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**Resistance as part of 5S standard implementation  
at case company  
Theory of Constraints and Layers of Resistance**

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vations  
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**ABSTRACT:**

5S is a well-studied Lean Manufacturing tool and its usability has been proven by many scholars and practical studies during the last decades. The roots of the 5S methodology is in the manufacturing industry in Japan, but the philosophy behind is applicable in also other industries and it has found a foothold for many organizations around the world. The goal of the 5S is to highly standardize the processes and the facilities to maximize the efficiency, minimize deviations and reduce waste.

The basis of the thesis is to form a 5S standard for the case company. The case company and the literature propose that Engineer-To-Order environment poses challenges to implement and maintain 5S methodology because of the amount of variations in the processes. A given tool to improve the implementation process is change management tool, based on the work of Eliyahu Goldratt called Theory of Constraints, more precisely the Layers of Resistance, which emphasizes the communication and co-operation with the key personnel.

During the process of making the thesis, a massive fire broke at the case company's facilities, which lead to a complete stop for the data gathering as the resources had to be focused on restarting the company's operations.

The output of this thesis is a literature review studying the applicable 5S methodologies to improve and deepen the knowledge for the case company about the methodology and how it relates to Lean Manufacturing concept. Second part of the literature review introduces the process of leading the change through the resistance. The survey conducted reveals and comprises themes, opinions and prejudices of the case company's personnel that can be used as a basis for decision making by the management. Also, a 5S compliant pilot workstation was introduced and documented, which can be duplicated as applicable throughout the factory.

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**KEYWORDS:** 5S implementation, Change Management, standardization, Resistance

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## Abbreviations

ETO	Engineer-To-Order
FAT	Factory Acceptance Test
LM	Lean Manufacturing
LP	Lean Practice
TOC	Theory Of Constraints

SOP Standard Operating Procedure

# 1 Introduction

The purpose of the thesis is to build a 5S factory standard for case company's manufacturing unit. During the thesis, a theoretical approach for the standard's implementation is being studied. This will be conducted from a case study and semi-structured research interviews. The theoretical framework for the thesis is constructed from the literature describing 5S, Lean Manufacturing and change management.

## 1.1 What is a standard?

A Standard is defined by The Britannica Dictionary as: *"A level of quality, achievement, etc., that is considered acceptable or desirable"* as well as *"generally accepted and used because of high quality or excellence."* Cobe (2019, p.59) has collected definitions for a standard, stating that they are "rules or guidelines to achieve order." BSI (2023) states that a standard is an agreed way to perform something, distilled from the wisdom of people that have expertise in the field of subject. International Organization for Standardization ISO (2023) sees a standard as a formula made to describe the best way to accomplish something. EU-regulation (Official Journal of European union, 2012) pictures a standard as a technical specification which is adopted by some recognized standardization body for continuous application. Lastly, the European Committee for Standardisation (2023) defines standard as technical document which is designed to apply as rule, definition, or guideline, where repeatable way to do something is achieved through consensus.

To approach the 5S factory standard as a concept, the Standard needs to be defined more exhaustively. Schniepp (2015) opens her paper by stating that a step-by-step instructions are actions performed repetitively to achieve expected outcome that is defined by the Standard Operating Procedure (SOP). The SOP is either words, diagrams or anything that can easily describe the operation. The SOP should strive for simplicity and compactness because it increases the retention of given information. A standard needs



(market) demand, consensus, adequate amount of technical quality to achieve the set final objective, which are interoperability and interconnectivity (ETSI, 1997).

Cobe (2019) explains that development process of a standard is not dependent on the intended use or origin, it is generally the same. The development process is divided into four areas: There is a existing need, developing the content, process of approving and revalidation.

As a baseline, the 5S factory standard for the case company has been built followingly:  
a) Assessing the (manufacturing) areas. b) Responsibilities and responsible person. c) Periodical monitoring. Before the 5S factory standard implementation and the thesis project, the case company has implemented 5S in their operations and there are department specific guides, rules, and work instructions. Tools, and for example working platforms and storage compartments have their own marked places at least to some extent and these are present at working stations according to the work phase. Personnel's personal tools are defined and stored in their own compartments.

## **1.2 Role of the change management**

Conclusion of a study by Mabin et. al. (2001) gives positive experiences from the Theory of Constraints. The usefulness emerges from the possibility to answer to question regarding "how to lead change?" TOC gives tools and a framework for more multidimensional issues, but it is feasible for addressing the change management issues and leadership, where sub-categories like revealing hidden assumptions or conflict resolving needs to be tackled before new solutions can be identified and implemented.

### 1.3 Why to implement a 5S standard?

The importance of this thesis emerges from its possibility to save money and reduce the use of space and time in the manufacturing process by following 5S methodology and standardization. Ho (1999) recognizes 5S practices to improve the physical environment, but also thinking processes. He mentions that 5S principles is a way to impress the customer, and effectively root quality processes which will lead to good services and products. Ho also proposes 5S practice implementation as a first step when reaching for total quality management program. Also, Mateos (2019) makes an opening in his paper, stating that regardless of the 5S being a basic concept, it can help to lay the foundation to some other continuous improvement methods.

A study abstract by Velásquez-Costa (2022) where 5S methodology was implemented in metalwork company, concluded a US\$ 75 savings per week in labor in tooling area from assembly guide developing, releasing of production area by 10 m<sup>2</sup>, and reduction in search time of tools by 85%. This resulted monthly savings of US\$ 2661. Another abstract by Teplická et. al. (2021), considering a production process of an engineering firm in Slovakia where 5S methods were implemented, reveals that changes in the layout of the workplace, resulted significant reduction in losses. 37% reduction in downtimes, 40% error elimination, 60% decrease in movements in workplace and 20% decrease in total operating costs. One implementation of 5S in a welding workshop in Malaysia had an impact of reduced total area used by 11,20% and reduced time for search activities by 18,75% (Rizkya et. al. 2019).

A case study by Ramdani et. al. (2019) reviews that complying with newly set standards can imply costs for the company, which can be realized in investments in machineries. But, if the expected profit increase is bigger than the cost of standardization, it is beneficial for the company. Lorenz et. al. (2019) cites in their research, that different standards help to overcome uncertainties, which affects the process development. Also, organizational learning is stated to improve, which enables the company to save money

and time. The authors see a standard as synchronized development tool, working as a platform for knowledge exchange.

In a larger scale, impact of 5S implementation can have broad variety of improvements. A study by Jugraj and Inderpreet (2017) concluded improvements in an Indian manufacturing industries outcome, like overall organizational achievements, continuous improvement and quality, achievements related to production, achievements related to cost, achievements as effective workplace, employee related achievements, and safety.

Also, the safety aspect, not so covered in the case studies based on 5S, was a part of the paper by Srinivasan et. al. (2016) where they were able to show positive impact on total safety climate score when comparing the case group and control group. A tool named SCAT, standing for the Safety Climate Assessment Toolkit, yielded significant increase in management commitment, which was one of the eight categories of safety climate.

#### **1.4 Research gap and research question**

There is a gap between implementation of 5S methodology in the company and opportunities offered by the successful implementation of the 5S. For the moment, the case company's manufacturing unit has a broad variety of tools, which are not in frequent use. The study aims to reduce the number of tools which are not necessary on all the manufacturing cells and platforms. The case company has purchased tools for specific use, but it has not been documented and kept on track, what tools they own and where they are placed. This might have caused the assembly platforms to overflow with tools that are not actually needed.

From conversations with the managers and the employees, there is remarkable dissonance on what is seen beneficial in the manufacturing unit. An easy-to-understand 5S-standard and its implementation may have not been successfully achieved before because of lack of change management tools.

The aim of the thesis is to answer the following research question: Can the implementation of the 5S-methodology in company's manufacturing unit be improved with a change management model? This question is divided into the following sub-questions:

- a) How to organize tools and equipment in the facilities?
- b) How to manage the change through Six Layers of Resistance?
- c) What are the practical benefits of the previously mentioned?
- d) How to maintain 5S factory standard?
- e) Where should the buffer areas be located in the factory?

## **1.5 Limitations**

The thesis is restricted to addressing the physical manufacturing areas, tools, and movers needed in the manufacturing process inside the factory. The thesis will not include any activities, resources or facilities that are connected to the testing of the transformer or outbound logistics. The thesis is limited to cover the collected data from the factory from November 2022 to March 27, 2023. The data collection was interrupted by a large fire at the factory, which led to a situation where resources of the case company had to be focused on recovering from the incident. Also, implementations that had already been done, has mostly likely been destroyed on the manufacturing line.

## **1.6 Case company**

The case company is owned by a global conglomerate corporation, which employees at the end of March 2020 nearly 30 000 people worldwide. The case company's business is in transformer manufacturing, which is carried out in around 30 service centers across the globe, with total of 14 000 employees. For the moment, the case company's transformer division has the world's largest installation base.

Case company's business unit produces power transformers in Vaasa, Finland. It has almost 300 employees, both blue and white collars combined. The factory has heritage in transformer manufacturing dating back till 1947.

Production manager of the case company's manufacturing unit recognizes that variance in the production portfolio is a significant factor, why the unit has not succeeded to maintain the 5S philosophy (Discussion with the production manager, 8.11.2022). Willner et. al. (2016) states that Engineer-to-order companies struggle to define the degree of standardization in the organizations. When Standardization is one cornerstone of 5S (see p.24). Also, Braglia et. al. (2019) has made the conclusion, that low repeat frequency with similar products and high variance in manufacturing process poses difficulties for Lean manufacturing systems.

The factory has a new production line for wind turbine transformers, which is more streamlined because of more standardized products. However, the so-called 2<sup>nd</sup> and the 3<sup>rd</sup> line produces transformer with very broad technical and dimensional variance. For example, complex distribution transformers, railway transformers, furnace & rectifier transformers, marine transformers, offshore transformers, variable speed drives transformers and reactors are made.

The transformers manufactured at the 2<sup>nd</sup> and the 3<sup>rd</sup> line are made Engineer to Order (ETO). Because of the variety in products, also the engineering times vary as well. A repeat product with no additional customer preferences can take some 50 hours, mainly paperwork. But the other end with complex transformers the electrical and mechanical design can take somewhere around 2000-3000 hours (Conversation with a Design engineer, 8.2.2023). Gosling & Naim (2009) state that ETO (Engineer-To-Order) is primarily associated in large scale and complex projects.

For perspective, a more standard transformer can be assembled, tested, and dispatched in less than two weeks if materials are available, and no deviations occur. Special

transformers at the 2<sup>nd</sup> and 3<sup>rd</sup> line can spend several months at the assembly cell and go through extended FAT's to assure the functionality and the quality. In 2022, the shortest manufacturing time from making of the windings to finishing of auxiliary wiring was seven days, the longest time was 149 days (Conversation with a Senior production planner).

