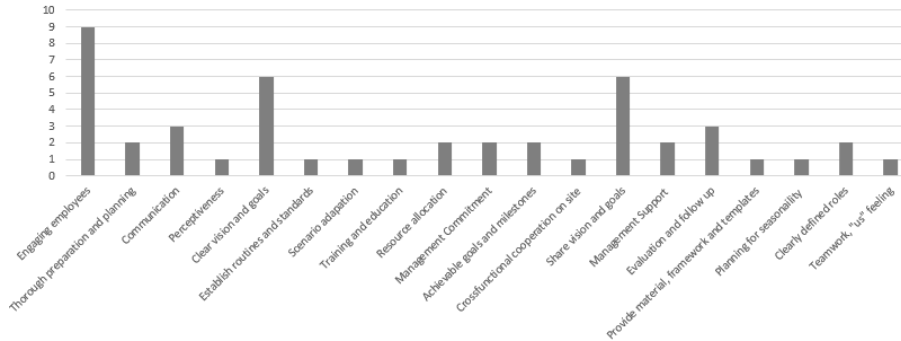


Figure 21: The frequency of the different critical success factors from the interviews, sorted in the same order as in Figure 20 to show discrepancies between importance and frequency.

4.2.1 Managerial

The managerial aspects mentioned within barriers were very rare, including only two different aspects with one mentioned each. These were lack of management commitment and poor leadership which were respectively ranked as a shared second in importance. The corresponding CSF factor were mentioned twice as often as its barrier counterpart. However, both ended up in the middle when arranging it by importance.

4.2.2 Organization

This category contains the largest amount of different factors mentioned for both barriers and CSFs. Many of the aspects have been mentioned few, sometimes just a single time, with a varying importance. The most frequently mentioned barriers are poorly designed scope and milestones and lack of evaluation and follow up. These were however the lowest scored ones in terms of importance while aspects related to planning and customization, i.e poor preparation and planning as well as low scenario adaption, excelled here. Regarding the success factors a pattern of planning and adaption related factors can be seen. The most frequent aspect is establishing clear visions and goals. Amongst the most prominent CSFs were clear visions and goals as well as thorough preparation and planning.

4.2.3 Workforce

This category contains some of the most frequently mentioned barriers such as resistance to change and not engaging the employees in the project. These

were often mentioned early in the interviews but were also an often recurring subject outside of the interviews during the site visits. Resistance to change was categorized as the most prominent barrier while lack of employee engagement were in a shared second. At the same time engaging employees were by far the most frequent mention amongst CSFs, where all but one mentioned it and were the first answer for many. In line with this it is also the highest ranking in terms of importance through the scoring where all who answered the survey gave it the highest score.

4.2.4 Financial

There were no large occurrence when it came to financial aspects for neither barriers or CSFs. Resource allocation was only mentioned once for barriers and twice for CSFs while two interviewees named insufficient time allocation as an important barrier. In contrast to the frequency the interviewees ranked the factors high in importance, especially insufficient resource allocation that was considered shared second for barriers.

4.2.5 Information

The barriers included in the information category, poor communication and lack of information sharing, were both frequently appearing in the interviews. The interviewees that mentioned those barriers often also highlighted the importance of having well functioning information sharing to enhance the possibilities to spread the required information. This is also seen as both factors were ranked shared second. In the same manner the CSFs in the information category are brought up in many interviews and especially sharing vision and goals was frequently appearing, but when ranked by importance the communication and perceptiveness were considered more important.

4.3 Performance Evaluation

Currently LMM employs different methods for performance evaluations. This thesis will mainly consider three of those, the first is the use of nine KPIs developed by LMM and used across all sites within the organization while the second is supplier audits from their largest supplier. The last one is an internal employee evaluation that Lantmännen perform every year.

Benchmarking & KPIs

The KPIs are divided into two different categories with the ninth KPI, customer satisfaction index, being part of neither. Each group consists of four KPIs and are divided into business indicators and workshop indicators. The business KPIs can be seen in the list below and considers business aspects such as coverage ratio but also turnover per salesmen and efficiency measurements for the warehouse. Per request by the company their target goals for the different KPIs are not included in this paper and results of over or undershooting the target are discussed regarding a hypothetical value. When determining the KPI target values LMM considered different aspects and trade-offs such as workload and cost to performance ratio.

- Turnover per spare part salesman
- Stock composition
- Coverage ratio
- Order type distribution

Turnover per spare part salesman is calculated as the average turnover per spare part salesman. This KPI is used to evaluate whether a location has the right amount of spare part salesmen. Depending on which area the salesmen operate within this value can differ. Coverage ratio is a traditional business indicator that measures the amount left after an item is sold but before expenses has been removed. This is affected by order patterns as well as promotions. Target coverage ratios varies between markets and type of products, factors to consider are for example volume, price, service contracts and after market. Stock composition considers the activity level of items in stock depending on three different categories, active, inactive/outdated items and active with a lower turnover rate. This KPI shows how active the warehouse is, preferably there is a low amount of outdated or inactive items as these inquire unnecessary tied up capital costs. It is also an indicator of whether a facility uses the available inventory management tools. Outdated items should not be kept at locations while slow moving items are better stored at the central warehouse and shipped on demand to reduce the tied up capital across all sites. This brings us to the final business KPI, order type distribution. LMM uses different categories when creating an order to the central warehouse depending on the urgency and required delivery speed, this KPI considers the distribution of the different urgency levels. Having excessive amounts of urgent orders leads to two things. First of all it makes it challenging to determine which orders are actually to be prioritized and expedited. Secondly it inquires increased logistics costs as more expensive and faster transportation modes may be chosen.

The second category for KPIs, the workshop related ones, consists of the following four KPIs that focuses on what literature refers to as productivity related aspects.

- Occupancy rate
- Average price (kr/h)
- Debit rate
- Uninvoiced

Occupancy rate is the first workshop KPI, this is calculated as the amount of hours where jobs is available through hours worked. Having a too high occupancy rate indicates that staff could overburdened as too much work is available. This could lead to unnecessary levels of stress as well as other tasks that are not registered as jobs being overlooked. This could be service, cleaning and maintenance and so on. A low occupancy rate indicates that the staff to job ratio is too high as there is not enough jobs to occupy the staff. Debit rate is presented as the fraction between hours debited to customers through amount of hours were jobs were available. Excessive amounts of time looking for tools, extra cleaning not related to the job and returns are all actions that decrease the debit rate. Both occupancy rate and debit rate consider aspects related to labour productivity and utilization. Average price is exactly what it implies, the average price a mechanic charges per hour worked. This is interrelated to the debit rate as it is of course affected by the amount of time that can be debited

to the customer. Similarly, waste of time and resources reduces the amount that can be charged per hour. Uninvoiced measures the amount of invoices that are not sent. Ideally, there are no invoices left unpaid and LMM works with routines for sending and following up on invoices to improve this KPI.

The final measurement is LMMs customer satisfaction index. This is based on customer feedback regarding processes and services provided on different locations. This includes aspects such as timeliness, perceived quality, how they experienced the service and so on. This KPI is used to evaluate how customers experience the service and to identify areas of improvement.

- LMKI - Lantmännen Maskins customer satisfaction index

Throughout the interviews the interviewees were asked to identify which of LMMs KPIs they thought would be affected by a 5S implementation. The results can be seen in Table 13. As can be seen the most frequent answers are associated with the workshop KPIs occupancy rate, debit rate, average price and uninvoiced. All of these were expected to be affected in a positive manner. Some believed that these factors would be affected directly by the initiative while some argued that improving one specific factor would inevitably affect the others as they are interrelated. A handful identified LMKI, Lantmännen Maskin customer satisfaction index, as another that could potentially be positively affected by 5S.

Table 13: The frequency of answers for the different LMM KPIs expected to be affected by a 5S implementation.

KPI	Frequency
Turnover per spare part salesman	1
Coverage ratio	1
Stock composition	2
Order type distribution	2
Occupancy rate	6
Debit rate	7
Average price	5
Uninvoiced	6
LMKI	3

In addition, interviewee D brought up the time aspect of performance measurement arguing that any project requires resources such as time and money which will during the implementation affect performance indicators at the location. Arguing that the KPIs should be expected to drop during the implementation phase before hopefully returning and exceeding the initial level. Furthermore, interviewee I reasoned on how appropriate performance indicators and expected results could be affected by varying maturity levels between sites. Locations that are already performing on a high level regarding a certain indicator might not be able to see noticeable improvements regarding this aspect while a less mature

site might. As a result the maturity of the site in question should be considered when deciding how to evaluate and which KPIs to consider.

Supplier Audits

The supplier audits are performed biannually by their largest supplier who evaluates a wide variety of traits. On a general level, it focuses on factors such as quality, cleanliness and order, competence and how well they comply with agreements. Some examples of items evaluated during the audits is the state and cleanliness of outside areas, clear and correct signs for the suppliers products according to agreements, competent salesmen, clean workspaces and tools, staff educated regarding the suppliers products in accordance to agreements. After all the items have been evaluated it is summarized and used as a measurement and a tool for future collaboration.

Employee Evaluations

LMM performs annual employee evaluations for the entire company where the employees get the opportunity to express how they experience the workplace and what is performed well and where improvement can be done. The results are evaluated on a general level as well as for each location, where the location manager get specific feedback regarding their site.

5 Analysis

This chapter will present the analysis which has been conducted according to the steps described in the method. The results and discussion of the pattern matching and coding of the CSFs and barriers can be seen as well as implications and conclusions. Following this is performance evaluation throughout the different stages are discussed and compared to theory. This chapter lays the foundation for answering the research questions.

5.1 Barriers

The analysis of barriers for organizational change was done through pattern matching using the data presented in Table 8 & 11 and Figures 10, 18 & 19. Each section compares similarities and discrepancies between frequency and scoring of the different barriers between literature and data collected from interviews followed by a section summarizing and discussing relevant results and implications.

5.1.1 Managerial

Analyzing the results from the theoretical study and the data collection within the managerial category shows that two out of three categories that were frequent in the theoretical study appeared in the interviews as well. However, while lack of management commitment were amongst the most frequently mentioned factors within literature it were only mentioned once through the interviews. Despite this discrepancy, management that is not committed and engaged in change initiatives are considered by both sources as one of the most prominent barriers.

