



Karelia University of Applied Sciences  
Bachelor of Engineering  
Industrial Management

# Daily Management Implementation for Improving Daily Operations

Case: UPM Plywood Joensuu

Eetu Holopainen & Iiro Kankkunen

Thesis August 2024

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THESIS  
August 2024  
Degree Programme in Industrial Management

Tikkarinne 9  
80200 JOENSUU  
FINLAND  
+ 358 13 260 600 (switchboard)

Author (s)  
Eetu Holopainen & Iiro Kankkunen

Title  
Daily Management Implementation for Improving Daily Operations : case UPM Plywood Joensuu  
Commissioned by: UPM Plywood Oy Joensuu

#### Abstract

This thesis was executed as a part of the Karelia University of Applied Sciences Industrial Management Degree Program. It was created as a case study for the UPM Plywood Joensuu mill. The purpose of this thesis is to research how Daily management can improve proactiveness and information flow as well as how training affects the implementation of Daily management.

The goal of the thesis is to enhance communication between blue- and white-collar workers to enhance faster reacting on changing situations using Lean. Implementing Daily management practices into an organisation requires will from the whole organisation to be successful.

The theoretical knowledgebase is based on previous studies of Daily management and information flow in different environments. The implementation of this thesis was conducted during a five-week period, where Daily management practices were observed 80 times and held 85 times. The implementation period was conducted as a pilot for a specific department.

The results suggest that problem solving and the use of new tools were easily adapted after initial resistance. Introduced tools had encouraging effects on employees, which showed as proactiveness.

Language  
English

Pages 52  
Appendices 6  
Pages of Appendices 11

Keywords  
Daily Management, Information flow, Case study

## Contents

1	Introduction .....	4
2	Terminology .....	6
2.1	Key performance indicators .....	6
2.2	Information flow .....	6
2.3	Industrial revolution.....	6
2.4	Benchmarking.....	7
2.5	Gemba Walk .....	7
2.6	Visual Management .....	7
2.7	Visual Board .....	8
2.8	Daily Management / Daily Huddle.....	8
3	Daily Management.....	9
3.1	Daily Management in the healthcare environment.....	9
3.2	Example studies .....	11
3.3	Daily Management case studies in industrial environment .....	12
3.4	Case studies in Daily Management and industry 4.0 .....	15
3.5	Lean Manufacturing .....	16
4	Information flow .....	19
4.1	Information sharing .....	20
4.2	Visual information studies .....	22
4.3	Gemba Walks to improve information flow .....	24
4.4	Information flow during Industry 4.0 .....	26
5	Methodologies used in the thesis.....	28
5.1	Systematic literature review .....	30
5.2	Benchmarking.....	31
5.3	Visual Board .....	32
6	Phases of the thesis.....	33
6.1	Preparations and making the visual board.....	34
6.2	Training for Daily Management practices .....	36
6.3	Implementation .....	38
7	Results.....	40
8	Discussion .....	46
9	Sources.....	49

## Appendices

Appendix 1	Benchmarking questionnaire
Appendix 2	Digital visual board
Appendix 3	Visual board on shopfloor
Appendix 4	Shift collector markings
Appendix 5	All collector markings
Appendix 6	Markings breakdown

TPS	Toyota Production System
LPS	Lean Production system
DM	Daily Management
DMM	Daily Management meeting
PDCA	Plan-Do-Check-Act
TQM	Total Quality management
KPI	Key performance indicators
CT	Cycle time
VM	Visual Management
CIP	Continuous Improvement Process
SQDP	Safety, Quality, Delivery, Productivity
QDIP+	Quality, Delivery, Inventory, Productivity, Safety

## 1 Introduction

This thesis studies the topic of implementing Daily Management in a case factory UPM Plywood Joensuu. Joensuu's plywood mill started producing plywood in 1918 as independent producer with the name *Itä-Suomen Faneritehdas Oy* (Pakkanen 2019, 4) and is today known as UPM Plywood Mill Joensuu. The main focus of Joensuu mill is to produce WISA birch plywood. It is used mostly in the transporting industry, and the final product can be found in cargo ships or vehicle floors. Yearly production capacity is 55,000 m<sup>3</sup>, and there are 170 employees producing plywood that go to customers all around the world. (Wisa Plywood 2024.)

The topic was chosen based on the observation that there is a relatively small number of comparable studies on the idea of how to bring Lean methodologies back to the manufacturing industries as well as how to introduce Daily management to blue-collar workers effectively so that it can sustain itself. The case company expressed a desire for improvements regarding information flow and Daily management in the factory. Topics were a crucial part of on-going changes to gain competitive advantage. The subjects of this study were familiar from earlier studies and projects within the geographical area and were within key interests for the researchers. The results of this study will provide an example of how to implement Daily management into a three-shift cycle and how to make it so that employees are in control of its improvements. The results gathered will also provide a map of the situation within the organisation, including matters going well and those that might need adjustments. In order to gain results, the research questions were:

1. How can implementing Daily Management improve proactiveness and information flow?

## 2. How does training before implementation affect the implementation results?

This study covers topics such as terminology, which includes the key topics and explanations. There will be two chapters that include an extensive knowledge base, where two main study fields are opened up in a systematic literature manor. This is followed by the methodologies, where all the key data collection methods are showcased. After that there come phases of thesis that describe the advancements and working methods. Finally come the results and conclusions, which discuss the results in more detail.

UPM Plywood Oy commenced an organisation-wide enhancement project called S-imple. This also affected Joensuu's plywood mill. The large production capacity and wide need enhances the importance of gaining a competitive advantage against other manufacturers. The current situation of the mill was analysed and ranked in different sectors with benchmarking by a third party. The improvement plan and timeline for the improvement of different areas of the mill's functions were made by the same third party. This included the levels the employees of the mill should reach before the end of the improvement project. One of those areas is Daily management, which was ranked to be on a low level and needed enhancement for improving the information flow between blue and white collars.