Engineer-To-Order is one of the six different possibilities of supply chain structures. It describes the range of operations done by the organization (Gosling & Naim. 2009). They classify ETO as a supply chain, where the point of decoupling happens at design stage. This means that each order placed by the customer goes through an individual design phase of a known product.

## **1.7 Current situation**

This chapter will analyze the current situation at the case company's transformer manufacturing unit. The core idea is to present and illustrate the current situation at the factory and the tools used to measure the performance before and during the thesis data gathering.

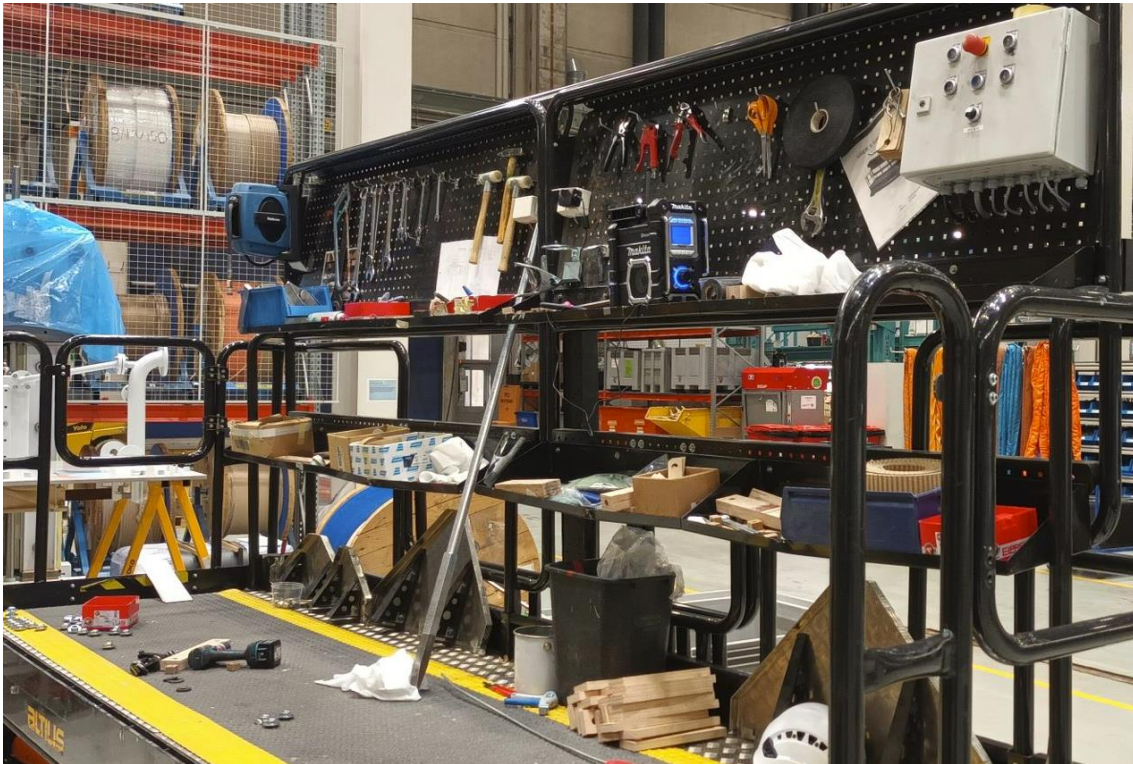
### **1.7.1 Procedures and guides**

The case company has procedures and guides which can be used to go into detail with the 5S methodology. Studying of the documents show a good understanding of the subject. The documents show the preparation date of November 2021, and for example, the quarantine pallet, used for disposing broken and obsolete tools, is mentioned and strict rules for the use of it has been given. Still, the case company does not have these pallets, nor is there a defined location where it should be put.

### 1.7.2 Assembly platforms

The factory uses two different types of assembly platforms at the moment. The case company is going to replace the outdated once with similar ones, once the maintenance period comes to its end, so the expiring platforms will not be covered in this thesis.

The starting point was, that the platforms were not unified, tools could be stored and borrowed anywhere, which does not make the platforms look professional, causes safety issues, and makes it hard for a substitute worker to find the tools needed for the assembly.



**Figure 1** Assembly platform.

The picture represents the situation at one assembly platform during a workday before the 5S implementation. The tools are hanging from hooks un-organized, press wood material and crepe papers are stored randomly, exposing them to contamination such as dust and debris. Tools laying on the floor poses a safety hazard.

A photo of clean, organized platform is posted on every platform for reference, how the platform should look like after the shift.



**Figure 2** 5S order from platform 2.1.

The case company has printed pictures which illustrates how the platforms should look like after each shift.



**Figure 3** 5S order from platform 2.2.

The hooks used for storing the tools, boxes and crates are not unified on the factory, reducing the visibility and standardization.



### 1.7.3 Compartments, cabinets, and racks

Some bigger, more seldomly used special tools are being stored in the compartments, cabinets, or racks in the factory. During a factory tour, there was some implications of which tool to be stored where, but practically, the tools were just stored on a place where they fit.



**Figure 4** Tool cabinet.

This tool cabinet is overflowing with wrenches and power tools along with other material which does not have a suitable place. The cabinet inspected did not have simplified layout or markings for the specific tools.



**Figure 5** Boxo-tool box container.

Flat surfaces in the factory tend to get occupied with material, tools and garbage when correct storage places are not found or has not been indicated. Inside the tool container, tools are neatly placed on the soft foam trays and boxes are locked. Some Boxos are specified for a person or pair of assembly staff, so they have their own keys to the container.

#### **1.7.4 Movers**

The case company has both owned and as a service provided movers and moving solutions inside the factory. The service provider has one reach truck and four counterbalance lift trucks for component and part-assembly moving. The case company's operated movers are two pedestrian tug trucks with four pallets, two 40-ton movers with eleven pallets, one 50-ton mover with two pallets, and four air film transporters with four pallets.

### 1.7.5 5S auditing

The case company's manufacturing unit holds weekly meetings to assess 5S in the factory. The factory has been divided to seven different areas, windmill transformer manufacturing line, Core, Winding, Winding assembly, 2<sup>nd</sup> and 3<sup>rd</sup> line, Test field, and Dispatch.

Weekly meetings are being held with production manager, line managers and continuous improvement manager, occasionally some other persons are present from the factory to give advice on tackling a specific task.

Once per month, a dedicated body audits the factory floor to check the 5S compliance. An audit book is being recorded and an action list is proposed to the responsible person. This double checks, that the line managers and the audit body is on the same page with the weekly audits. Monthly audits also include occupational safety manager's presence, which is not part of the weekly audit.

Pvm: 26.8.2022		Pisteiden antaja:	Pisteet	5	4	3	2	1
Sort	<b>Tunnistetaan mitä tarvitaan ja mitä ei tarvita</b>							
	1	Vain tarvittavat työkalut, laitteet, huonekalut jne. ovat esillä		x				
	2	Vain tarvittavat tavarat ovat seinillä, valkotauluilla jne.		x				
	3	Käytävät, rappuset ja palotiet ovat vapaina				x		
	4	Vain tarvittavat varastot, tarvikkeet ja materiaalit ovat esillä (käynnissä oleviin projekteihin)				x		
	5	Uhkat turvallisuuteen (vesi, öljy, kemikaalit, koneet, PPE) ovat kartoitettu ja kontrolloitu		x				
				Subtotal >>				18
Set in Order	<b>Kaikelle paikka ja kaikki paikoillaan</b>							
	1	Kaikille tavaroille on määritelty paikka		x				
	2	Tavarat ovat sijoiteltu niille määritellyissä paikoissa				x		
	3	Käytävät, työpisteet ja laitteiden paikat ovat merkitty		x				
	4	Valmiista työvaiheesta ei ole jätetty tavaroita työpisteelle (vain WIP)		x				
	5	Korkeus- ja määräraajat ovat selkeästi merkitty		x				
				Subtotal >>				19
Shine	<b>Siivoaminen sekä keinojen etsiminen puhtaana pitoon</b>							
	1	Lattiat, seinät, portaat ja muut pinnat ovat puhtaita liasta				x		
	2	Laitteet ovat puhtaita liasta				x		
	3	Siivousvälineet ovat helposti saatavilla ja hyvässä kunnossa		x				
	4	Kyltit ja merkit ovat puhtaita ja ehjiä		x				
	5	Siivouksessa ei koeta olevan ongelmia					x	
				Subtotal >>				16
Standardize	<b>Ylläpidä ja seuraa kolmea ensimmäistä kohtaa</b>							
	1	Tarvittavat kyltit ja ohjeistukset ovat esillä ja ajantasalla				x		
	2	5S standardit ovat selvillä, näkyvillä ja päivitettyjä (esim. vastualueet, layout, siivouslistat)					x	
	3	Tarkastuslistat siivoukselle ja ylläpidolle on olemassa						x
	4	Kaikki määrät ja rajat ovat helposti huomattavissa (kunnollinen merkintä)					x	
	5	Työtehtävään vaadittavat työkalut ovat helposti saatavilla				x		
				Subtotal >>				11
Sustain	<b>Pysytään säännöissä</b>							
	1	Kaikki työntekijät ymmärtävät 5S periaatteen						
	2	Päivittäistä 5S rutiinia seurataan (siivous ja järjestely)						
	3	Kaikki henkilökohtaiset tarvikkeet säilytetään asianmukaisesti						
	4	Työohjeet ovat saatavilla ja päivitettyjä						
	5	5S auditoinnit järjestetään ja huomautukset korjataan						
				Subtotal >>				0

Figure 6 5S weekly audit from a manufacturing line.

Figure 6 illustrates the state of the manufacturing line's latest 5S situation. As the process is still ongoing, the sustain-phase has not yet been achieved. The line manager gives the score to the manufacturing line and elaborates what has been done when the score improves and what needs to be done to achieve maximum points.

An action list is also implemented to keep on track with the most crucial improvements. The list includes the task, responsible person, due date, status, and comments. From start of January, 27 different tasks are ongoing, 3 are completed, 24 are on-going, none is delayed.

Week	WindStar	Core	Winding	Winding assembly	2. and 3. line	Test field	Dispatch	TARGET
38	33	17	28	32	17	25	32	80
39	33	17	28	32	17	25	32	80
40	33	17	28	32	17	25	32	80
41	36	34	32	32	27	25	36	80
42	36	38	35	37	27	27	36	80
43	36	38	35	37	27	27	36	80
44	36	54	49	58	46	43	52	80
45	63	72	63	75	58	48	63	80
46	0	0	0	0	0	0	0	80
47	0	0	0	0	0	0	0	80
48	0	0	0	0	0	0	0	80
49	0	0	0	0	0	0	0	80
50	0	0	0	0	0	0	0	80
51	0	0	0	0	0	0	0	80
52	0	0	0	0	0	0	0	80

**Figure 7** Review of the overall scores from the factory.

The overall score represents how the factory manages its 5S. Here it is visible, that none of the manufacturing areas are yet at the sustain-phase.