The second aspect that they had in common were lack of, or poor, leadership. With roughly the same frequency of mention at 10 % this aspect is ranked in the middle by the survey. The belief that managerial aspects could affect other areas were found both in literature and in the interviews. When talking about leadership the interviewee highlighted how it is related to other aspects, for example employee engagement and resistance to change, and how poor leadership can get staff demotivated and hamper the progress within these areas.

One recurring factor in literature that was never mentioned in the interviews were insufficient top management support. This factor is often ranked amongst the most important and it is interesting that this is completely overlooked in the data collection. This could potentially be as a result of many projects at LMM are initiated by upper management at HQ and thus middle managers considering it as "their" project and that their support is a prerequisite.

5.1.2 Organization

One factor appearing in both the interviews and the literature review is the lack of vision, this is mentioned with the same frequency in both interviews and articles, at roughly 30 %. The scoring for the lack of vision is rather low in the collected data, especially in comparison to the ranking by literature which tends to rank it as an important factor. Another aspect that was brought up from both sides was the lack of planning where the opposite can be seen, that is

the data collection ranks it highly while literature tends to consider it to be less important. Here a discrepancy can be seen regarding the frequency, it is located in the middle when considering the articles, about 30 %, while it was discussed at only one interview, both the interviewees and literature are ranking it as a very important factor.

Lack of strategic perspective and poor alignment between initiative goals and the organizations strategic goals is a common aspect mentioned in literature. This is however not mentioned in the interviews where a more site specific perspective is applied. Here the factors low scenario adaption and functional silos and low cooperation between the different divisions at the location are brought forward. These two aspects are rarely mentioned in research. Lastly, the barrier that literature consider one of the most important factors is lack of evaluation and follow up. This is infrequently mentioned in literature, but were amongst the most frequently mentioned in the interviews. Worth mentioning is that the interviewees ranked it as one of the least important barriers despite mentioning it so often. Evaluation and follow up is especially important after a project to ensure that changes are sustained.

5.1.3 Workforce

This category contains some of the most frequently mentioned barriers for both the interviews and the literature review. First of, the factor that were most frequent in the data collection and second most frequent in literature were resistance to change. Through the surveys this was also ranked as the single most important barrier. Often this factor were a central point that interviewees used when finding other related barriers. Thus it is believed to be an especially important barrier for this specific type of business and that it is affected by how well one works with other barriers.

Secondly, not engaging employees or lack of employee commitment were another factor that the data sets have in common. This is the second most common barrier from the interviews and the second most important. However, it were the tenth most frequent in literature.

Three factors that are closely related but where a discrepancy is seen is associated to knowledge and training. One which both sets have in common is lack of skills, knowledge and expertise or just lack of knowledge. This is closely related to the one of the most frequent barriers mentioned in literature, misunderstanding of concepts, which was not mentioned through the interviews. As a lack of knowledge regarding a method or model can result in a misunderstanding of concepts which in turn affects the resistance to change and potentially the employee engagement. Employee turnover is mentioned once in the interviews and the result of this is lack of knowledge. However, this only turns into a true problem if knowledge is not shared or unevenly distributed.

One prominent barrier in literature is lack of training and education. Surprisingly this was not mentioned a single time throughout the interviews. This is considered a prominent barrier, so why did it end up not being mentioned? We believe that as the training and education are provided from the HQ to the middle managers they do not think of this factor as it is not typically part of their job description, but once again something that is expected as a part of

new initiatives provided from their superiors.

5.1.4 Financial

For the financial aspects the literature and the interviewees have a common point of view, both mentioning the importance of having enough economic funding and time invested in the project. None of the factors connected to resources were mentioned most frequently by any of the actors but the interviewees ranked the insufficient resource allocation as the second most important. The high scoring might be a result of the fact that a project has a starting cost and requires investments throughout the implementation and the fact that each site can be considered small, a project cover a larger part of the revenue compared to a large organization and therefore the risk is higher. Interviewees also brought up balance between projects and day-to-day activities as an important part of the time allocation aspect. Examples of previous projects where too much time were allocated to projects which made daily activities suffer which ended up in them dropping the project.

Other aspects included in literature but not in the interviews were the perspectives of human resources and IT resources. This may be a result of the size of the investigated organization, the papers studied often focuses on larger organizations with more functions. So while larger organizations may have entire departments for HR or IT services this tasks are either controlled through the HQ or integrated in another role at the locations, thus it is reasonable that these aspects were not mentioned amongst the five most prominent barriers in interviews.

5.1.5 Information

One common factor between literature and interviews is lack of communication, in both scenarios it is amongst the most frequently mentioned barriers and are by both ranked as a prominent barrier. Communication considers both up and downstream information flows regarding processes on site relevant for project design and the initiatives. One important barrier according to the interviewees is lack of information sharing which was interpreted as a downstream information flow about purpose and execution of the initiative. This was infrequently mentioned in literature mainly because it is included in the definition of communication, but it is worth mentioning that for the employees this was an important aspect they distinguished.

5.1.6 Discussion and Implications

A pattern seen within the different categories is a discrepancy regarding scopes and perspective. Literature often considers factors ranging from site specific to organizational wide or even external factors such as politics, trends or regulations. This data is generally collected from experienced managers or experts within the field. As this thesis collected data from middle managers a certain gap is to be expected between the two data sets. The interviewees tended to mention factors that are relevant for their position or site while leaving out factors considering a wider scope and the organization as a whole. This could be seen in areas such as lack of strategic perspective, management commitment,

organizational strategy or training and education. Despite this, when asked to rank these factors they were considered important despite not being mentioned often.

Considering the frequency and scoring of the data some barriers stand out. Despite the low frequency in the interviews, lack of management commitment has to be considered as one of, if not the, most important barrier. One reason for this is the high scoring through literature and by the interviewees, but also because of the ripple effect it is believed to create on other important barriers such as employee engagement and resistance to change. These two are in turn amongst the most important barriers as a result of the high importance through interviews and data collections. Because of the high frequency it is mentioned by the interviewees we believe it is especially important for locations of this size.

One factor that both literature and practicals agreed about was the importance of well functioning communication, it was both mentioned frequently and scored high. Worth noting is the highlighted importance of downstream information sharing which interviewees believed were an enabler for reducing resistance to change and improving employee engagement. Finally, lack of evaluation and follow up should be included in this list despite the low ranking by interviewees. It is one of the most important enablers for sustained change and ranked as one of the most crucial barriers by Errida and Lotfi (2021). Another reason for this inclusion is that it is very closely related to 5S, especially the fifth stage sustain.

5.2 Critical Success Factors

The analysis of critical success factors for organizational change was done through pattern matching using the data presented in Table 9 & 12 and Figures 11, 20 & 21. Each section compares similarities and discrepancies between frequency and scoring of the different barriers between literature and data collected from interviews followed by a section summarizing and discussing relevant results and implications.

5.2.1 Managerial

Managerial success factors were often considered the most important in literature. It is also amongst the most frequently mentioned and contains several more aspects in literature compared to CSFs mentioned in the data collection. Management commitment is one factor that was mentioned in both, it is considered by many to be the most important factor but in the interviews it was mentioned twice and scored in the middle. The other factor both sets have in common is management support which follows the same pattern where literature mentions it more often and ranks it of a higher importance.

Through the literature review three factors were mentioned that did not appear through the data collection. These were leadership, project management skills and resistance & change management. Leadership is one of the factors that is most frequently occurring in the literature, this is one of the managerial aspects that could influence other aspects such as employee engagement. Resistance & change management as well as project management skills are likely more relevant to bigger businesses where the projects in question can be significantly

larger and more resources allocated which enables tasks such as resistance management.

A pattern seen through this entire category is a trend of literature ranking managerial aspects higher than the interviewees. In addition, more CSFs and a wider range of aspects are covered in literature while the interviewees mainly touch upon aspects in their direct vicinity.

5.2.2 Organization

Comparing the literature review with the results from the interviews the first observation is that many different aspects are mentioned both from the researchers but also from the interviewees. Many of them are similar such as long term planning and clear vision and goals while some are more distinguished from the other. A brief distinction between the literature studied and the aspects mentioned through the interviews are that many of the factors from the literature leaning towards the wide picture such as organizational strategy, external support and supply chain integration while factors mentioned in the interviews such as planning for seasonality and scenario adaption are more focused on the individual site. For example is having an well formulated strategy and shaping their operation after it is the most frequently mentioned factor in the literature in this category but it is not mentioned in any of the interviews. This aspect was discussed in section 5.1 as well where it was expected that the managers at the sites, that can be considered middle managers at LMM as a whole, were lacking the wide perspective as the top management got.

Long term planning is a factor that is mentioned through the literature and when comparing to the answers from the interviewees, many of those factors could be seen as a part of what literature includes in long term planning. Those are preparation and planning, clearly defined roles, evaluation and follow up, establishing routines and standards. When looking at the frequency and scoring for those aspects they seem to be valued higher in the interviews rather than in the literature, literature are ranking those somewhere in the middle while the interviewees rank thorough preparation and planning as a very important CSF and clear vision is mentioned among the most frequent. This displays a similar pattern of narrower scope and higher site focus from the participants compared to literature. Finally, teamwork is a aspect that is named of both the academia and the interviewees but does not seem to be that important since it is ranked at the bottom.

5.2.3 Workforce

The most frequently mentioned and highest ranked CSF from the interviews were engaging employees, this factor was mentioned by 90 % of the participants and received the highest score by all. This factor is also touched upon in literature but were often called employee participation. While it is still a frequently occurring CSF that is deemed important it is typically not as clearly emphasized as through the interviews. Once again, the different origins of the data may be the reason for this as the interviewees generally work a lot closer to the employees than the subjects interviewed in literature. Another possible explanation is the small size of the different locations and thus each individuals

attitude and participation in the project plays a bigger role.

Another CSF these two sets have in common is training and education. It is amongst the most frequently mentioned in literature but it only appeared once in the interviews. However, both parties considers it an important CSF. One difference between the two is that the interviewee talked about training and education of employees while literature includes all levels of an organizations hierarchy. Literature often mentions skills, knowledge and expertise as a CSF. While this is not mentioned as a CSF by the interviewees it was listed as a barrier in the form of lack of knowledge.

The most common workforce factor from literature, organizational culture, is not mentioned through the interviews. Despite discussing general aspects within the organization and how certain CSFs could be applicable to other locations, but not their own, most listed CSFs that they deemed important for their own site.

5.2.4 Financial

The financial category of CSFs is the least common category with only one mention from the interviews but three different aspects through literature. Both agree the resource allocation is a critical aspect for projects. This includes aspects such as allocating sufficient resources for success and being aware of costs and reduced capacity but also finding a balance between time dedicated to projects and day to day tasks.

Profitability and reward systems are two factors mentioned in literature but not through the interviews. Neither are ranked particularly high and regarding the reward systems caution is advised as it is mostly useful in the beginning and that the changes should become a natural part of the work environment. These factors are not mentioned in the interviews, but there is a kind of reward system in place at LMM already. The mechanics in the workshop have partly performance based salary and performance improvements would show on this bonus.

5.2.5 Information

The final category is information where two factors overlap, those are share vision and goals as well as communication. While communication is the most frequent of those two in literature the reverse can be seen from the interviews. A similar pattern to what was identified regarding the barriers can be seen in this section. Communication is seen as a two way street while sharing vision and goals is a downstream flow of information and the interviewees primarily mention the information sharing. However, both literature and the participants of the survey ranks communication, and thus a two way information flow, higher than sharing of vision and goals. The interviewees captures the upstream information flow through the factor perceptiveness which was not very frequently mentioned but score as one of the most important. Communication could potentially be considered a bit of an umbrella term and if one excel at this, the other two would naturally be covered as well.

5.2.6 Discussion and Implications

Patterns found throughout the analysis of the CSFs align fairly well with what was found through the barriers. In the different categories participants tended to mention CSFs that are closely related to their responsibilities and site. Since the interviewees were middle managers their responsibilities typically revolved around a specific site and its performance. Aspects regarding a wider scope such as organizational culture or alignment between organizational strategy and change method are not often mentioned through the interviews while these factors are more often recurring in academia. Similarly, literature often ranks site related aspects lower and managerial and organizational aspects higher.

Based on the frequency and scoring of the CSFs both by interviewees and by literature some are especially important. Employee engagement or participation is the first aspect, by almost all interviewees it was the factor that was named first and got highlighted by many who claimed that unless the staff is included you might as well just give up. Its importance is further supported by both the frequency and scoring as well as the literature. Two other factors that stands out are management commitment and support. Despite the low frequency and relatively low scoring through the interviews literature is in agreement that these are two of the most important CSFs to work with which should not be ignored. Along the same lines as with the barriers, the importance of these factors are emphasized by how it affects others like employee engagement and organizational culture.

Organizational culture is another factor that should be taken into special consideration. Despite the low frequency of mentions from participants it is frequently occurring in literature and considered to be of high importance. Furthermore, the interdependencies between organizational culture and other important aspects, such as employee participation, is why this is considered as one of the most prominent CSFs. A good organizational culture that is open to change and new initiatives could also be considered the remedy to one of the major barriers, resistance to change.

Training and education was ranked at the top of importance, both by interviewees and researchers, and the importance of continuously improving and develop is often highlighted in the literature. Training and education of employees leads to a better understanding and knowledge of the subject. This in turn improves the organizational culture and reduces resistance to change and facilitates employee engagement. Finally, communication is a factor that is ranked as a prominent CSF by both literature and interviewees. The same pattern of a higher focus on downstream, but higher importance on two way communication, as seen amongst the barriers can also be identified amongst the CSFs. Similarly, the believed correlation between communication and employee participation can be applied here.

5.3 Performance Evaluation

Based on the models identified in section 3.5 the analysis is performed by adapting those models to fit the context using literature and the data collection. As in the previous section the performance evaluation is divided into the three segments: prior, during and after.

5.3.1 Prior

Prior to beginning an implementation a lot of preparation needs to be done. Through the CSF and barrier analysis some of the more important aspects were associated with stages prior to the project. Some examples are thorough preparation and planning, clear vision and goals and resistance to change. To improve the odds of success these aspects should be evaluated before starting the actual implementations. Näslund and Norrman (2022) proposes a model to design and gain acceptance for the change purpose while Hammer (2007) suggests evaluating the enterprise capabilities to determine readiness for change.

Through working with a combination of these two models many of the identified CSFs and barriers are covered. Including the different aspects when designing the change purpose and performing the recommended steps to establish an accepted change purpose affects prominent barriers such as resistance to change or CSFs such as clear vision and goals, communication, management commitment and more. The model proposed by Hammer (*ibid.*) compliments this tool as it focuses on other factors, for example skills and knowledge, training and education, resistance to change and employee engagement.

These tools can be used to determine if a location is ready to begin the change initiative. Determining which aspects should be considered and what levels of maturity are acceptable creates natural tollgates during the prior stage. Once all tollgates are fulfilled one can proceed with the project where the transition between preparation and implementation is a logical milestone.

5.3.2 During

Performance evaluation during a 5S implementation is to a high degree incorporated in the method. As one needs to evaluate progress to determine when a sufficient standard has been reached and when it is time to proceed to the next step. Ohlsson (2015) recommends creating lists of activities and goals for each of the 5 S:es, these can be considered tollgates, as you go along each item is ranked on a scale from 1 (Large improvements needed) to 5 (Perfection), where 3 is a passing grade. Once all tollgates for a stage are passed you are ready to move on to the next S. Creating these tollgates and considering the transitions as milestones for the project is an easy and shareable way of measuring how the implementation is proceeding.

The tollgates needed to reach milestones may differ between sites depending on factors such as initial maturity level and what functions are available at the location. Engaging employees and communicating goals and purpose of the project are identified as significant factors in the prior analysis. As such, employees should be included when deciding on which areas should be included in the project, expected standards and tollgates. Not only does this improve the quality, but also increases the understanding and knowledge of the workers which is a way of reducing the resistance towards change.

5.3.3 After

A large part of the evaluation of a project is done after it is already in place and as 5S is cyclical this evaluation takes place between iterations. A variety of

possible tools and methods have been discussed in section 3.5.3 as well as performance evaluation methods currently in place at LMM, see section 4.3. This section aims to combine the information from these two chapters to generate a suitable combination of performance evaluation models for the 5S implementation at LMM.

5S Specific Tools

In the during stage the areas included in the project and standards are determined while the final S, sustain, focuses on the sustainability of the change initiative and the goal is to develop conditions that enables 5S to be a part of the culture for the day-to-day work and encourage continuous improvement (Olofsson 2013). As mentioned earlier, relevant activities and appropriate goals are defined for each of the five S:es. The final stage focuses on evaluating the performance and creating routines and standards that ensures lasting change as well as determining what should be included in the next 5S iteration and also review the standards for areas already in the project to determine if any of the existing targets should be raised (Ohlsson 2015). While there are more elaborate models for evaluating 5S performance and sustainability, such as the models by Setiawan et al. (2021) and Ranjith, Ganesh, and Rajendran (2021) presented in section 3.5.3. It was also identified that SMEs often are reluctant to, and lack the human resources for, employing more advanced performance evaluation systems. In addition, while managers at the HQ in Malmö are capable of employing these models managers across all sites may not be able to do this independently. These aspects in combination with resistance to change being identified as one of the most significant barriers dissuades us from recommending either of these models and suggests focusing on the self audits incorporated in the 5S method.

Through self audits the compliance and performance regarding agreed upon standards and routines are evaluated as well as evaluation of how employees, leadership and management follows and enables continued improvements of 5S (Ohlsson 2015). These aspect correlate to the CSFs identified in section 5.1 with main point in the CSFs management commitment and support, organizational culture and employee engagement. This is done in the same manner as in the during stage with a ranking 1 to 5 (ibid.). A schedule for planning and control of who is responsible for the self audits should be developed to be able to secure that the evaluations are performed.

Benchmarking & KPIs

Regarding the KPIs, two different sources are compared. The first source is literature, where the expected improvements of 5S implementations collected. The second source is the interviewees who has replied to the question: Which of LMMs KPIs do you believe would be affected by a 5S implementation? On this question the most frequent answers were all workshop related KPIs, which were mentioned by 50 - 70 % of the participants. Furthermore, it was often stated that the workshop KPIs are interrelated and that if one were to be affected it would in turn affect the others. This is in agreement with literature which states that continuous improvement programs typically improve productivity related aspects such as quality, staff utilization and better use of available space. This

theory is further supported by the 5S literature that states the same areas of improvement. As the existing workshop indicators captures many of the relevant indicators of performance for 5S we recommend that LMM do not reinvent the wheel and rather continue using the already established KPIs and compliment these hard values with soft values that covers the other benefits of 5S. Our belief is that maintaining existing methods increases the chances of success as the managers already know how to use the existing systems, thus the changes will be smaller compared to reworking or adding new evaluation methods.

Other Tools

Some of the most prominent benefits of 5S according to literature are aspects that can not be captured in the LMM KPIs. Safety and employee satisfaction are two of those benefits and should thus be measured using other tools. Safety can be measured using other systems already in place for reporting possible hazards and accidents, following up and evaluating this data on sites where 5S is implemented can show if there has been improvements. Furthermore, comparing it to sites where 5S has not yet been implemented could serve as an indicator if 5S is the source of the improvements or if other factors might be affecting it. As some participants pointed out, if routines for reporting incidents and hazards improve the amount of reports will increase. Thus, this aspect should be considered if initially the performance decreases.

Due to the high emphasize of employee satisfaction and having a healthy workplace for the employees this aspect should also be considered when evaluating whether a 5S implementation has been successful or not. Furthermore, through the analysis of CSFs and barriers employee engagement and resistance to change were amongst the most prominent. We believe that satisfied and content employees are more likely to be engaged in projects and compliant towards new initiatives. This is measured and followed up annually through the employee evaluations which could be used to compare employee satisfaction before and after which is another soft indicator of 5S performance. As it is related to many of the important CSFs and barriers, it could be beneficial to increase the frequency of employee evaluations and feedback in relation to initiatives to understand how they feel regarding the project as it progresses.

6 Conclusion

In this chapter the answers to the research questions are presented. Presenting the most prominent barriers and CSFs identified through the analysis and a brief comparison. Following this the recommended milestones and tollgates for the project is shown. Finally, a recommendation of tools for evaluating the performance and how to determine success is presented.

6.1 Answering the Research Questions

RQ1: What are the most prominent barriers and challenges of organizational change and more specific Lean (5S)?

Through a literature review 17 barriers for organizational change were identified with a variety of frequency. Combining this with 16 barriers gathered through data collection and a survey ranking them based on importance an analysis was performed. Considering the aspects of frequency, importance according to literature and participants as well as change method the following were concluded to be the most prominent for LMM. While these were considered the most prominent, all barriers are important aspects to considered and the complete list of barriers identified through literature can be seen in Table 8 and in Table 11 for the data collection.