5S KUUKAUSI AUDITOINTI						ATTENDANCE: 49%	
AREA: 2. ja 3. Linja		AUDITOR:		RL, MMK, PH			
DATE: 21.12.2022		FILL: "1" TO "4" FOR ITEM APPLICABLE and "-" FOR ITEM NOT APPLICABLE					
ITEMS FOR VERIFICATION		2. LINJAN UUNIALUE	2. LINJAN KOKOONPANO	3. LINJAN KOKOONPANO	KEROSIINIKÄYTT ÄVÄ	SÄILÖINTIALU E	ARVIOINTI
SEIRI - SORT  Pidä työalueella vain tarvittavat tavarat. Erotele käyttöiheyden mukaan	1.a) Työalueella on vain tarvittavia tavaroita (materiaali, työkalut, varusteet, laitteet ja dokumentit) Tarkastus sisältää otannan kaappien ja laatikoiden sisälle		2	2		2	50%
	1.b) Materiaalit, työkalut, varusteet ja laitteet on sijoitettu käyttötarpeen mukaan.		2	2		2	50%
	1.c) Alueella ei ole puutetta tai ylitarjontaa mistään (kulutustavarat, kalusteet, varusteet, laitteet jne.)		2	2		1	42%
	1.d) Alueella ei käytetä koneita, varusteita tai laitteita jotka ovat puutteellisia (vaurioituneita, likaisia, maalaamattomia, vuotavia, improvisoituja jne.)		3	3		1	58%
	1.e) Vanhoja dokumentteja tai tietoja ei ole työalueella. Tämä sisältää piirustukset, suunnitelmat, kuvat, posterit ja vanhentuneet varoitukset joita saattaa olla seinillä		2	2		2	50%

Figure 8 Sort-step in monthly 5S audit.

First and fourth empty columns of the monthly 5S audit is not applicable for the oven areas, since there are no materials, tools, equipment, or documents used.

## 2 Literature review

Theoretical foundation of the thesis is covered with literature review, which consists of 5S philosophy and methodology, Lean Manufacturing and Lean Practices, and Change Management. Emphasis is on the 5S methodology and the chosen change management model named Theory of Constraints, which is part of the theoretical concept of Theory Of Constraints.

### 2.1 5S

Before industrialization, Japanese had embedded philosophical approaches to their work, namely Shintoism, Confucianism and Buddhism, which gave the philosophy of 5S concept its roots. Shintoism encouraged to cleanliness, Confucianism marked for orderliness and Buddhism for the importance of self-discipline. Although, the philosophy of 5S was developed and introduced formally in Japan late 60's, it was during the late 80's and early 90's, when Takasi Osada came up with the framework of 5S. The five S's are derived from Japanese language: Seiri, Setion, Sesio, Seiketsu and Shikute. Respectively: organization, neatness, cleaning, standardization, and discipline (Randhawa and Ahuja 2017). The development and first steps of 5S philosophy was done by Hiroyuki Hirano in Toyota Production Systems in 1980's (Vasudevan et. al. 2020). Srinivasan et. al (2016) summarize that 5S is a Lean tool used commonly to create an organized working environment. Korkut et. al. (Prawira et. al. 2018) comprises 5S philosophy to focus on simplification of work environment, reduction of waste while improving safety and quality, and effective workplace organization.

Gupta & Chandna (2020) comprise 5S as a useful manufacturing tool, which is easy to implement with successful outcomes for a company. The results stated the same as previously mentioned in Randhawa's & Ahuja's (2017) study, but also points out the smooth functions in work. They point out that implementation of 5S in a company attracts investments and projects, this yields from the superiority in the field. Cudney (2009, p. 81)

captures that 5S builds a foundation to the organization to deliver products and services of high quality, in right quantity and at right time, thus, satisfying or even exceeding the customer requirements. Gapp et. al. (2008) underlay the benefits of 5S as a tool that can reveal hidden problems. These can be something deriving from the orderliness as maximizing effectiveness and efficiency by reducing the workload and human errors when the processes are simplified. Cleanliness as maximizing effectiveness by having a contribution towards healthier life, wellbeing, and safety. Discipline as adequate training and education which enhances the level of morale, leading to increased quality of work and working standards.

Further Vasudevan et. al. (2020) cites that key tools to achieve lean manufacturing is concept of 5S, since it drives for the learning and change in development in the organization. They also suggest in their text, that 5S is method that aims to remove factors that are not adding value or to maximize levels that adds value to the organization, thus improving quality. Santos et. al. (2006, p.147) sees the main objective of 5S tool as a way to educate employees and reinforce an attitude that will support the work habits. These attitudes and habits make it easier to maintain the orderliness and cleanliness of the workplace. They also mention the simplicity of the methodology but underline that most companies are not adhered as well as they should.

A doctoral thesis by Ljungström (2004) proposes 5S as suitable technique when starting the process of continuous improvement and work development. Different criteria were compared to other continuous improvement techniques, 5S was deemed strong in following categories: no or small amount of structural changes needed, ability to understand the concept, usability directly in daily work, fast results, and economical benefits can be evaluated. Also, personnel involvement was mentioned to be mediocre. Still, no other techniques were perceived to be strong.

**Table 1** Force comparison of different Continuous Improvement tools (Ljungström, 2004).

Techniques Criteria	5S	TPM	Muda	Ci	Six Sigma	Invest- ments
No or small structural changes	●	●	○	○	◐	○
Easy to understand	●	◐	●	◐	○	●
Usable directly in daily work	●	◐	○	○	○	○
Fast results	●	◐	◐	○	○	○
Possibility to evaluate economical benefits	●	●	●	◐	●	●
Involves all personnel	◐	◐	○	◐	○	○

● = Strong                      ◐ = Medium                      ○ = Weak

The table consists of the criteria and techniques to compare the selected Continuous improvement tools, showing strong applicability of 5S technique.

## 2.2 5S steps

Santos et. al. (2006, p. 149) sees one initial step that needs to be taken if a company wants to succeed in the 5S methodology. The initial step is to convince the management that taking the time away from the production to take the first steps to implement the methodology, and the Shine and Sustain will be remaining in the organization forever, the methodology will increase the productivity in the long run. Rizkya et. al. (2019) sees the organizational commitment and worker discipline as key elements to successful implementation of 5S.

The five S's are enlighten by Gupta & Pankaj (2020) in their work followingly, practical actions are elaborated by Sassani (2016, p. 214 – 216) and Santos et. al. (2006, pp. 151–156) describes some key observations:



### **2.2.1 Sort**

Sort: There are symptoms in the organizations that may indicate lack of sorting. These are, for example, obsolete equipment that are usually placed somewhere in the vicinity, near the walls and the tools will remain there for prolonged time. These retired tools do not get stored or disposed in a correct way. Another way to notice that sorting has not been done, is if the employees have to make their way through machinery, objects and different parts to access the working area. Also, pieces from obsolete machinery and products that are no longer manufactured indicates that there is need for sorting.

Sort stands for the set of people or resources that belong in a similar nature or category that should be categorized at a single place. This reduces used time when shifting and moving of resources. The wastage is also reduced by sorting. Sassani sees that actions that needs to be undertaken are: inspecting the workplace and removing items which are not needed immediately, eliminate obstacles, remove unnecessary distractions, remove scraps and waste materials, and improve and maintain the achieved tidiness. Santos et. al. propose a three step way to sort objects into three categories: Objects that are used often, objects that will probably be used, and objects that will not be used. Filip (2015) gives questions that can help the sorting process: Why is this needed? Who needs this? How often is this needed? When was the last time this was needed?

### **2.2.2 Set**

Set in order: Before going to the second step, the first step must be completed, because there is no point to set anything obsolete and unnecessary objects to order. Specific places are set for everything, and everything is set in those places. The employees do not have to waste time or resources on finding items when their location is specified. The tools do not lay around, which decreases the mess, possibility of breaking or getting lost. The actual progress of the work and effectiveness increases when visibility improves. Actions: Organize all items necessary for easy access, organize workstations for close

proximity and easy access for the tools, investigate if changes of tooling or design improves efficiency, improve workflow, organize facilities for safe movement and convenience for equipment, material and personnel, improving and maintaining. Also, the objective of Set in order is to have the necessary elements in a way that anyone is able to find them, use them and later return them to the same specific place after using them.

Filip & Marascu-Klein (2015) mentions that tools used by several operators must have a separate storage place. Occasionally used things must have a storage place, but it should be outside the area, where they are used. The distance from the area can be dependent on the frequency of the use. Marking of the storage places must be kept in mind, as it reduces the time of identifying the right places when searching for the tools. Additionally, if the 5S process will take a tremendous amount of time, the recommendation is that actions that are urgently needed are carried out first. Later, discovered needs can be assigned.

### **2.2.3 Shine**

Shine: The third S suggests the cleanliness. It is the cleaning of tools and workplaces. By keeping everything neat and clean, it reduces the risks of damage to tools and hazard for employees. Actions: Clean all the workplaces thoroughly, use cleaning as a safety tool and a process with check-up, plan maintenance of machinery, maintain the clean environment. The cleaning should be made as a habit. Filip & Marascu-Klein (2015) notes that cleanness is also the current data, and comprehensibility and legibility of the delivered information. Also, the cleanness should be extended to cover the operators personally.

#### **2.2.4 Standardize**

Standardize: To standardize is to set a benchmark by the organization for maintaining the quality of products. For example, in manufacturing, the organization standards reach to purchasing of materials in sufficient quality. Standardization improves trust on the company when standardization can be audited and obtained from governing authorities of third-party bodies, but standardization is mostly fixed internally in the company. Maintaining a quality is the goal of standardization. Actions: Implement and standardize the best practices, maintain every procedure, system, or item according to its standard, return all items to right locations after use, standardize everything and apply uniformly to similar procedures. Also, 5S audits is a tool to watch over the execution of 5S. The Standardizing is basically making the three previous steps easier for the employees and forming them into a habit. Standardizing can also be approached as a visual control of the 5S. Gupta (2015) sees it crucial to hold regular audits and give scores to the areas of responsibilities and their performance.