- Lack of management commitment
- Poor communication
- Lack of employee engagement
- Lack of evaluation and follow up
- Resistance to change

RQ2: What are the most prominent critical success factors and drivers for organizational change and more specific Lean (5S)?

In a similar manner 21 different CSFs were identified through the literature review while 19 CSFs were gathered through the data collection. The analysis considered the aspects frequency, scoring and model for the CSFs as well. Below the six most important CSFs are presented. However, all the identified CSFs are relevant and important and can be seen in Table 9 & 12.

- Management commitment
- Organizational culture
- Management support
- Communication
- Employee engagement
- Training and education

A clear correlation between the most important CSFs and barriers can be seen. For the CSFs management commitment, management support, employee engagement and communication a corresponding barrier phrased as "lack of CSF" is apparent. Organizational culture is considered the countering factor to resistance to change. Thus, training and education as well as lack of evaluation and follow up are the two factors lacking a counterpart.

RQ3: How can LMM know if the change initiative was successful?

To determine if a project is successful, the purpose and goal of the initiative must first be determined so that one can evaluate the correct measurements. The goal of a 5S implementation should consider productivity related measurements as previously discussed as well as safety, quality and employee satisfaction as these are the main benefits related to 5S. We recommend that LMM should use the performance measurement systems already in place, these are LMM KPIs, employee evaluations, supplier audits and incident & hazard reports in combination with self audits through 5S. The KPIs provides hard values of how the performance of a site is affected and it is easy to compare current and past values, special focus should be on the workshop related KPIs.

Through tracking incident and hazard reports one can determine if the workplace safety is increased through 5S, which is one of the main objectives. Using employee evaluations in a similar manner allows for tracking the performance regarding the work environment and the well being of the employees. The supplier audits considers a wide variety of factors and many should be positively affected by a properly implemented 5S system. Following up on these audits is another indicator of performance. Additionally, the fifth S incorporates self audits as a central part of the process. This evaluates the actual 5S behavior and how well routines and standards are followed.

Combining the results of the methods mentioned above gives a good indication of how well LMM is performing within the different areas that are affected by 5S while at the same time minimizing the amount of changes for the employees to facilitate an easier implementation and greater probability of success. Considering all these factors is important when determining whether the project is successful or not.

6.2 Fulfillment of Purpose

This thesis has fulfilled its purpose as it has delivered CSFs and barriers important to consider during and prior to the implementation as well as how to evaluate the performance and whether it was successful or not. The researchers has also participated in meetings discussing how the practical implementation should be adapted for LMM.

6.3 Contributions

This thesis has not contributed to any new theoretical findings but have rather found results in line with existing theory. However, one aspect identified that was not seen in literature is the discrepancy between middle managers site specific view on CSFs and barriers versus the more comprehensive view often seen in literature. In a similar manner, the practical contributions to LMM have mainly been of a supportive nature, confirming their hypothesis regarding how to prepare and execute the change initiative while also adding some new aspects. Conclusions and recommendations from this thesis has been used as an inspiration during the preparation work as well as when preparing managers for the coming implementation.

The practical contributions of this thesis are believed to be applicable in other

organizations, especially those of a similar organizational structure. The identified CSFs and barriers are presented as a general list and applicable, with only small or no adaptations, to other change methods. The level of generalization is lower for the identified evaluation methods as the purpose of the initiative needs to be considered and subsequently which aspects should be evaluated.

6.4 Limitations

This thesis used mainly qualitative methods for data collection and analysis. Thus, the sample sizes were selected to accommodate this method. As a result, the data and analysis generated through the quantitative method became lackluster. The low number of participants created a low number possible outcomes and in the end many factors had the exact same scoring which made it challenging to formulate concrete conclusions based on them.

6.5 Future Research

This thesis highlights the discrepancy between opinions regarding critical success factors and barriers for literature and middle managers. Whereas middle managers have a higher focus on site specific aspects while literature focuses on a wider scope. These results can be further investigated through increasing sample size of the data collection and extending the literature review and focusing on papers on service and SMEs.

References

- Abu, F. et al. (2019). “The implementation of lean manufacturing in the furniture industry: a review and analysis on the motives, barriers, challenges, and the applications.” In: *Journal of Cleaner Production* 234, pp. 660–680. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=19238792&site=eds-live&scope=site>.
- Achanga, P. et al. (2006). “Critical success factors for lean implementation within SMEs.” In: 17.4, pp. 460–471. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.17410380610662889&site=eds-live&scope=site>.
- Alkhorairif, A., H. Rashid, and P. McLaughlin (2019). “Lean implementation in small and medium enterprises: Literature review.” In: *Operations Research Perspectives* 6. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S2214716018301659&site=eds-live&scope=site>.
- Antomarioni, S. et al. (2021). “Lean projects’ evaluation: the perceived level of success and barriers.” In: *Total Quality Management & Business Excellence* 32.13/14, pp. 1441–1465. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=153155231&site=eds-live&scope=site>.
- Antonio, B.T. and R.D. Kusumastuti (2019). “Lean Operations Implementation at an Indonesian Shoe Producer.” In: *South East Asian Journal of Management* 13.1, pp. 92–105. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=137283851&site=eds-live&scope=site>.
- Antony, J. et al. (2021). “Using Six Sigma DMAIC for Lean project management in education: a case study in a German kindergarten.” In: *TOTAL QUALITY MANAGEMENT & BUSINESS EXCELLENCE*. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edswss&AN=000695441800001&site=eds-live&scope=site>.
- Baker, G. and H. Maddux (2005). “Enhancing Organizational Performance: Facilitating the Critical Transition to a Process View of Management.” In: *SAM Advanced Management Journal (07497075)* 70.4, pp. 43–60. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true%5C&AuthType=ip,uid%5C&db=bth%5C&AN=20195512%5C&site=eds-live%5C&scope=site>.
- Bayhan, H.G., S. Demirkesen, and E. Jayamanne (Feb. 2019). “Enablers and Barriers of Lean Implementation in Construction Projects”. In: *IOP Conference Series: Materials Science and Engineering* 471, p. 022002. URL: <https://doi.org/10.1088/1757-899x/471/2/022002>.
- Behn, R.D. (2003). “Why Measure Performance? Different Purposes Require Different Measures.” In: *Public Administration Review* 63.5, pp. 586–606. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsjsr&AN=edsjsr.3110101&site=eds-live&scope=site>.

- Bhamu, J. and K. Singh Sangwan (2014). "Lean manufacturing: literature review and research issues." In: *International Journal of Operations & Production Management* 34.7, pp. 876–940. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.IJOPM.08.2012.0315&site=eds-live&scope=site>.
- Bhasin, S. (2012). "An appropriate change strategy for lean success." In: *Management Decision* 50.3, pp. 439–458. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.00251741211216223&site=eds-live&scope=site>.
- Bhuiyan, N. and A. Baghel (2005). "An overview of continuous improvement: from the past to the present." In: *Management Decision* 43.5, pp. 761–771. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.00251740510597761&site=eds-live&scope=site>.
- Braun, V. and V. Clarke (Jan. 2006). "Using thematic analysis in psychology". In: *Qualitative Research in Psychology* 3, pp. 77–101. DOI: 10.1191/1478088706qp063oa.
- Calabro, A., F. Lonetti, and E. Marchetti (2015). "KPI Evaluation of the Business Process Execution through Event Monitoring Activity." In: *2015 International Conference on Enterprise Systems (ES), Enterprise Systems (ES), 2015 International Conference on, es*, pp. 169–176. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsee&AN=edsee.7406860&site=eds-live&scope=site>.
- Cambridge Business English Dictionary (2022a). *Critical Success Factor from the Cambridge Business English Dictionary*. URL: <https://dictionary.cambridge.org/dictionary/english/critical-success-factor>. (accessed: 03.29.2022).
- (2022b). *organizational change from the Cambridge Business English Dictionary*. URL: <https://dictionary.cambridge.org/dictionary/english/organizational-change>. (accessed: 02.25.2022).
- Cândido, C.J.F. and S.P. Santos (2015). "Strategy implementation: What is the failure rate?" In: *Journal of Management & Organization* 21, pp. 237–262. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-84923038218&site=eds-live&scope=site>.
- Chaneski, W. S. (2009). "Lean Concepts Really Do Apply In All Industries." In: *Modern Machine Shop* 81.11, pp. 34–36. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=37701641&site=eds-live&scope=site>.
- DeSanctis, I. et al. (2018). "The moderating effects of corporate and national factors on lean projects barriers: a cross-national study." In: *Production Planning and Control* 29.12, pp. 972–991. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-85053879230&site=eds-live&scope=site>.
- Dixon-Woods, M. and G.P. Martin (2016). "Does quality improvement improve quality?" In: *Future hospital journal* 3.3, pp. 191–194. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.3-3.0-85053879230&site=eds-live&scope=site>.

- lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true%5C&AuthType=ip,uid%5C&db=cmedm%5C&AN=31098223%5C&site=eds-live%5C&scope=site.
- Do, D. (2022). *What is Muda, Mura, and Muri?* URL: <https://theleanway.net/muda-mura-muri>. (accessed: 05.25.2022).
- Durakovic, B. et al. (2018). "Lean manufacturing: Trends and implementation issues". In: *Periodicals of Engineering and Natural Sciences (PEN)*. URL: https://www.researchgate.net/publication/327801199_Lean_manufacturing_Trends_and_implementation_issues.
- Elkhairi, A., F. Fedouaki, and S. El Alami (2019). "Barriers and Critical Success Factors for Implementing Lean Manufacturing in SMEs". In: *IFAC-PapersOnLine* 52.13, pp. 565–570. URL: <https://www.sciencedirect.com/science/article/pii/S2405896319312571>.
- Eriksson, M. and J. Lilliesköld (2010). *Handbook for Small Projects*. Liber AB. ISBN: 9789147099658.
- Errida, A. and B. Lotfi (2021). "The determinants of organizational change management success: Literature review and case study." In: *International Journal of Engineering Business Management*, pp. 1–15. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=150253714&site=eds-live&scope=site>.
- Garmer, K. (2016). *Effektivare med 5S-metoden : systematiskt arbetsmiljöarbete*. Prevent. ISBN: 9789173651035.
- Garvin, D.A., A.C. Edmondson, and F. Gino (2019). "Is Yours a Learning Organization?." In: *Harvard Business Review*, pp. 86–93. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=139817344&site=eds-live&scope=site>.
- Ghalayini, A.M. and J.S. Noble (1996). "The changing basis of performance measurement." In: *International Journal of Operations Production Management* 16.8, pp. 63–80. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.01443579610125787&site=eds-live&scope=site>.
- Hak, T. and J. Dul (2010). *Pattern Matching*. Vol. 2. Sage Publications, Inc. ISBN: 978-1-4129-5739-7. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsgvr&AN=edsgcl.1562500259&site=eds-live&scope=site>.
- Hammer, M. (2004). "Deep change. How operational innovation can transform your company." In: *Harvard business review* 82.4, p. 84. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=cmedm&AN=15077369&site=eds-live&scope=site>.
- (2007). "The Process Audit." In: *Harvard Business Review* 85.4, pp. 111–123. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true%5C&AuthType=ip,uid%5C&db=bth%5C&AN=24267684%5C&site=eds-live%5C&scope=site>.
- Hansson, Emma-Lisa (2019). *LTH Master's student guide: Citation searching*. URL: <https://libguides.lub.lu.se/lthmasters>. (accessed: 02.17.2022).