#### **2.2.5 Sustain**

Sustain: Sustaining is following the correct ways of work repetitively. The aim is to have the methods and procedures in such a way that it does not need to be changed frequently. This links up the preceding 4S's. Sustainability cannot be reached in organizations if the previously mentioned steps are not aligned. Actions: Keep proper working order in systems and operations, perform audits regularly for operations and systems, train and encourage discipline to sustain achieved results. Enforce the new working procedures until they become a habit. Key prerequisites to achieve the Sustain is to have discipline and trust. Without those, the goals will not be achieved.

Sassani states that Sort is the most important action as it has significant impact on the environment but Sustain prevents the achieved state of 5S system from deteriorating. Sassani also proposes a small core team to undertake the implementation process as a

whole and seek ideas and inputs along the way from personnel involved. Chapman (2005) sees that the level of Standardizing and Sustaining is the way to measure how well a factory has been made visual. He argues that many companies fall short in their implementation process, when only the first three S's are implemented and a misconception is made, that everything else will just fall in line and the organization is able to sustain the visual factory by itself.

## **2.3 5S audits**

Bhasin (2011) has made a conclusion in his survey, where he states that audits help the organization by developing a regular rhythm that engages the management predictably with their assigned responsibilities. Audits keep the people stay aware of tasks that they should address. Filip & Marascua-Klein (2015) cites Filip's earlier work when defining 5S audit as: standard tool which is used for periodical and permanent verification and re-viewing of 5S methods. They underline that the implementation of 5S is the responsibility of the lean management, not the auditors. The cornerstone of 5S audit evaluation is to examine if the situation in the organization has improved or has there been a setback compared to the previous auditing.

### **2.3.1 Safety as part of 5S**

Mateos (2019) sees safety as a concept that should always be considered. Along with the popularity of 5S spreading, organizations have added safety among the traditional methods and referring to them as 5S+1 or 6S. Before continuing with 5S steps, the author proposes a review of the area with safety department to identify safety hazards. Common hazards can be leaking pipes, exposed machinery components, cracked floors, electrical cabinets that have obstructions, unchecked eye wash stations, no guard rails, or expired fire extinguishers.

## 2.4 Lean Manufacturing

Lean Manufacturing has been perceived by industry to give an answer to the customer driven requirements to reduce costs and to be more responsive. The effect emerges from the possibility to reduce or eliminate waste with no additional requirements or resources needed, streamline processes, and increase value addition (Ben et. al. 2019; Bhamu & Sangwan, 2014). The lean concept, originating from Japan after the World War II emerged when the manufacturers realized their short coming with the massive investments required to rebuild facilities that were destroyed (Bhamu & Sangwan, 2014).

Lean Manufacturing is a manufacturing practice that aims to reduce variations in process through identifying waste and eliminating it in the value stream (Pagliosa et. al. 2021). Their study states that implementing Lean Manufacturing (LM) principles and practices associates positively operational performance improvement. Considering the waste elimination in manufacturing and service industry, it has been a popular paradigm applied by many companies for enhancing productivity and quality (Wahab et. al, 2013). Further, they define “lean” as lean production or lean manufacturing because it uses less of everything when comparing to mass production. However, they mention that companies tend to have their own understanding of lean manufacturing, where various sets of techniques and tools have been adopted.

LM is a “*socio-technical approach*” where humans are factors that fundamentally makes the continuous improvement sustain, it consists of the techniques and tools, which concerns the people and the relations, which connects to the technical environment (Pagliosa et. al. 2021; Sahoo, 2020). They influence each other parallel to the quality of work they perform. They cite that there are five principles for waste elimination and value maximization: Value specification from customer’s perspective, identification of value flow, making the value flow, customer demand driven production, and pursuing of perfection (Pagliosa et. al. 2021).

Wang (2010, p.1—2) recognize seven different wastes which should be reduced to improve customer satisfaction. The scope of this thesis excludes four of them, leaving excess inventory, unnecessary motion and overprocessing for closer inspection. Excess inventory makes the problems on the plant floor less visible, thus making them harder to identify and resolve to improve performance in operations. Unnecessary motion refers to excessive moving of workers and equipment. This tends to cause damage, wear, fatigue, and safety issues. Overprocessing is the habit of using expensive resources more than is needed. In the concept of 5S factory standard it can be linked to additional and obsolete tools and equipment.

#### **2.4.1 Lean Practices**

Lean practices are the concrete tools that makes the Lean Manufacturing principles operational. They reduce variability and waste during manufacturing process, which in result improves company's performance. To select the appropriate Lean Practice, (LP) the company needs to analyze its context and verify the applicability in their operations (Pagliosa et. al. 2021).

Wahab et. al. (2013) have produced a list of seven main dimensions to measure lean manufacturing practices and leanness: Manufacturing process and equipment, visual information system, manufacturing scheduling and planning, supplier relationship, product and workforce development, customer relationship, and technology.

#### **2.4.2 Soft-lean practices**

Hernandez-Matias (2020) have concluded that the so-called soft-lean practices have had a correlation with successful LM implementations. Gadenne & Sharma (2009) has identified factors, such as top management philosophy, employee training and interaction with employees to have a favorable influence in the implementation of Lean with the

hard factors. Lewis et. al. (Sahoo, 2020) mentions factors, such as leadership, teamwork, human resource utilization, communication, empowerment, organizational culture, and performance awards.

## **2.5 Change management**

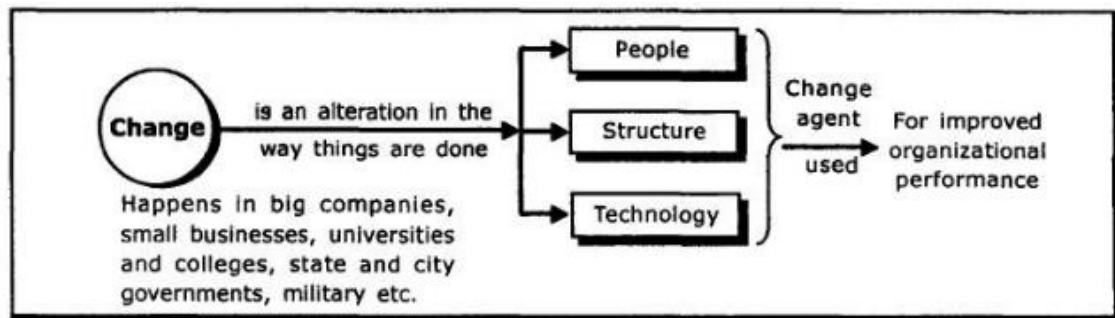
The case company has identified a need for change management model to make the implementation of 5S factory standard more effectively. In this chapter, change management is being covered theoretically to gather perspective for a change management model. Also, one change management model is being presented, which is given as a corner stone from the case company.

Anderson & Anderson (2010, pp.18—19) have made an opening in their book, addressing that change is inseparable part of life, and nothing is going to remain the same. They initialize that change can go in two directions, it can go towards what we want, or what we do not want. And sometimes, change has been perceived to have ominous tone. To have better possibilities to lead change and alter the negative perspectives, greater understanding of human dynamics must be acquired. Internal issues like unconscious false assumptions of bad outcomes, seeing change as a negative disruption, unnecessary efforts, or poor change leadership might lead to resistance.

## **2.6 Change management in general**

Change management in organizational focus is to plan, organize, lead, and control the process of change to improve performance and to achieve strategic objectives (Ha, 2014, p.1). It also captures the systematic approach to manage the changes that are dealing with people and resources with their respective factors (Al-Ali et. al. 2017). Change management is altering the way things are done. It is perceived as something that is always part of manager's job. The increase of change has been visible for recent years (Murthy,

2007, p.3). The ability to actually manage change has been stated as maybe the most important contemporary issue for organizations that needs to execute change management. The impulse for this comes from the increasing global competition and technological changes, which increases the need for flexibility and responsiveness and effectiveness (Gark & Jain, 2008). Figure 9 represents the building blocks of change. It is something that is achieved through people, structure, and technologies, that are named the change agents.



**Figure 9** Meaning of change (Murphy, 2007, p.3).

Murphy (2007, p.3—4) separates that need for changes emerge from two different forces: Internal forces and external forces. Namely, the external forces are something that comes outside of the organization, like laws and regulations or economic changes. Internal forces can originate from internal operations or from impact of external changes, which can include the will to modify the strategy, changes in the workforce, or employee attitudes.

Described by Vora, (2013) foundation of change management is in leadership, which sets the direction, project management to tackle technical aspects, and the people which implements the change. This change management model consists of four key areas: (1) Determine need for change, (2) Prepare and plan for change, (3) execute the change, (4) Sustain the change.

What Vora (2013) emphasizes, is the importance of continuous improvement, which can be achieved through Deming Cycle of plan, which consists of the steps of Plan, Do, Study,



Act and the process of unfreezing, transition, and refreezing of behaviors, which makes the implementation and sustaining of the change possible.

### **2.6.1 Contributes to successful change**

Chen & Hix (2022) argue that shifting the individual's perspective and behavior is the key to achieve successful change. The scholars have found some common factors that influence the change process successfulness. Excluding the organization's external forces, internal forces such as change in leadership, dissatisfaction of employees or new equipment are noted as a contributing factor (Schulz-Knappe, 2019). Also, the manager driving the change must be prepared to face resistance. O Connor (1993) defines that discovering of the resistance is the first step. Secondly, a balanced approach for resistance needs to be structured. After the sources of resistance have been recognized, a deeper understanding of the actual problems can be developed. Malik et. al. (2021) have also composed studies to make a conclusion about the resistance and its impact on the change implementation, where emotions may vary from creativeness, pleasure and eagerness, to annoyance, nervousness, pessimism, terror, and anger.

Also Al-Ali et. Al (2017) recognizes the importance of the role of the leader when using words like controlling, adapting, and coordinating. A study from Abrell-Vogel & Rowold (2014) points out positive effects of transformational leadership behavior such as individual support and providing appropriate model is affecting the followers' commitment towards the change. Neiva et. al. (2020) has concluded in their paper, that the supportive mindset for the change in the organization is the most wanted reaction by the companies, and that these behaviors to support the change is a critical aspect to able to success in the change. Neiva et. al. (2020) study compiles the behavioral responses for the change, linked to the level of commitment. There are members of organizations, who want and are willing to change, those that have no other alternatives, and those, that must change. The ones responding that they want to change, have the highest commitment levels for organizational change.

Schein & Schein (2016, p.74) sees that there is more than strategies and tactics involved when examining change and the dynamics in culture evolution. An understanding of the cultural elements and their interactions must be constructed. The authors argue that the complexity of the cultural linkages are not something that needs to be inspected in detail, but a process needs to be developed to give a rapid response on identifying, which elements are in favor for desired changes, and which elements will hinder the progress and require more assessing.