- Höst, M., B. Regnell, and P. Runeson (2006). *Att genomföra examensarbete*. Studentlitteratur. ISBN: 9789144005218.
- Hu, Q. et al. (2015). “Lean implementation within SMEs: a literature review.” In: *Journal of Manufacturing Technology Management* 26.7, pp. 980–1012. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.JMTM.02.2014.0013&site=eds-live&scope=site>.
- Hvolby, H-H and A. Thorstenson (Aug. 2001). “Performance measurement in small and medium-sized enterprises”. In: *Proceedings of The Institution of Mechanical Engineers Part B-journal of Engineering Manufacture - PROC INST MECH ENG B-J ENG MA* 215, pp. 1143–1146. DOI: 10.1243/0954405011518926.
- Ibrahim, A., R. Christian, and K. Abdessamad (2017). “A comparative exploration of lean manufacturing and six sigma in terms of their critical success factors”. In: *Journal of Cleaner Production* 164, pp. 325–337. URL: <https://www.sciencedirect.com/science/article/pii/S095965261731315X>.
- Ishak, Z., S.L. Fong, and S.C. Shin (2019). “SMART KPI Management System Framework.” In: *2019 IEEE 9th International Conference on System Engineering and Technology (ICSET), System Engineering and Technology (ICSET), 2019 IEEE 9th International Conference on*, pp. 172–177. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsee&AN=edsee.8906478&site=eds-live&scope=site>.
- Kallio, H. et al. (2016). “Systematic methodological review: developing a framework for a qualitative semi-structured interview guide”. In: *Journal of Advance Nursing*, pp. 2954–2965. URL: <https://onlinelibrary.wiley.com/doi/10.1111/jan.13031>.
- Kaplan, R.S. and D.P Norton (2001). *The strategy-focused organization : how balanced scorecard companies thrive in the new business environment*. [Elektronisk resurs]. ISBN: 1578512506. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=cat07147a&AN=lub.6917957&site=eds-live&scope=site>.
- Knol, W.H. et al. (2018). “Implementing lean practices in manufacturing SMEs: testing ‘critical success factors’ using Necessary Condition Analysis”. In: *International Journal of Production Research* 56.11, pp. 3955–3973. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=130722163&site=eds-live&scope=site>.
- Leite, H., Z. Radnor, and N. Bateman (2022). “Meaningful inhibitors of the lean journey: a systematic review and categorisation of over 20 years of literature.” In: *Production Planning & Control* 33.5, pp. 403–426. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=155893094&site=eds-live&scope=site>.
- Leite, H. R and G. E Vieira (2015). “Lean philosophy and its applications in the service industry: a review of the current knowledge.” In: 25.3, pp. 529–541. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsdoj&AN=edsdoj.4988b979b03d4b02becfd449febde883&site=eds-live&scope=site>.
- Lewin, K. (1947). “Frontiers in Group Dynamics: Concept, Method and Reality in Social Science; Social Equilibria and Social Change.” In: *Human Relations*

- 1.1, pp. 5–41. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edo&AN=ejs40828246&site=eds-live&scope=site>.
- LM (2022a). *About us*. URL: <https://www.lantmannen.com/about-lantmannen/>. (accessed: 02.02.2022).
- (2022b). *Sectors and Businesses*. URL: <https://www.lantmannen.com/about-lantmannen/sectors-and-business/>. (accessed: 02.02.2022).
- LMM (2022). *About Us*. URL: <https://www.lantmannenlantbrukmaskin.com/about-us/>. (accessed: 02.02.2022).
- Long, T.B., A. Looijen, and V. Blok (2018). “Critical success factors for the transition to business models for sustainability in the food and beverage industry in the Netherlands.” In: *Journal of Cleaner Production* 175, pp. 82–95. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S0959652617327257&site=eds-live&scope=site>.
- Lund University (2021). *Block Search*. URL: <https://libguides.lub.lu.se/c.php?g=677619&p=4828808>. (accessed: 03.23.2022).
- McKinsey & Company (2015). “How to beat the transformation odds”. In: *McKinsey & Company*. URL: https://www.mckinsey.com/~media/mckinsey/business%5C%20functions/people%5C%20and%5C%20organizational%5C%20performance/our%5C%20insights/how%5C%20to%5C%20beat%5C%20the%5C%20transformation%5C%20odds/how_to_beat_the_transformation_odds.pdf.
- McLean, R.S., J. Antony, and J.J. Dahlgaard (2017). “Failure of Continuous Improvement initiatives in manufacturing environments: a systematic review of the evidence.” In: *Total Quality Management Business Excellence* 28.3/4, pp. 219–237. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=120493475&site=eds-live&scope=site>.
- Meredith, J (1998). “Building operations management theory through case and field research”. In: *Journal of Operations Management* 16.4, pp. 441–454. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=6064291&site=eds-live&scope=site>.
- Moosa, K. and A. Sajid (July 2010). “Critical analysis of Six Sigma implementation”. In: *Total Quality Management* 21, pp. 745–759. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=52174294&site=eds-live&scope=site>.
- Moser, A. and I. Korstjens (2018a). “Series: Practical guidance to qualitative research. Part 3: Sampling, data collection and analysis”. In: *European Journal of General Practice* 24.1, pp. 9–18. URL: <https://doi.org/10.1080/13814788.2017.1375091>.
- (2018b). “Series: Practical guidance to qualitative research. Part 4: Trustworthiness and publishing”. In: *European Journal of General Practice* 24.1. PMID: 29202616, pp. 120–124. URL: <https://doi.org/10.1080/13814788.2017.1375092>.
- Näslund, D. (2013). “Lean and six sigma – critical success factors revisited.” In: *International Journal of Quality and Service Sciences* 5.1, pp. 86–100. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/>

- login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.17566691311316266&site=eds-live&scope=site.
- Näslund, D. and R. Kale (2020). "Is agile the latest management fad? A review of success factors of agile transformations." In: *International Journal of Quality and Service Sciences* 12.4, pp. 489–504. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.IJQSS.12.2019.0142&site=eds-live&scope=site>.
- Näslund, D. and A. Norrman (2022). "A Conceptual Framework for Understanding Purpose of Change Initiatives." In: *Journal of Change Management*. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsswe&AN=edsswe.oai.lup.lub.lu.se.90145504.b45c.4ce5.a183.e8a19dbbe3dc&site=eds-live&scope=site>.
- Nationalencyklopedin (2022a). *Kvalitativ Metod*. URL: <https://www.ne.se/uppslagsverk/encyklopedi/enkel/kvalitativ-metod>. (accessed: 03.02.2022).
- (2022b). *Kvantitativ Metod*. URL: <https://www.ne.se/uppslagsverk/encyklopedi/1%C3%A5ng/kvantitativ-metod>. (accessed: 03.02.2022).
- Netland, T.H. (2016). "Critical success factors for implementing lean production: the effect of contingencies". In: *International Journal of Production Research* 54.8, pp. 2433–2448. URL: <https://doi.org/10.1080/00207543.2015.1096976>.
- Ohlsson, R. (2015). *5S för alla*. DynaMate IS. ISBN: 9789163787058.
- Olhager, J. (Jan. 2022a). "Exjobb - Introkurs 2022 - Del 2 - Forskningsmetodik". In: *Department of Industrial Management and Logistics*.
- (Jan. 2022b). "Exjobb - Introkurs 2022 - Del 3 - Infosökning, rapportskrivning". In: *Department of Industrial Management and Logistics*.
- Olofsson, O. (2013). *Lyckas med 5S*. WCM Consulting AB. ISBN: 9789163740077.
- Palinkas, Lawrence A. et al. (2015). "Purposeful Sampling for Qualitative Data Collection and Analysis in Mixed Method Implementation Research". In: *Administration and Policy in Mental Health and Mental Health Services Research* 42, pp. 533–544. URL: <https://doi.org/10.1007/s10488-013-0528-y>.
- Rajesh, A., S. Bhupender, and M. Sunil (2017). "Analysis of interaction among the barriers to 5S implementation using interpretive structural modeling approach." In: *Benchmarking: An International Journal* 24.7, pp. 1834–1853. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.BIJ.07.2016.0110&site=eds-live&scope=site>.
- Ramdass, K. (2014). "Integrating 5S principles with process improvement: A case study." In: *2015 Portland International Conference on Management of Engineering Technology (PICMET)*, pp. 1908–1917. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edb&AN=110298135&site=eds-live&scope=site>.
- Randhawa, J. S. and I. S. Ahuja (2017). "5S – a quality improvement tool for sustainable performance: literature review and directions." In: *International Journal of Quality and Reliability Management* 34.3, pp. 334–361. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-85013635487&site=eds-live&scope=site>.