### **2.6.2 Mistakes in leading transformation**

To cover the extent of the multidimensionality of leading in transformation, a list of common mistakes by Anderson & Anderson (2010, p. 20) is presented. They mention ten different mistakes, not ranked in any specific order: (1) Change effort is not clearly linked to the strategy, thus falling short to bring clarity to the stakeholders. (2) Roles for change leadership, structures and decision making is not provided clearly, causing difficulties on understanding how the change effort will interface operations. (3) Not having the strategic discipline on how to lead the change in the organization, missing common agendas, methodologies, and infrastructures needed for successful change. (4) The scope of change is misdiagnosed, either focusing on just the organizational or technological initiatives and neglecting cultural mindsets or behavioral requirements or vice versa. (5) Having multiple competing or separate initiatives misaligning, rather than one unified effort. (6) Not having enough capacity for the change, resulting unrealistic timelines and excessive workloads. (7) The organizational culture is not addressed properly. (8) The leadership model and the leaders do not enforce the change. (9) The emotional side towards the change is not addressed properly, as the actions are not designed to minimize negative reactions. (10) Communication falls short, and engagement is not built with two-way communication.

## 2.7 Theory Of Constraints

Resistance to change: enemy or ally? (2002) in Strategic Direction argues that half or even two-thirds of all the major corporate programs aiming for a change, fail. They make a note that one critically important factor is not being recognized. The article elaborates the resistance in organizational setting as an expression of reservation, normally arising in a form of response or reaction when change is confronted. Managers tend to interpret the resistance as any actions aiming to stop the change.

Goldratt's Theory of Constraints (TOC) is covering areas where, for example, traditional optimization concepts like Lessons learned or Best practice have often already implied. It pursues to give answers to questions like: What are the business goals? How can they be reached? What strategies and tactics should be employed? How to set the priorities? How to keep overview of everything? How will the business maintain itself? (Techt, 2015, pp. 9–15). Although, TOC principles are broad and covering constraints across the business processes, no more than the change management and resistance perspective is being covered in the thesis.

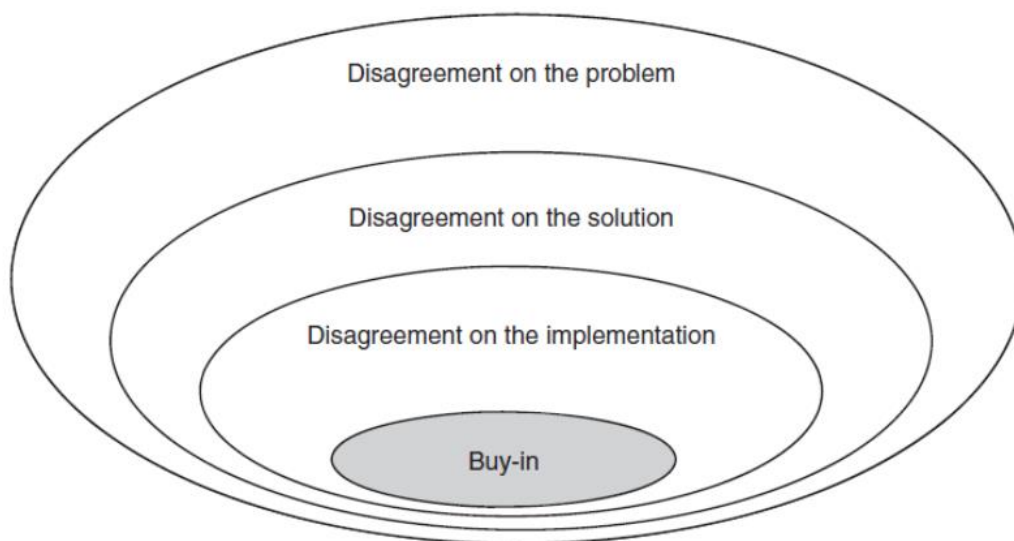
Mabin et. al (2001) research comprises that in central of Theory of Constraints model is the appreciation towards resistance since it is a positive and necessary building block in change processes. According to TOC, the manager's responsibility is to identify resistance in its forms, and he must be able to test action plans and change strategies to achieve successful implementation, which has approval from all the parties. Ma Regina (2018) cites that the role of leadership is vital when it comes to shaping the attitudes of employees towards organizational change. However, they point out the emerging perspective of leadership from the eyes of the followers, not something that is static.

The study by Ma Regina (2018) gathers various factors that are influencing the attitude of employees towards change. These are: experiences from previous changes, the organizations' ability to manage the change, and emotional intelligence. Jørgensen et al.

(2009) survey reveals that changing the mindset and attitudes was perceived as a barrier to change by 58 of project professionals.

Before the resistance for change occurs, there has been an idea which is introduced to others. Techt (2015, p. 139; Goldratt (2010, p. 572) comprises that three questions must be answered in order to put a strategy into practice: What is going to be changed (the problem that is being addressed)? What directions will these changes take (solution to the problem)? How are the changes implemented (implementation of the solution)? It is stated by Techt (2015, p.139) that the first two are easy to give an answer, but the implementation confronts resistance, which is captured as the actual challenge. Goldratt (2010, p. 572) state that the second and the third question may seem self-explanatory, but also it is crucial for everyone to understand and agree about the problem. Together, the three questions form the Buy-in of the proposed solution in a nutshell.

The Buy-in by Goldratt (2010, p. 573) is captured in an onion form, where layers need to be “peeled off” sequentially to get into the buy-in of the given solution. First, there needs to be agreement of the problem to be able to agree about the solution, which must be followed by the agreement of implementing to ultimately achieve the buy-in.



**Figure 10** Layers of Resistance to the Buy-in (Goldratt. 2010).

When discussing resistance of change Mabin et. al. (2001) survey from change management literature covered prerequisites to successfully accomplish the change. These were vision, culture, strong leadership, mission, communication, and participation. O Connor (1993) found five common causes for resistance among staff: 1, There is no believe that there is actual need for change. 2, the need for change is described differentially. 3, No goals are set for change. 4, the goal is not seen attainable. 5, the staff does not have confidence in the manager who is driving the change. Also, O Connor (1993) states that resistance results from ideas that are involved differently, plans, motives, and priorities. After identifying the potential sources, a debate of the issues can be encouraged, and courses of action can be changed respectively. Thus, an interpretation can be made, that not all resistance is bad for change management.

Change management model described by Vora (see p. 31) is quite strictly management based and straight-forward. Banerjee & Lowalekar (2021) start their study by implying that clear and effective communication is the key point of all interaction. They find reasons for resistance from, for example, the complexity of change and lack of control of the change, but also some might want to resist the change to protect some self-interests.

When dealing with resistance, Techt (2015, p. 139) argue that implementations of new strategies and solutions faces a dilemma: Will it be more prosperous to use the limited time of an individual to strive for perfection and polish the smallest details, or would it be better to concentrate on making up an agreement and start involving people to cooperation? Goldratt's theory (Techt (2015 p.139–140) annotates that believing of revising an idea to make it perfect from the start, and thus, reducing resistance automatically, is more likely to end up closing the eyes for potential objections and leaving unpreparedness when objection suddenly appears.

## 2.8 Layers Of Resistance – The concept

Goldratt's Theory of Resistance has a starting point, where solutions are comprised as a process where an "inventor" develops a solution, which is systematically tested by involving every party affected by this new solution. Here, the resistance is not perceived and handled as something problematic, but as a contribution which adds value to the improvement and implementation for the given solution (Techt, 2015 p. 140).

The Resistance is divided and investigated in six layers: (1) There is a disagreement on the problem, (2) There is a disagreement regarding direction of the problem's solution, (3) There is a disagreement on the effectiveness the solution offers, (4) Concerns arose that along positive effects from the solution will also bring negative side effects that can potentially be worse than the original difficulties, (5) There are concerns that obstacles and stumbling blocks far too insurmountable prevents the implementation of the solution, (6) There is no actions, even though explicit agreements have been made (Techt, 2015 p. 141).

According to Techt (2015 p.141) the first layer is addressing the actual object of change and the difficulties the change is facing and root causes. Layers 2-4 address the heading of change. The features are uncertainty of how the change will work itself out, will the change give an actual solution, and will there arise negative side effects along with change. Layers 5-6 address the implementation of the solution. Resistance may arise from the concerns of having obstacles preventing to drive through the solution, and lack of actions even though there are agreements on the heading. Later, a concept of Nine Layers Of Resistance (Goldratt. 2010, p. 578) has also been introduced.

A point raised by the author is, that neglecting possible negative side effects communicated to the developer of the solution, will lead to excessive use of time, and will make it harder to sell the solution in the organization, whereas being open to the concerns and stumbling blocks, the early reactions, the degree of cooperation and agreement makes the implementation of the idea faster and smoother. Overall, the idea of solution

will not be exposed to personal attacks and will eventually form from personal truth of an individual to a mutual team vision (Techt, 2015 pp. 142–144).

## **2.9 The layers of resistance**

Goldratt (2010, p. 574) argue that overcoming responses for a change, like “what is wrong with the current solution?” Or “I do not see a problem.” Is a symptom of the counterpart for not yet acknowledging that there is a problem. A compact reason for the resistance is given, such as that the problem is not yet at the counterpart’s sight or affecting their work. Or there is a misconception that no problems will occur when continuing with the same old ways of work. Additionally, failing to see the problems in the current situation, sometimes, a failure to tackle problems may cause a person to accept negative phenomenon as part of reality, that cannot be changed.

### **2.9.1 Disagreeing on the problem**

The first layer, or the first step to towards the change is the realization that there is indeed a problem in the organization. Every employee knows something that could be improved, and usually, the members of the organization have a perspective of their own of the difficulties, and the relationships, but also what is going wrong and what kind of steps to take. What causes dissonance is, that people tend to have or give focus on their own perspective (Techt, 2015 p. 147).

To successfully approach and address the problem, everyone affected by the problem and possible solution needs to join the process of diagnosis, this method makes it easier to reach out for an agreement on the problem and share visions of the difficulties and causes (Techt, 2015 p. 147). Goldratt (2010, p. 577) emphasizes that these discussions about different problems, may reveal that they are related in some manner. It is also possible, that the parties are talking about the same problem, but with different terms.

Ultimately, the goal of the first layer is to gain mutual focus on the core problem and what are the undesirable effects of it, but also making sure that the counterpart is not feeling like being blamed for the problems (Goldratt, 2010, p. 577).

### **2.9.2 Disagreeing on the direction**

The second layer focuses on dealing with perspective issues regarding the solution for the problem. Goldratt (2010, p. 579) captures the issue as a situation where the parties try to convince everyone that their solution is the best. Ultimately, if there is no agreement on the direction, there is also no point to go into details of any of them. The author proposes to have a pre-designed list of criteria for a good solution, which may include ways to avoid or tackle undesirable effects, how does the solution meet the important needs of parties involved or avoid negative ramifications. Next step is to review the proposed directions with the agreed criteria. At this point, if the proposed direction is surpassed by another one presented, it can be wise to continue with that one.

The reason for “going an extra mile” with the list of criteria, rather than discussing each solution and judging its useability is to avoid the possibility for discussion to become emotional and personal. Keeping the proposed direction in the other hand and the criteria in the other, should keep the discussion practical, not personal (Goldratt, 2010 p. 579).

### **2.9.3 Disagreeing on the effectiveness**

In the third layer, resistance towards the presented solution emerges. Goldratt (2010, p. 579) captures this resistance as statements like: “the solution you proposed is not good enough,” “the whole problem is not addressed,” “the problem does not cover the X or the Y.” These statements claim that people agree on the solution, but it is not yet



complete. These objections make it possible to inspect whether the solution is comprehensive or is it missing some aspects.

If the concerns for the solution stated by the counterpart is not valid, further explanation of the solution must be given in order to confirm that it will achieve the benefits. Also, objectivity must be held towards our own proposal. If indeed it can be shown that the solution proposed does not solve the problem, the solution has to be re-evaluated, and if needed, return back to previous layer for choosing different direction (Goldratt, 2010 p.579)

Finally, Goldratt (2010, p.580) proposes straightforward way to overcome the layer is by having a consensus of the benefits the change should be bringing. This is achieved by writing down the opposite of the undesirable effects recognized in the discussion of the problem. Then it should be visible, if the change is able to attain the effect.

#### **2.9.4 “Yes, but...”**

The fourth Layer is about confronting the “buts” in the solution. Goldratt (2010, p. 580) recognizes that feelings of damage from the solution, will result unwillingness to collaborate. The author sees it vital to capture, whether this feeling is based on something actual. If yes, then it should be addressed. If not, then it must be reasoned to the counterpart. Techt (2015, p.155) emphasizes that these “buts” are nevertheless positive signal. The counterpart agrees with the solution but has some concerns about side effects that would be negative.

Goldratt (2010, p. 580) underlines that if the actual concerns are bypassed carelessly, the solution can show off even more harmful, thus, making the buy-in even harder to achieve. And, time should be spent on this layer as much as its needed to ensure the parties that no negative ramifications will occur through the solution. These ramifications might be manifested as a losing some positive benefits. The author explains that in

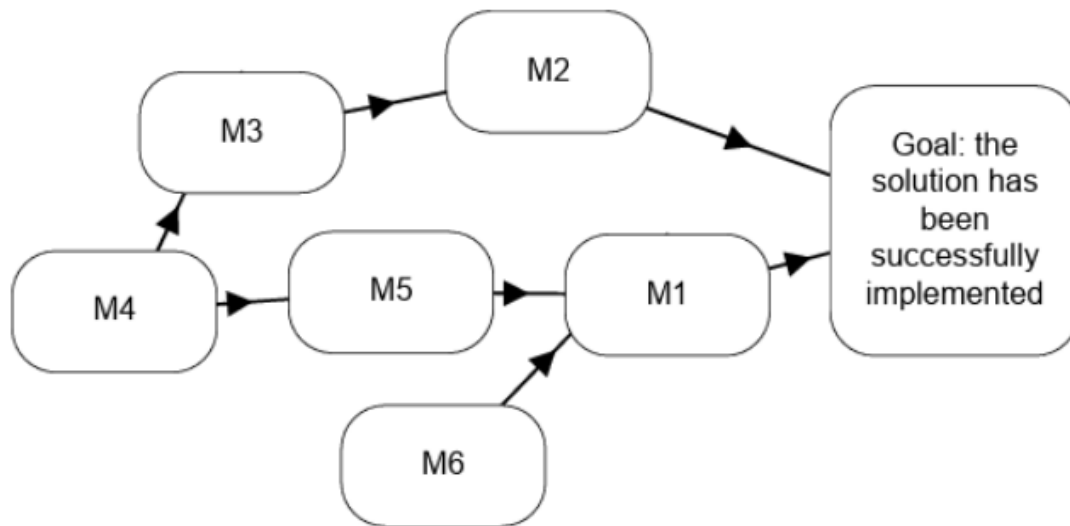
order to gain some other new benefits, old ones may need to be given up. The resolved issue and the advantages acquired from the solution must state clearly, why it is beneficial to give up on the old ones.

### **2.9.5 Concerns of obstacles**

On the fifth Layer, comes the questions about implementation. According to Goldratt (2010, p. 581) some may find it difficult to distinguish the problems assessed at the previous layer, where disagreements emerged from the quality of the proposed solution, and whether will it give negative ramification. Now, the disagreement is about the possibility to achieve it, even though the solution is accepted by the parties. Techt (2015, p. 157) talks about moving from the “whats” to the “hows”, meaning the planning of implementation. Why this is mentioned, is because mixing these two causes bouncing between objections and which will delay the time to achieve the buy-in. There is no reason to discuss obstacles faced during implementation, if there is no certainty that the change proposed is the one that is actually going to be implemented. The author proposes two questions, which helps to distinguish on which Layer the resistance should be addressed: “If we implement this change, is this something that can happen?” and “Is this something that blocks the achievement of the change?” If the resistance is something that can be answered through first question, then it is a negative ramification, if through the second question, then it is an obstacle.

As it is with the previous layers, also the obstacles brought up in the conversation can also be dealt with neglection, or it can be used as a source of valuable information, which helps to plan the change better and minimize the unpleasant surprises (Goldratt, 2010 p. 581). Techt (2015, p.157) gives instructions on how to approach this Layer: Collect and write down stumbling blocks, rephrase the “allegedly” insurmountable blocks so that they become milestones and intermediate targets that are manageable. This is now the framework of the improvement plan. According to the author, that the ones voicing these concerns will probably be the ones that already knows how the stumbling blocks

can be tackled. It is just the discussion and visualization which encourages the people to deliver the solution. The next step is arranging the intermediate targets and milestones so that the prerequisites for the next one is achieved. After that, it can be analyzed if the targets or milestones are adequate to achieve the final goal.



**Figure 11** A framework for improvement plan (Techt, 2015 p. 158).

The framework depicts the milestones that needs to be achieved to get to reach the goal that has been set.

### 2.9.6 Lack of action

Sometimes the actions just do not start without giving an extra push. According to the TOC (Goldratt, 2010 p.582—583), the resistance can also form from something inherent, and not even linked to the change that is driven. These might be some personality traits, making them more prone to resisting the change. People might feel like they are being pushed out of their comfort zone or they are not good at handling their own perceived uncertainty. Also, social pressure from the norms affects people’s willingness to act towards the change, the reasons are numerous.

Time and effort are given as the cure for this resistance. Author sees that the inherent resistance is not blocking the change, just slowing it down. The people that do understand the need for a change but are not willing to cooperate, will eventually come around. Early detection of the external reasons that causes resisting will give a much more space and better starting point to overcome the issue. If the resistance is caused by people being pushed from their comfort zone, a constant involvement like asking for the information they are lacking or discussing how to make things easier is proposed (Goldratt, 2010 p.583). Techt (2015, p.159) finalizes that if the previous layers have been covered systematically, but no actions occur, only unwavering leadership will help to carry out carry out the change that everyone agreed on.

### **3 Methodology**

This chapter will discuss the research procedure and methods used in this work. Because of the nature of the problem, where the target of the study is linked to its environment, a case study approach has been chosen. For the limited time frame, qualitative analysis of the impact is applied, and data gathering is conducted with semi-structured research interview based on a research interview form given in the Appendix 1 (see p.72), since there is notable amount of opinions throughout the factory that might not be able to get captured by closed questionnaires.

#### **3.1 Case study approach**

The research is conducted as a case study, focusing on normative aspect. Gillham (2000, p.1-2) explains case study as an investigation that tries to answer to a specific research question through different kinds of evidence. He argues that the evidence in the case settings must be abstracted and combined to reach for the best possible answer. So, Gillham sees that evidence of one kind or source is not sufficient to be valid on its own, and the weaknesses and strengths of evidence from multiple sources is the main characteristics of case study. Creswell (Shekhar, 2014) explains the case study as research with interpretive paradigm with qualitative approach where the researcher investigates a bounded system with detailed data collection from multiple sources of information. The output is a case description and a theme based in the specific case it.

As the 5S implementation is strictly connected to the case company's environment, as well as the change management is connected to the people, we want to make an impact. The case study approach is justified.

### **3.2 Thesis methodology**

The research is conducted by referring to existing literature to comprise a 5S method suitable for the case company, Lean Manufacturing perception is provided to increase the awareness of non-value adding processes. 5S is one of the building blocks of Lean (Randhawa & Ahuja, 2017) and change management model works as the catalyst for 5S standard implementation in the thesis.

Practical validation will be done mainly through qualitative research, where data is gathered from semi-structured interviews from the stakeholders like, production manager, line managers, employees, but also from 5S audits by an internal body. Additionally, some internal documents have been used along with secondary data like conversations around shop floor. The implementation process is being driven by a change management model proposed by the production manager. Question of interviews can be found in Appendix 1 (see p.72)

Semi-structured research interview has been chosen as a data collection method, since it can create an opening for a narrative not yet unfolded, but also include questions given by theory. Semi-structured approach also leave space for contextual influence to be explored (Galletta. p.2. 2013) and it serves as an opening for further discussion (Mojathed et. al. 2014). Capturing the context is vital in the data collection since perception of necessities in a workplace can vary depending on the positional hierarchy and the level of hands-on involvement in the manufacturing process.

### **3.3 Validity and reliability of the research**

The research itself has a good foundation from the 5S methodology. It has been used in for decades and there is vast amount of studies and literature covering the concept and positive effects have been documented (see p.10). Also, as mentioned in chapter 1.5 (see p.12) Lean has been a difficult area to handle at ETO environment. This gives validity

for the research agenda. Reliability of the research is more emphasized on the literature review, since data collection was not able to be finished, but some openings for connections are presented. The processual operationalization of validity is discussed more broadly in the conclusion chapter.

## 4 Results

During the thesis work, a fire broke out at the factory, making the collection of data and drawing complete results impossible. The available data is used to form applicable results, which are summarized 5S steps and interview themes.

### 4.1 Sorting

The list of tools required for daily activities in the pilot assembly point are gathered on a spreadsheet. Overall, of 47 different tools and other consumables were identified that are needed daily. This spreadsheet was used to fabricate the plastic foam trays for containing the tools.