- Randhawa, J. S. and I. S. Ahuja (2017). "Evaluating impact of 5S implementation on business performance". In: *INTERNATIONAL JOURNAL OF PRODUCTIVITY AND PERFORMANCE MANAGEMENT* 66.7, 948–978. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.IJPPM.08.2016.0154&site=eds-live&scope=site>.
- Ranjith, K.R., L.S. Ganesh, and C. Rajendran (2021). "An entropy based approach to 5S maturity." In: *Materials Today: Proceedings* 46.Part 17, pp. 8103–8110. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S2214785321020551&site=eds-live&scope=site>.
- Raval, S., R. Kant, and R. Shankar (June 2019). "Benchmarking the Lean Six Sigma performance measures: a balanced score card approach". In: *Benchmarking: An International Journal* 26. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=18879297&site=eds-live&scope=site>.
- Robson, C. and K. McCartan (2016). *Lyckas med 5S*. John Wiley & Sons Ltd. ISBN: 9781118745236.
- Rowley, J. and F Slack (June 2004). "Conducting a literature review". In: *Management Research News* 27. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.01409170410784185&site=eds-live&scope=site>.
- Rummler, G.A. and A.P. Brache (1991). "Managing the white space on the organization chart." In: *Supervision* 52.5, p. 6. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=9705135597&site=eds-live&scope=site>.
- Rymaszewska, A. (2014). "The challenges of lean manufacturing implementation in SMEs." In: *Benchmarking: An International Journal* 21.6. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.BIJ.10.2012.0065&site=eds-live&scope=site>.
- Sambasivan, M. and N.Y. Fei (2008). "Evaluation of critical success factors of implementation of ISO 14001 using analytic hierarchy process (AHP): a case study from Malaysia." In: *Journal of Cleaner Production* 16.13, pp. 1424–1433. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselp&AN=S0959652607001795&site=eds-live&scope=site>.
- Sanchez, L. and B. Blanco (2014). "Three decades of continuous improvement." In: *Total Quality Management Business Excellence* 25.9/10, pp. 986–1001. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=97727515&site=eds-live&scope=site>.
- Sandrita, S., A. Roma, and R. Darius (2021). "Experience of lean application in higher education institutions." In: *International Journal of Lean Six Sigma* 13.2, pp. 408–427. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.IJLSS.11.2020.0208&site=eds-live&scope=site>.

- Self, D. R., A.A. Armenakis, and M. Schraeder (2007). "Organizational Change Content, Process, and Context: A Simultaneous Analysis of Employee Reactions." In: *Journal of Change Management* 7.2, pp. 211–229. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=26705929&site=eds-live&scope=site>.
- Senthil K., D. and S. Vinodh (2020). "TISM for analysis of barriers affecting the adoption of lean concepts to electronics component manufacture." In: *International Journal of Lean Six Sigma* 11.6, pp. 1127–1159. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.IJLSS.09.2018.0100&site=eds-live&scope=site>.
- Setiawan, N. et al. (2021). "A proposal of performance measurement and management model for 5S sustainability in manufacturing SMEs: A Review." In: *JOURNAL OF ADVANCED MECHANICAL DESIGN SYSTEMS AND MANUFACTURING* 15.2, pp. 20–00168. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edswsc&AN=000635597800005&site=eds-live&scope=site>.
- Shah, R. and P.T. Ward (2003). "Lean manufacturing: context, practice bundles, and performance." In: *Journal of Operations Management* 21.2, pp. 129–149. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=7694094&site=eds-live&scope=site>.
- Shapiro, B.P. (1977). "Can marketing and manufacturing coexist?" In: *Harvard Business Review* 55.5, pp. 104–114. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true%5C&AuthType=ip,uid%5C&db=bth%5C&AN=3867508%5C&site=eds-live%5C&scope=site>.
- Sharma, S.S., D.D. Shukla, and B.P. Sharma (2019). "Analysis of Lean Manufacturing Implementation in SMEs: A "5S" Technique". In: *Lecture Notes in Mechanical Engineering*. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=18631613&site=eds-live&scope=site>.
- Singh, J., V. Rastogi, and R. Sharma (2014). "Implementation of 5S practices: A review". In: *Uncertain Supply Chain Management* 2.3, pp. 155–162.
- Sony, M. and S. Naik (2020). "Critical factors for the successful implementation of Industry 4.0: a review and future research direction." In: *Production Planning and Control* 31.10, pp. 799–815. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edselc&AN=edselc.2-52.0-85075201873&site=eds-live&scope=site>.
- Stan, L et al. (May 2018). "KPI PERFORMANCE INDICATORS FOR EVALUATING EMPLOYEES ON INDUSTRIAL PRODUCTION LINES". In.
- Todorovic, M. and M. Cupic (2017). "How Does 5s Implementation Affect Company Performance? A Case Study Applied to a Subsidiary of a Rubber Goods Manufacturer from Serbia." In: *Engineering Economics* 28.3, pp. 311–322. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=bth&AN=123921839&site=eds-live&scope=site>.

- Vahid, J., S. Hanifa, and F. Gerald (2019). "A framework for addressing the challenges of business process change during enterprise systems integration." In: *Business Process Management Journal* 26.2, pp. 463–488. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.BPMJ.03.2019.0128&site=eds-live&scope=site>.
- Villa, A. et al. (2019). "A Framework for SME Performance Evaluation." In: Politecnico di Torino, Turin, Italy, 19032. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=inh&AN=18647635&site=eds-live&scope=site>.
- Voss, C., N. Tsiriktsis, and M. Frohlich (2002). "Case research in operations management." In: *International Journal of Operations & Production Management* 22.2, pp. 195–219. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.01443570210414329&site=eds-live&scope=site>.
- Womack, J. P. and Jones, D. T. (2005). *Lean Consumption*. URL: <https://hbr.org/2005/03/lean-consumption>. (accessed: 05.27.2022).
- Yamchello, H.T. et al. (2014). "A review of the Critical Success Factors in the Adoption of Lean Production System by Small and Medium Sized Enterprises". In: *ADVANCES IN MECHANICAL AND MANUFACTURING ENGINEERING* 564, pp. 627–+. URL: <https://www.scientific.net/AMM.564.627>.
- Yin, R.K. (2003). *Applications of case study research*. SAGE Publications. ISBN: 0761925511.
- (2014). *Case Study Research*. Applied social research methods series. SAGE Publications. ISBN: 9781452242569. URL: <https://books.google.se/books?id=Cdk5DQAAQBAJ>.
- Zargun, S. and A. Al-Ashaab (2014). "Critical Success Factors for Lean Manufacturing: A Systematic Literature Review An International Comparison between Developing and Developed Countries". In: *MATERIALS, INDUSTRIAL, AND MANUFACTURING ENGINEERING RESEARCH ADVANCES 1.1* 845, pp. 668–681. URL: <https://www.scientific.net/AMR.845.668>.
- Zuliyanti, H. A. A., P. Venkateswarlu, and P. Dirk (2017). "Success factors and barriers to implementing lean in the printing industry : A case study and theoretical framework." In: *Journal of Manufacturing Technology Management* 28.4, pp. 458–484. URL: <http://ludwig.lub.lu.se/login?url=https://search.ebscohost.com/login.aspx?direct=true&AuthType=ip,uid&db=edsemr&AN=edsemr.10.1108.JMTM.05.2016.0067&site=eds-live&scope=site>.

7 Appendix

Interview Guide - English

We are writing our masters' thesis at Lund University within the area of Business Process Management at Lantmännen Maskin. The purpose is to do a pre-study for a coming implementation of a 5S policy, the goal is to identify challenges and drivers for successfully executing projects. To manage this, we are performing interviews with selected people at chosen sites that have much knowledge about the operations at the different sites and/or Lantmännen Maskin. Combining this data with conclusions drawn from the literature, gaps between theory and practice are identified and used to determine important aspects for the recommended framework. Formally, the purpose of the project is to develop a framework for the implementation and evaluation of a 5S system in LMMs' different warehouses and workshops throughout Sweden. To be able to fulfill the purpose the following questions needs to be answered:

- RQ1: What are the problems and challenges of organizational change and more specific Lean (5S)?
- RQ2: What are the critical success factors and drivers for organizational change and more specific Lean (5S)?
- RQ3: What milestones should LMM use during the organizational change of 5S for the different segments?
- RQ4: How can LMM know if they are successful?

5S is a policy that originated in Japan and is a tool of LEAN manufacturing. The purpose of 5S is continuous improvement through establishing standards and routines resulting in a clean and sustainable work environment. The five different stages of 5S and their meaning are briefly described in the table below.

Japanese	English	Description
Seiri	Sort	Selecting the relevant items and amount for a specific task and/or area and removing the unnecessary items, thus keeping the workplace clear and easy to operate.
Seiton	Set in order	Arrange the workplace according to the operation and use labels to designate and mark a location for each tool.
Seiso	Shine	Keep the workplace clean to avoid unnecessary defects and to provide a safe and healthy work environment.
Seiketsu	Standardize	Standardize process according to the aforementioned steps to enable easier execution for operators.
Shitsuke	Sustain	Sustain the improvement through continuous improvements and self-audits as well as working towards making 5S a part of the work culture.

Initial Questions:

Q: May we record this?

A:

Main Questions

Q: Do you have any prior knowledge or experience of 5S?

A:

Q: What do you believe are the five most important factors/drivers for a successful project?

A:

Q: What do you believe are the five biggest challenges when undergoing a project?

A:

Q: We understand that several projects have been performed here in the past years. In your experience, what was performed well and where did you experience difficulties?

A:

Q: How would you determine whether a project is successful or not?

A:

Extra questions

Q: Rank KPIs, which ones do you believe are affected by 5S?

A:

- Turnover per spare part salesman
- Coverage ratio
- Stock composition
- Order type distribution
- Occupancy rate
- Debit rate
- Average Price (kr/h)
- Uninvoiced
- LMKI - Lantmännen Maskins Customer Satisfaction Index

Q: Do you experience big variations in workload (seasonality), and do you believe this is affecting the chances of performing a successful implementation?

A:

Q: Do you have any questions or something you'd like to add?

A:

Interview Guide - Swedish

Intervjuguide

Vi skriver för närvarande vår mastersuppsats vid Lunds universitet inom området Business Process Management och gör detta i samarbete med Lantmännen Maskin. Syftet med vårt arbete är att göra en förstudie för en kommande implementering av en 5S policy, där målet är att identifiera utmaningar och drivande faktorer för att implementera detta på ett framgångsrikt sätt. För att möjliggöra detta på bästa sätt så gör vi intervjuer med utvalda personer på utvalda anläggningar som har kunskap om de olika aktiviteter som utförs på anläggningarna. Med hjälp av informationen från intervjuerna i kombination med studerad litteratur så kommer möjliga luckor mellan teorin och praktiken identifieras och sedan användas som viktiga aspekter i ett rekommenderat ramverk för implementeringen.

Formellt så är syftet för projektet att utveckla ett ramverk för implementering och utvärdering av ett 5S system på LMMs olika butiker och verkstäder i Sverige. För att möjliggöra detta så har fyra forskningsfrågor tagits fram.