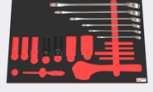

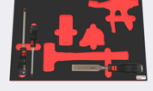

Foam		Työtason seinällä vasen/oikea		Laatikkot vasen/oikea	
Vasen	Oikee	Kiintytystapa	työkalu	Laatikko	esine
 Siirtoleukapihdit pieni Siirtoleukapihdit iso Peltisaksat Saksat Kaapelileikkuri 2x	 Siirtoleukapihdit pieni Siirtoleukapihdit iso Peltisaksat Saksat kaapelileikkuri 2x Peli, magneettinostin, ruuvinnoukki	Haarukassa	Iskevä	Isolaatikko	Kreppiruulat
 Lenkkiavaimet 12,17,19,24,30,34 Hylsyt 17,19,24, 27(12kulmainen), 34 Poranterä 10, 13, 18 Kierretappi 12,16 Erikois hylsy 1 ja 2 Jakoavain 30mm	 Lenkkiavaimet 12,17,19,24,30,34 Hylsyt 17,19,24, 27(12kulmainen), 34 Poranterä 10, 13, 18 Kierretappi 12,16 Erikois hylsy 1 ja 2 Jakoavain 30mm	Haarukassa	Iskevä	Isolaatikko	Aaltopahvi
 Vasarapieni Mitta Nippuside kiristin Meisseli taltta+ tähtipää Taltta mittari	 Vasarapieni Mitta Nippuside kiristin Meisseli taltta+ tähtipää Taltta mittari Kaapelinkuorinta T snipper	Haarukassa	Leikkuri	Isolaatikko	Palikat
		Haarukassa	Porakone	Kantolaatikko	Lasikuituruuvit
		Kuppi	Kaapelipuristin	Kantolaatikko	prespaani prikat
		Kuppi	Kaapelipuristin	Rasia	Liukastepalikka
		Kuppi	Nippusiteet		
		Syvä kuppi	Rautakankki ilmapilli		
		Tikkuihin	Prespaanipalat		
		Tikkuihin	nostokorvat M12, M16		
		Tikkuihin	Nipistimet 2x		
		Tikkuihin	Vatupassi pitkä		
		Tikkuihin	Vatupassi lyhyt		
		Tikkuihin	Vasara		
		Tikkuihin	mustarulla		
		Tikkuihin	Tikkuihin		
		Tikkuihin	Sähköteippi		
		Teline	Liimapullo		
		Kynäteline	Öjypullo		
		Kynäteline	Kynäyt		

Figure 12 Tools included in the plastis foam trays at manufacturing line 3.

The spreadsheet produced by the line manager has been separated for left-hand side and the right-hand side. The two columns on the right-hand side includes what is stored on the assembly platform walls on both sides and the way it should be stored, and the plastic boxes and what they contain.



#### 4.1.1 Tools with non-frequent use

28 different tools were identified that are needed time-to-time. A moveable wall should have been introduced to store these tools in a way, that they have central location in can be easily accessed from both assembly lines. The wall did not make it in time to the factory.

Harvoin tarvittavat		
Lenkkiavaimet	Määrä	Hylsy
36mm	2kpl	36mm lyhyt 36mm pitkä
41mm	2kpl	41mm lyhyt 41mm pitkä
46mm	2kpl	46mm lyhyt 46mm pitkä
55mm	2kpl	55mm lyhyt 55mm pitkä
65mm	2kpl	65mm lyhyt 65mm pitkä
75mm	2kpl	75mm lyhyt 75mm pitkä
85mm	2kpl	85mm lyhyt 85mm pitkä
		Tuuman kara
<b>Väännin</b>		
Pretorque 1900Nm	3kpl	
<b>Yläikeen puristimet</b>		
	3 kpl	
<b>Puusepän puristimet</b>		
pieni	4kpl	
iso	4kpl	
<b>Kanget</b>		
	1kpl	
<b>Magneetti ja peili</b>		
	1kpl	
<b>Noukkija</b>		
	1kpl	

Figure 13 non-frequently used tools.

The list of the tools shows, that the non-frequently used tools comprises of mostly spanners and sockets.

### 4.1.2 Sorting out the non-essentials



**Figure 14** non-essential tools gathered from the pilot assembly platform.

Figure 14 shows the diversity of tools found on the platform that was defined extra or obsolete. The paintings on the tools, especially wrenches give out that they have been loaned from other assembly lines or assembly points.

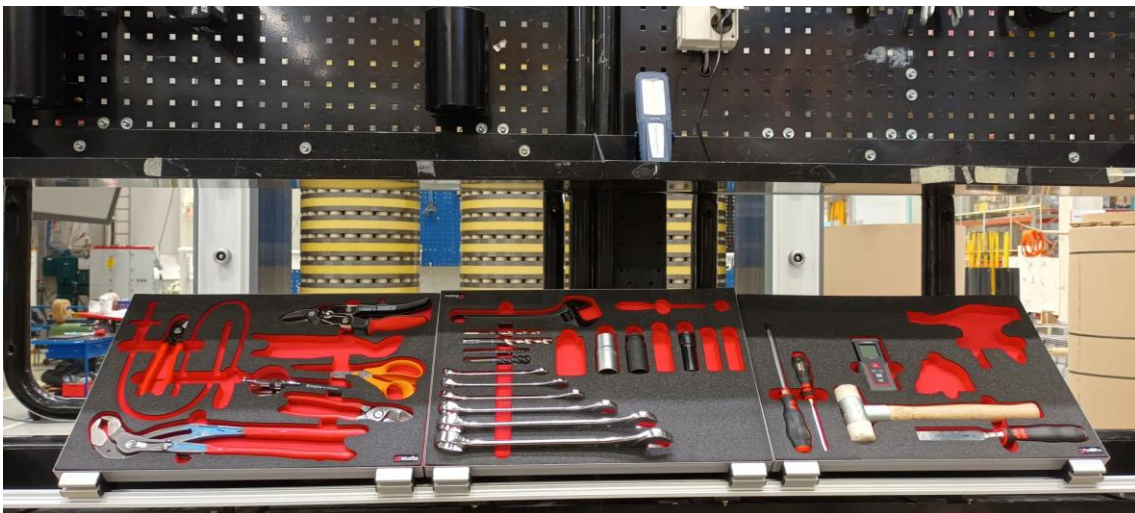
## 4.2 Setting

The tools and consumables are placed and stored on the assembly platforms with a dedicated place, introduced in the sorting chapter.



**Figure 15** Plastic foam tray "Vaahtomuovi2"

This tray includes tools that are needed on both side of the transformer daily. Overall eight pieces of this version was ordered to the company for the four assembly stations at 3<sup>rd</sup> line. For mutual understanding and easier communication, the trays have their own identifying name.



**Figure 16** Three foam plastic tool trays for the high voltage side assembly.

There are five different trays making up two different setups. The trays have been divided by their function. The other side is for the high voltage-side assembly, the other one is for the low voltage-side. The possibility to move the working platforms increases their functionality, as they can be switched from side to side.



**Figure 17** A plastic box with a lid, containing crepe paper.

A slightly transparent plastic boxes keeps the consumables away from debris and dust, but they are easy to spot and use. As seen in Figure one (see p.15) crepe papers along with other consumables have been laying around on the assembly platforms.

### **4.3 Shining**

The company had the production and testing area specific weekly auditing, which also included the cleanliness. As this was previously conducted with the line managers, the weekly auditing was handed over for the employees. However, this given responsibility was not implemented well, resulting an eight-week gap on the auditing. After the gap, the overall audit score was improved by three points from 58 to 61 points.

#### 4.4 Standardizing

Standardizing was able to get into a point, where the tools had their own color marking for each factory area. For the 3<sup>rd</sup> line, a color coding was also made for each assembly point.

3L	3,1
3L	3,2
3L	3,3
3L	3,4
3L	Yhteiset 1
3L	Yhteiset 2

**Figure 18** Color coding for the 3rd line and the assembly points.

The 3<sup>rd</sup> line base color was set to be brown, and the four assembly points had their own individual colors. For the common tools, placed on the vicinity for the assembly points had a second color marking of grey and black.

Sydän
Käämintä
Kääminkalustus
Foliokäämintä
2 linja
3 linja
Lähetämö
Windstar
Koekenttä

**Figure 19** Color coding for the rest of the factory.

The color chart includes all the rest of the facility. As applicable, there will be introduced the second color.

## **4.5 Sustaining**

The Sustain part was not covered as parts of the factory was not able to be accessed, and there were no people working there. The detailed Sustaining step and procedure will most likely be formed after the manufacturing lines are operational again.

## **4.6 Interviews**

The semi-structured interview questions, presented in Appendix 1 (see p. 72), have been formed to extract the level of understanding regarding the 5S methodology in the organization and the maturity of change management compared to some aspects of Theory of Constraints. Background questions like the position or task in the organization have been asked for the sake of clarity and repeatability, even though the interview form is not making a separation whether the interviewee is a blue or white collar. This approach has been chosen, because the interview is not aiming to form the actual change management procedure.

### **4.6.1 Themes regarding 5S**

Three out of three participants know what the 5S methodology is, two of them have also some academic understanding of the concept, a separation can be made between the interviewees working in supervisory roles and workers. All three respondents have the similar opinion, that 5S concept has not been introduced properly. The 5S is perceived as a part of everyday work life, but there is lack of knowledge of all the sub-categories and goals, suggesting that company might have something to improve in the training of employees.

The question regarding the overall tidiness of the factory, has been too broad to collect answers from this level, but 2<sup>nd</sup> and 3<sup>rd</sup> line has been described mediocre by the three

participants. From worker perspective, there is more differences in tidiness between the shifts than between lines or assembly points. A visual inspection on the factory floor might not give a complete picture of the tools and their usability if the person is not familiar with the production phases and the challenges. So, ancillaries that might look obsolete or remnant can be found in the factory. Their importance is underlined by the workers when visiting the factory, but they are in conflict with the 5S methodology which sees improvised, non-standardized tools as something that should not be tolerated.

When asking whether there have been changes in the tidiness, or possible root causes, two respondents with longer experience in the factory mentions the planning of the production as an issue. The transformer is usually a big piece of equipment, and so are the parts. So, if there are bottlenecks or interruptions in the process, which happens at the same time a lot of space can be left occupied for undefined period of time. This causes problems when defining space for equipment and material in the factory. One interviewee agrees with the statement heard at the factory, that some tools have been bought for specific non-occurring use, but no one has been responsible for documenting and sorting them. So, they have just been shoved somewhere out of sight. Insight from the interview unfolds that the interviewee was not sure how much time there is dedicated for cleaning per shift, nor is it enough or too little.

#### **4.6.2 Change management perspective**

The interviewees are mostly satisfied with the level of communication with their managers. Shorter work experience reflects in the amount of support needed from the managers. The three interviewees are in direct and daily contact with their manager. They perceive that the communication works in both ways, and they are listened. One interviewee saw that more aggregated communication would be in order, further explaining that employees and managers would benefit when the goals and requirements are commonly decided.