- RQ1: What are the problems and challenges of organizational change and more specific Lean (5S)?
- RQ2: What are the critical success factors and drivers for organizational change and more specific Lean (5S)?
- RQ3: What milestones should LMM use during the organizational change of 5S for the different segments?
- RQ4: How can LMM know if they are successful?

5S är en policy som härstammar från Japan och är ett verktyg för Lean. Syftet med 5S är att uppnå kontinuerlig förbättring genom att etablera standarder och rutiner för att få en ren och hållbar arbetsmiljö. De fem stegen för 5S, och deras innebörd, är presenterade i tabellen nedan.

Japanska	Svenska	Förklaring
Seiri	Sortera	Välja ut relevanta föremål och antal för varje uppgift och/eller område och ta bort det som inte är nödvändigt med målet att få arbetsplatsen ren och enkel att arbeta vid.
Seiton	Systematisera	Märk upp varje arbetsplats och med hjälp av foton och lappar få varje verktyg att få sin egen plats.
Seiso	Städa	Håll arbetsplatsen ren med målet att få en bra arbetsmiljö, undvika onödiga fel och för att undvika skador.
Seiketsu	Standardisera	Standardisera processer enligt stegen ovan för att underlätta för operatörerna.
Shitsuke	Skapa vana	Säkra förbättringen genom kontinuerligt förbättringsarbete och själv-utvärdering och även jobba för att etablera 5S som en del i arbetskulturen.

Inledande frågor:

Q: Är det ok om vi spelar in denna intervjun?

A:

Huvudfrågor:

Q: Har du några tidigare kunskap eller erfarenheter inom 5S?

A:

Q: Vad är enligt dig de fem viktigaste faktorerna för att ett projekt ska lyckas?

A:

Q: Vad är enligt dig de fem största utmaningarna eller problemen under ett projekt?

A:

Q: De senaste åren har ett antal projekt utförts här, vad skulle du säga har gjorts väl och var skulle man kunna bli bättre?

A:

Extra frågor (mån av tid)

Q: Vilka av LMMs KPI:er tror du skulle påverkas av 5S?

A:

- Omsättning per reservdelssäljare
- Debiteringsgrad
- Täckningsgrad
- Snittpris (kr/h)
- Lagersammansättning
- Ofakutrerat
- Ordertypsfordelning
- LMKI - Lantmännen Maskins Kundnöjdhetsindex
- Beläggningsgrad

Q: Har ni stora säsongsvariationer gällande arbetsbörda och tror du detta är något som kan påverka chansen att lyckas med en implementering.

A:

Q: Har du några frågor eller är det något du skulle vilja tillägga?

A:

Interview A - Summary (Pilot)

Prior experience of 5S

Have previous experience of implementing and working with 5S. Good knowledge of methods, why you do it and advantages of the method.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Involve managers in the project	Determining scope and appropriate milestones
Inform employees of what, why and how	Low site and scenario adaption
Thorough preparation and planning	Poorly prepared material such as documents, templates and frameworks
Site and scenario adaption	Insufficient time allocation
Preparing material such a templates and frameworks	Not engaging employees

Lantmännen Maskin has previously done the following well:

- Been physically present and involved in the implementation, which creates trust and a sense of belonging.
- Inclusion of employees when what would be included by 5S would be decided.
- Dedicated time has been set aside for the project.

In the future Lantmännen Maskin can improve on:

- Anchor locally, ie adapt to the facility. Could offer different tools that can be selected according to what works for each facility.
- More physical meetings make it easier to get people involved and get in touch if you are on site.

Evaluation and follow up

Evaluation of projects should use the LMM KPIs. For 5S the debit rates and average price should be affected positively. Evaluating 5S is easy as you can compare reality to agreed upon standards and pictures taking during the implementation.

Relevant routines in place at the site

- Yearly inventory of warehouse
- Weekly cleaning routines in place
- Standards and routines available for workshop and office spaces

Other comments or advice

- The probability of success strongly affects the probability of success as the workload can vary greatly between high and low season. Adapt according to eg geography.
- Appoint someone who is interested in order and find out to be responsible for pulling in the daily 5S work.
- Use easy and clear language that everyone understands.

Interview B - Summary

Prior experience of 5S

Has prior experience with 5S, knows how it works and has used it before. Implemented at the facility about 1-2 years ago under the leadership of the project manager.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engaging employees	Evaluation and follow up of standards and routines
Clear vision and goals	Resistance to change
Follow up and evaluation	N/A
Management participation and support	N/A
N/A	N/A

Lantmännen Maskin has previously done the following well:

- Having a clear purpose for the implementation and a plan to get there
- Patience for old habits dying hard
- Being present and participating during the initial stages

In the future Lantmännen Maskin can improve on:

No special areas of improvement

Evaluation and follow up Occupancy rate and debit rate will probably be positively affected by a 5S implementation as less time will be spent looking for items, performing extra cleaning and so on.

Relevant routines in place at the site

- External cleaning company twice a week for shop and common areas
- Daily routines established through prior 5S work in the workshop
- Yearly inventory in warehouse
- 5S standards in place such as pictures, labels and checklists in warehouse and office spaces

Other comments or advice

Very large variations in workload. At its peak at grass harvest (May-June) and autumn harvest (August - October). Try to get service on machines between the periods to spread the load over the year. Advantageous to run implementations and courses during the low season, mainly during the winter.

Interview C - Summary

Prior experience of 5S

Been implemented at the facility before, about 10 years ago, no memory of the implementation. Has experience of working with the 5S that has survived at the facility.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engaging employees	Not following up and relapsing into old habits
Management commitment	Locked into old behaviours, resistance to change
Informing employees and managers at site of purpose and advantages	Not engaging employees
Follow up and evaluation of routines	Reasonable scope and delimitations
Establish routines and standard	N/A

Lantmännen Maskin has previously done the following well:

N/A, hasn't been a part of any projects recently

In the future Lantmännen Maskin can improve on:

N/A, hasn't been a part of any projects recently

Evaluation and follow up Debit rate should be improved as less time is wasted and cleaning can be performed in each order. Improved routines for work orders could improve the uninvoiced as well as the order type distribution

Relevant routines in place at the site

- Yearly inventory (October through December)
- Daily cleanup of workspace at the end of each day
- Weekly meetings, following up on cleaning and routines amongst other things
- Weekly cleaning
- 5S standards such as pictures and labels in workshop and offices

Other comments or advice It used to be more seasonal variations, but now the workload is more even throughout the year. Customers perform maintenance to a greater extent in good time and have a little more planning ahead. Prevents seasonally based by calling people during low seasons. More intense during the harvest periods. Better to start projects in January / February when it is low season. October-November is inventory, can be a lot to combine this with starting a project.

Interview D - Summary

Prior experience of 5S

Has previous experience of 5S and has been involved in previous projects where 5S was implemented on parts of the facility (Office, workshop and lunch room). This project was implemented around 2019/2020 and was implemented partly on site and partly across teams.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Allocating sufficient resources	Lost competence due to staff turnover
Clear vision, why and what	Unclear vision
Achievable goals and reasonable delimitation's	Not engaging employees at the site
Engaging and involving employees	Project lack delimitation's and includes too many areas
Planning in accordance to seasonalities	Management does not allocated sufficient resources for success

Lantmännen Maskin has previously done the following well:

During previous projects, the facility was visited on a couple of occasions during the start-up of the project. The staff was informed about what the project entailed and how to work with it and where the purpose is. Physically present at start-up and helped to start the project. Surrender was done via teams.

In the future Lantmännen Maskin can improve on:

It is important to keep in mind what the workload can look like at a given facility when planning the project and avoid planning too much during the high season. Announce in good time about visits and / or projects to facilitate planning at the facility.

Evaluation and follow up All KPIs will be affected. At first negative when resources are invested in the project, but in the long run they will probably be improved.

Relevant routines in place at the site

- Yearly inventory of warehouse
- Cleaning is done at the end of each job
- Weekly cleaning routines
- Weekly meetings
- External cleaning services twice a week for shop and shared spaces

Other comments or advice

In addition to being seasonal, it should be borne in mind that during the low season a lot of time is spent on other training that workshop staff need, during this period it is important to have good foresight so that training and projects do not clash.

High season is during late spring and early autumn and an inventory takes place during October-November.

Interview E - Summary

Prior experience of 5S

Has previous experience from other companies, both from working with it and implementing it. Among other things at a company in Malmö. No experience from that at Lantmännen.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engaging employees in the project	Lack of information
Educate the employees about the method (5S)	Lack of knowledge
Clear vision, what and why	Unclear vision, what and why
Communication	Poor communication within the company
Transparency	Resistance to change

Lantmännen Maskin has previously done the following well:

N/A, no projects at LMM

In the future Lantmännen Maskin can improve on:

N/A, no projects at LMM

Evaluation and follow up Expects average price and stock composition to be positively affected by a 5S implementation as better routines leads to less wasted time and less inventory errors.

Relevant routines in place at the site

- Yearly inventory of warehouse
- No routines for cleaning in workshop
- External cleaning service for office and store

Other comments or advice

Large variation in workload, can also vary from year to year depending on the weather. The highest workload is in May and around the harvest in August (then they work around the clock on stand-by). The best season to work with implementation and projects is during the winter after the harvest. Emphasizes that seasons can vary depending on where in the country you are.

Important to implement to make the workplace more attractive when recruiting new employees, difficult to hire when there is chaos in the workplace. Points out that too much change can lead to some of the old people choosing to leave because they are so stuck in their way of working.

Tips from implementation from previous workplace: More fun to work when it is clean and tidy, more positive environment. Involve the workers in the implementation, for example taking pictures and putting up notes

Interview F - Summary

Prior experience of 5S

Have previously worked at a company in the machinery industry where they had 5S and have now started a bit with their own implementation of 5S inspired working methods at the plant. Major changes in the workshop and staff rooms in the past year with a positive response from the staff, early established a board for information.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Clear vision, goals and a plan for getting there	Poor evaluation and follow up
Engaging employees	Not engaging employees
Defining clear roles and project leaders	Lack of communication
Evaluation and follow up	N/A
Acting upon evaluation	N/A

Lantmännen Maskin has previously done the following well/In the future Lantmännen Maskin can improve on:

Transform the number talk in a way that the staff understands, explain why it should be done and how it can be done. Support for site managers in this through, for example, prepared material to facilitate this communication. Help with how to inform your staff.

It is positive that meetings are started up to share information, but there is potential for improvement regarding structure such as agenda, theme and foresight so that staff can prepare. Facilitates information flows in both directions. Managers can, for example, hear how their facility thinks about certain issues before the meeting.

Evaluation and follow up

Occupancy rate is mainly affected, in that there is always an order that staff can stamp on, and Uninvoiced, does not have to bargain on itself through late invoicing.

Average price and debit rate improve as a result of improvements in uninvoiced and occupancy rate.

Relevant routines in place at the site

- Morning meetings with 5S inspired board
- Weekly meetings
- Cleaning at the end of each job
- Yearly inventory in warehouse
- 5S inspired standards with pictures, labeling and more

Other comments or advice

Big difference when starting a project. It is best to start in October at the earliest and until March. Set routines etc. so that they work during the season

as well. In the north, the high season is even shorter, so perhaps even more important for them is that they work with projects outside the high season.

Interview G - Summary

Prior experience of 5S

Has worked in the automotive industry with a version of Lean with the help of experts from an insurance company. Knows what 5S is and has a good understanding of the principles. Very positive attitude towards 5S and other projects.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engaging employees	Lacking communication and information sharing
Communication	Poorly organized
Sharing information	Resistance & fear of change
Allocating resources to the project	N/A
Defining clear roles	N/A

Lantmännen Maskin has previously done the following well/In the future Lantmännen Maskin can improve on:

Not at LMM, but the same question regarding a similar project at a company in the car industry that was called 2010: A lot of information regarding the project should be shared, talk about the purpose of the project. People are generally positive about change but also afraid, it is important to highlight the positive and help the staff reach that level of acceptance. Establish clear frameworks and roles for how people in different parts should work.

Evaluation and follow up

All workshop KPIs should be improved as order and routines mean that less time is wasted as a result of messy premises. The various workshop KPIs are connected, so the improvement of one also affects the others.

Relevant routines in place at the site

- Weekly meetings at location
- Monthly meetings with more information
- Cleaning after each job
- Yearly inventory in warehouse
- Relevant 5S standards and routines include labeling, pictures and sorting out items that are not needed

Other comments or advice

Very seasonal, sales of services and spare parts go up during the high season. Customers leave their machines unattended until the beginning of the high season and then there is panic for service and maintenance. The best time for implementation is October through March, it is much easier to engage the staff if you have time.

Interview H - Summary

Prior experience of 5S

Not worked with it before but heard about it. Know that it is about order and creating routines.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engage employees	Not engage employees
Clear vision - how and why you do a project	Resistance to change - hard to change old habits
Share the vision - explain purpose and methods	Poor leadership - do not run over anyone
Delimitations - focus on the relevant areas	Lack of management commitment
An active participant and present project manager	N/A

Lantmännen Maskin has previously done the following well:

- Committed and well-trained project managers

In the future Lantmännen Maskin can improve on:

- Consider the time allocation for projects so that there is sufficient time for daily activities
- Communicate expectations and scope in advance to facilitate planning

Evaluation and follow up

Depending on which areas are covered by the 5S project but highlighted uninvoiced as a potential KPI that can be positively affected.

Relevant routines in place at the site

- Yearly inventory
- Regular meetings / gatherings
 - Local meetings monthly
 - Management group meeting every two weeks
 - Alternate meetings for workshop and shop once a week
- Cleaning after finished work performed as needed
- No regular weekly cleaning

Other comments or advice

Seasons vary between facilities in the country. May to the end of September, it is non-stop at this site and then the workload varies between the winter seasons depending on snow etc. If there is a lot of snow, there may be some work in December/January. Not in August! Projects could start around the end of October/beginning of November to start running routines so that you can maintain them during the peak season.

Interview I - Summary

Prior experience of 5S

Have heard from an acquaintance who has worked with it before and have checked it out a bit. Do not remember exactly but that you should be able to see flows and improvements. Have no experience of working with it.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Clear vision; what should be done and why	Lack of communication
Share vision with the employees	Not engaging the employees
Engage the employees	Lack of crossfunctional cooperation on site
Perceptiveness; Listen to the employees	Do not get acceptance for projects from the employees
Communication	N/A

Lantmännen Maskin has previously done the following well/In the future Lantmännen Maskin can improve on

To include all participants / testers from the start instead of including people afterwards. Becomes a huge uphill when you enter in the middle of the project and try to catch up.

Evaluation and follow up

The workshop part will probably be improved with order. Can also affect the store's KPIs, but is probably the biggest impact in workshop. The greatest potential for 5S is in the workshop. (Order type distribution may be needed at some facilities.)

Relevant routines in place at the site

- Yearly inventory
- Cleaning should be done in connection with finished work, can be neglected when peak workload. Cleaning should be charged to the customer
- Larger cleanings if needed
- Morning meetings for different departments

Other comments or advice

Emphasizes the importance of routines and standards for how things are retrieved from stock and how they are ordered / written up. Should be linked to specific orders to reduce balance differences, uninvoiced etc.

Very intense from April to October. Many people perform snow removal, the winter season is very weather dependent as snow removal and forestry is dependent on the amount of snow. Animal farms have jobs regardless. Campaigns for early service of machines for spring use to "flatten the curve" during the high season. November to February are the best months to work on projects.

Interview J - Summary

Prior experience of 5S

Have heard of 5S before but have no previous experience of working with it.

Up to five important aspects and barriers when performing change projects

Critical Success Factors	Barriers & Challenges
Engage the employees	Resistance to change; get out of old habits
Teamwork, "us"-feeling within the organization	Personal pride; prestige in old way of working
Cooperation between the departments within the site	Insufficient time allocation; balance between project and daily activities
Thorough preparation with pilot site and recommendations	N/A
N/A	N/A

Lantmännen Maskin has previously done the following well/In the future Lantmännen Maskin can improve on

Sometimes a complete instruction is given as to how things should be done and sometimes only what is to be accomplished without a presented plan of how to reach it. To perform a pilot and provide a proposal for other facilities would have been appreciated.

Evaluation and follow up

Have weekly meetings about the KPIs. The more harmonious you can work in the workshop, the better you can perform. Above all, the degree of coverage in the workshop will be better which will impact the occupancy rate and debit rate.

Relevant routines in place at the site

- Yearly spare part inventory, ongoing basis with a deadline in November
- Other inventory such as machine inventory
- Cleaning takes place after finishing the job, the customer is charged
- Collective cleaning when needed, mainly during the peak season
- Should start with weekly meetings since it is requested by staff, frequency should be evaluated
- Local meetings three to four times a year

Other comments or advice

Spring farming begins somewhere around the middle of May. The harvest starts around midsummer. Four months that are very busy, May to August. During the winter it is not so hectic, many winter equip their tractors and use them for snow removal. The best time of year to implement projects is January-March.

Factors mentioned in the different interviews

CSF	Interview A	Interview B	Interview C	Interview D	Interview E	Interview F	Interview G	Interview H	Interview I	Interview J	Number of occurrences
Engaging employees											9
Thorough preparation and planning	x									x	2
Communication					x					x	3
Perceptiveness										x	1
Clear vision and goals		x			x					x	6
Establish routines and standards											1
Scenario adaptation	x										1
Training and education											1
Resource allocation											2
Management Commitment	x										2
Achievable goals and milestones											2
Crossfunctional cooperation on site											1
Share vision and goals											6
Management Support											2
Evaluation and follow up											3
Provide material, framework and templates	x										1
Planning for seasonality											1
Clearly defined roles											2
Teamwork, "us" feeling											1
Barrier											
Resistance to change											7
Lack of management commitment											1
Poor preparation and planning	x										1
Low scenario adaptation	x										1
Not engaging employees											6
Lack of knowledge											1
Insufficient resource allocation											1
Poor communication											4
Lack of information sharing											3
Poor leadership											1
Lack of clear vision											2
Insufficient time allocation	x										2
Poorly designed scope and milestones	x										3
Lack of evaluation and follow up											3
Functional silos											2
Employee turnover, lost competence											1

Scoring of the different factors from survey

CSF	Weighted score	1	2	3	4	5
Management Commitment	4.625	0	0	0	3	5
Management Support	4.5	0	0	1	2	5
Clear vision and goals	4.75	0	0	0	2	6
Through preparation and planning	4.875	0	0	0	1	7
Evaluation and follow up	4.5	0	1	0	1	6
Establish routines and standards	4.75	0	0	0	2	6
Scenario adaption	4.75	0	0	1	0	7
Achievable goals and milestones	4.625	0	0	0	3	5
Clearly defined roles	4.375	0	0	1	3	4
Provide material, framework and template	4.5	0	0	1	2	5
Planning for seasonality	4.5	1	0	0	0	7
Crossfunctional cooperation on site	4.625	0	0	1	1	6
Teamwork, "us" feeling	4.375	0	1	0	2	5
Engaging employees	5	0	0	0	0	8
Training and education	4.75	0	0	0	2	6
Resource allocation	4.75	0	0	0	2	6
Communication	4.875	0	0	0	1	7
Share vision and goals	4.625	0	0	0	3	5
Perceptiveness	4.875	0	0	0	1	7
Barrier						
Lack of Management commitment	4.75	0	0	0	2	6
Poor Leadership	4.625	0	0	1	1	6
Lack of clear vision	4.625	0	0	0	3	5
Poorly designed scope and milestones	4.375	0	0	1	3	4
Poor preparation and planning	4.75	0	0	0	2	6
Functional silos	4.25	0	0	2	2	4
Lack of evaluation and follow up	4.375	0	0	1	3	4
Low scenario adaption	4.75	0	0	0	2	6
Not engaging employees	4.75	0	0	0	2	6
Resistance to change	4.875	0	0	0	1	7
Lack of knowledge	4.75	0	0	0	2	6
Employee turnover, lost competence	4	1	0	0	4	3
Insufficient time allocation	4.625	0	0	1	1	6
Insufficient resource allocation	4.75	0	0	0	2	6
Poor communication	4.75	0	0	0	2	6
Lack of information sharing	4.75	0	0	0	2	6

KPIs mentioned in the different interviews

KPI																					
Turnover per spare part salesman													X								1
Coverage ratio													X								1
Stock composition												X									2
Order type distribution					X								X								2
Occupancy rate			X											X							6
Debit rate	X			X									X								7
Average price (kr/h)	X											X									5
Uninvoiced LMKI													X					X			6
													X					X			3