Two more experienced interviewees recognize that they have made some proposals for new ways of work, they cannot name them in the interview. From employee side, collective frustration has been reported as the ways of work proposed are not seen to be handled that good, facing a total neglect. But at the same time, managers are perceived to ask more opinions and indent employees, which is seen as a positive impact. All three do see that minor and easy changes are usually handled properly, but when it comes to more complex and time-consuming changes that may also have notable costs to implement, the proposals are forgotten, turned down, or left without no one in charge. It is hard to draw a conclusion based on this, since no actual evidence regarding the reactions were presented.

Conversations on the factory floor reflect the same answers as given in the interviews, where no negative reaction has been visible towards proposals for new ways of work, but more often, any actions are not taken.



## 5 Conclusions

This chapter consists of the conclusions of the thesis, discussion about the validity and reliability reflected to literature, and future research.

### 5.1 The research question

The objective of this study was to answer the question: Can the implementation of the 5S-methodology in company's manufacturing unit be improved with a change management model? The objective was divided to following subcategories:

- a) How to organize tools and equipment in the facilities?
- b) How to manage the change through Six Layers of Resistance?
- c) What are the practical benefits of the previously mentioned?
- d) How to maintain 5S factory standard?
- e) Where should the buffer areas be located in the factory?

Organizing of the tools were done in collaboration with some key employees from the 3<sup>rd</sup> manufacturing line, line supervisor and the production manager. A mutual understanding of the storage system was agreed with participants, and the foam plastic trays were decided as the storage solution. The line supervisor was in charge for collecting the list of frequently used tools from the employees. This was the optimal choice of work distribution since the employees and the supervisors have much more robust vision and hands-on knowledge about the needs during a workday.

After this initial phase, a long lead time for the trays held the progress back. After the trays were received, installed, and filled with the newly ordered tools. The moribund ones could be sorted out. The work continued parallel by studying the tools required and space needed for the non-frequently used tools. Because there was not enough time, and also partly because lack of initiative, the ordering of the tool walls was held back. The question that needed to be sorted out, was how many of these walls would be

needed at the 2<sup>nd</sup> and the 3<sup>rd</sup> line. A conclusion was drawn, that two walls would be enough.

What was left uncovered in the thesis from the original plan, was some minor, yet visually important improvements considering electrical and hydraulic tools, located on a shelf on the 3<sup>rd</sup> manufacturing line. The plan was to sort out the obsolete ones, order new accessories and study, whether the shelf was on the best possible location, considering the needs of both 2<sup>nd</sup> and the 3<sup>rd</sup> line.

Also, the inbound logistics transportation system was not able to be documented in such extent, that executions could have been made. Generally, the pallets had a well-planned storing system, but some smaller platforms were left on the site after the transporting of the transformer core. The biggest platforms have high utility rates, so most of the time they have a load on them, which gives an implication, that there might not be a need to make reservations for them in already occupied factory.

Managing the change through Six Layers of Resistance was explained in theoretical form. The amount of literature and academic studies regarding the concept set some limitations on what kind of expectations could be given of the outcome. But the conversations with the production manager enforces the feasibility. One particular reason for choosing this model is that the employees tend to have prejudices about new ways of work, and procedures, but on the other side, they possess great amount of know-how and skills that can be utilized with better collaboration.

Six Layers of Resistance emphasizes the collective decision making, communication and positive attitude towards the resistance. This might bring the employees closer and more involved in the decision making. But as there are people at the factory that are not capable to fully understand the written theoretical part in English, which is not given in the thesis and there must be an actual change that needs to be undertaken. The applicability and ability to use the guides and layers of resistance given is yet to be seen.

The practical benefits of the previously mentioned has been opened in the most possible extent with the user stories collected from the production manager, line supervisors and the employees, which are then seen on the Results chapter of the thesis. Practical benefits at its core are the standardized plastic foam trays and the non-frequently used tools. Which gives the starting point for the whole factory standardization.

Other practical benefit are the answers that were extracted from the interviews. There were two different themes that were approach during the same interview, first part was considering 5S and the second one was change management. Although there was no adequate number of respondents, some conclusions can be drawn, and it narrows down the scope for more detailed research about issues. For example, why the respondents felt that their proposals for new ways of work faced total neglects.

It was difficult to get answers to the question of how to maintain 5S factory standard with the help of interviews. Anyway, as the 5S concept has been vastly studied, theoretical proposals can be made from the literature. This gives quite universal instructions, which have been seen as a problem for ETO environment both in the literature and also in the case company. The maintaining of the 5S factory standard can be proposed for future research as the maturity of the new factory standard has been implemented fully. Along the work, it was noticed that the approach for the 5S factory standard must be made from one pilot station, which can be duplicated with the least amount of additional work and reforming as possible.

The location of buffer areas was the most critical sub-question that was left out of the research because of the incident. This was communicated at the beginning of the work, but had also confirmation from the interviews, where respondents reported the production planning and deviations as a big impact for the cleanliness of the factory.

To answer the main research question, can the implementation of the 5S-methodology in company's manufacturing unit be improved with a change management model? For the given impressions from managers and from the interviews conducted, there is a slight optimistic attitude towards the model. The biggest challenges that could be derived from the thesis study is, that the employees held prejudices, which would set them on the second layer of resistance or disagreeing on the directions of the problem. This can be inferred from the casual conversations and interviews on the factory floor. Many answers given by the employees on the factory floor, was that they need more Boxo-tool containers, so nothing would go missing and everything would stay on their place with no extra effort. This has four downsides explained below.

Firstly, it would increase the inventory of the case company, which would stray the company away from the sorting stage in general. Secondly, open drawers would not be subjected to the setting stage, which gives the possibility to store the non-essentials, which needs to be reduced. Also, the locked, personal Boxos are not useful, when the owner of the key is not present at the factory. Thirdly, it mixes the frequently and non-frequently used tools, which affects the visibility and easiness to find correct tools from the perception of someone who is not skillful on figuring out where to look for a specific tool. Fourthly, the color coding would be much more difficult to read, as more colors and variations would have been introduced. Lastly, the literature mentions that organizations tend to underestimate the fourth and the fifth S, which were Standardizing and Sustaining, which might be one potential downside of the employee's proposal.

The Six Layers of Resistance as a change management model is well justified. The management and the employees both report that proposals for new ways of work is not received well and faces resistance. Which has, according to some opinions, led to a situation that the factory has not been able to improve the operations. But as stated previously on the conclusions, it is yet too early to evaluate the benefits from the model, as it has not been able fully tested in change management situation.

## 5.2 Reliability and validity

Validity of the research can be measured with validity operationalization given by Hayashi et. al. (2019), where five supportive elements create the overall validity. The data collection has been organized to focus on the facilities and the people experiencing the first impacts of the 5S implementation, and the conclusion chapter holds the discussion of the results. Data codification is clearly divided into two categories, focusing on the 5S and the change management. With more participants, different themes and similarities could have been summarized and possible connections made. Riege (2003) proposes four measures to test the validity and reliability of a case study. Construct validity needs multiple sources, the thesis has a literature review as theoretical background and interviews. Chain of evidence, with the semi-structured research interview questions as appendix 1 (see p.72), that has been proven by the case company's manager. Internal validity is visualized with pictures that assists the explanation of research problem. External validity gives strong reference from the literature review part with 5S implementation results, the scope for the case company's manufacturing facilities has some amount of generalization abilities, that can be achieved with adjustments, making the research design phase applicable. The reliability is shown with complete list of references covering the research topic. Observations are recorded, semi-structured case study protocol has been used, and the interviews have been recorded.

The reliability and the validity are not the strongest part for the thesis, as the data gathering faced a complete stop during the progress. The validity proposed in the study by Hayashi et. al. (2019) could have been improved by adding data sources, like quantitative records of approximate inventory value reduction.

From the literature side, 5S is a well-studied and proven methodology, which has a track record of improving operational performance in organizations. Especially manufacturing companies were studied in the academic papers, where the range of improvement has been mentioned in the introduction part of this thesis.

The Six Layers of Resistance did not have that much of studies to reflect. Some reasons might be that the theory is not well known, and it has variations like seven and Nine Layers of Resistance. The father of the Theory of Constraints, which includes the original Six Layers of Resistance was Eliyahu Goldratt, who has been responsible for other well know optimization tool, this gives validity for the model.

The validity of the research still stands. Optimization is a dynamic process, that needs continuous improvement. The best practices are really the best practices for limited amount of time, until they must be revised. Even though 5S is an old methodology, it has still a good foothold on different industries around the world. The simplicity of the methodology gives the possibility to keep it in the toolbox of continuous improvement tools.

Also, the change management in general is something that a prosperous business has to be able to conduct to survive in the global competitive environment as given in the change management chapter in general. The contemporality of the change management as a research topic gives great validity for the company to reflect their ability to adapt and lead the change they wish to achieve.

### **5.3 Future research**

This thesis gives a background for some future studies to be conducted. An easy heading would be to start analyzing the situation with the 5S Sorting in a bigger scale as the manufacturing line can be accessed again. This would give a quick start for disposing the tools and equipment that are not used anymore. Also, the layout of the manufacturing area can be redesigned in some extent, as deconstruction must be done. This opens a possibility to tackle the situation with buffer areas more freely. The 5S implementation process could be finished for the pilot manufacturing platform and proceed to implementing it to the rest of the factory, as it is applicable.

The change management model and its applicability can be revised and evaluated after some extent of time. Before this, the translation of the theory has to be made, since the employees at the factory might not have adequate command on English. This would form a practical handbook for the managers to rely on. Also, the translated 5S material presented in the thesis can be given to the employees so they can familiarize themselves with the concept, as it was noted on the interviews, that there is a lack of full understanding about the concept.

The biggest proposal for future research would be to study how to maintain the new 5S factory standard, once it has been completed. This would need deeper research from the ETO environment and its difficulties to comply with 5S methodology. This could also include benchmarking from other organizations operating in ETO environment. Some practical tools and involvement plan for the Standardizing and Sustaining of the standard would be good to deliver.

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## Appendix 1. Semi-structured interview form

5S
What is your position/task at the Case company?
How well do you know 5S?
How well has it been introduced to you by the company?
How do you find the overall tidiness in the factory? (at the moment)
How about your workplace? (at the moment)
Can you tell if there has been changes in the tidiness lately?
If yes, what kind and when?
<b>Change management</b>
How would you describe management's participation in your work?
How often are you in contact with you manager(s)?
What is your preferred channel of communication towards management?
Do you make propositions for new ways of work?
If yes, what kind of reactions there has usually been?
Has the proposed changes been carried out?
If not, has there been explanation why not?