As the improvement plan has many sectors, thesis workers were commissioned to work on the improvement plan and execution of the Daily Management. Careful consideration was used to ensuring that an objective view will be used to discover what actions need to be taken to improve daily management practices. The objective view also makes sure that the newest practices of Daily management will be implemented in the mill's daily operations. The goal was to reach a working Daily management model that is in line with the organisation's objectives.

## **2 Terminology**

### **2.1 Key performance indicators**

Key performance indicators, or KPIs as they are better known, are measurement indicators that are set to monitor specific metrics and show what the situation is. This makes it possible to then prepare countermeasures according to the situations at hand. If a company lacks these proficient KPIs, the result can be a mediocre performance and poor reaction to sudden problems. (Rodrigues, De Sá, Ferreira, Silva & Santos 2019, 5.)

### **2.2 Information flow**

Information flow indicates that information or knowledge is shared from one person to another. Basic information is needed for an organisation to function, and flowing information is needed to have loyal and trusting employees (Holà 2012, 108). Without information or knowledge sharing, even the basic functions of an organization would not be functional. Information flow can be visual, spoken, or signal communication.

### **2.3 Industrial revolution**

An industrial revolution indicates that important improvement to the production systems has taken place; it can also be recognized by terms like Industry 1.0 to 5.0. Each number means an industrial revolution to the manufacturing industry. The first industrial revolution (Industry 1.0) introduced machines that used water or steam to function. Now Industry 5.0 is the most recent one, in which

automation, flexibility, and human centricity are the key things to pursue. (Tarrantino 2022, 49.)

## **2.4 Benchmarking**

“Benchmarking is first and foremost a tool for improvement, achieved through comparison with other organisations recognised as the best within the area” (Andersen & Pettersen 1996, 17). Therefore, it can be stated that benchmarking is comparing one company or another to a specific competition with given performance indicators to make it comparable (Andersen & Pettersen 1996, 20).

## **2.5 Gemba Walk**

Gemba originates from the words *Genchi genbutsu*, which is shortened for Gemba. In its key element, Gemba is about going and seeing where the work is being executed. Gemba aims to tackle the quality issues and the root causes for them. This can be executed with five whys or with other methods like Benchmarking. Gemba also helps in making and keeping a standard way of working. (Soliman 2014, 26.)

## **2.6 Visual Management**

Visual Management makes an organisation more transparent and makes the information available to everyone (Singh & Kumar 2020, 1154). VM is a powerful communication tool, which comes from Lean philosophy. VM can be many things it can be a board, visual cues of where to walk on the shopfloor, or emergency exit signs. The key point of VM is that everyone knows the status of a process or what to do or where to move without saying a word (Nicholas 2010, 454).

## **2.7 Visual Board**

Visual boards are boards or displays that are mounted to a wall and display essential information for Daily management. The board can show information such as production tracking, KPI, or daily job status. (Nicholas 2010, 440.) This gives the employees a piece of base information for the daily meetings and in general if they want to know how others are performing. It also allows to see problem points in the production that can be solved faster with quick identification.

## **2.8 Daily Management / Daily Huddle**

Daily management is one of the quality measures of Lean philosophy that gives structure and creates a problem-solving environment for the local leaders. Because Daily management creates a problem-solving environment, it is also heavily involved in continuous improvement, also known as kaizen. Daily management allows monitoring the critical metrics and focus on the customers whether internal or external. This provides a clearer picture of the daily operations for everyone. (Zarbo, Varney, Copeland, D'Angelo & Sharma 2015, 890.)

### **3 Daily Management**

Daily Management (DM) is a continuous improvement tool that organisations can make use of in everyday operations. DM is composed of three main components, leader standard work, visual controls, and daily accountability process (Donnelly 2014, 550). It is typical for DMM to be around 5 to 10 minutes long and cover areas of interest every day (Maurer 2018, 209-210).

Daily management is part of the Lean philosophy which is aimed at efficient and practical problem-solving (Shah & Ward 2003, 129-149). Lean was invented by the Japanese car manufacturer Toyota in 1948 (Likert 2004, 22). However, at first, the process was known as the Toyota Production system (TPS). In 1988 the name “Lean” was put into use by a businessman named John Krafcik in his article “Triumph of the Lean Production system” (Krafcik 1988). Krafcik’s article (1988) describes the situation of Lean implementation and its performance. At the time, this was the first article where Lean was used as a term for TPS.

Since the invention of Lean, there have been many industries that are amazed by the effect of implementing Lean and what can be achieved when successfully implemented. This has led to many industries cherry-picking parts of Lean Tools (LT) to improve their industries. One of the most famous tools and methods has been DM. DM has been proven to be useful for communication as well as useful for efficiency (Singh & Kumar 2020, 1153).

#### **3.1 Daily management in the healthcare environment**

DM has been a key interest among many industries to start implementing the Lean philosophy amongst their operations to make day-to-day operating better. After Lean was coined in the 1980s it became more popular amongst other industries such as finance, construction, and healthcare. This new interest from

the healthcare side was heavily focused on continuous quality improvements. (Burr et al. 2021, 823.) The heavy focus across time on the quality of treatment and hospital operations, in general, created a perfect fit to implement some new quality tools such as Lean. It is a major factor which is why every hospital has their quality improvement programs (Burr et al. 2021, 825). This incentivises more research and implementation experiments to be done in the healthcare industry.

During the systematic research for DM topic-related studies, it was clear that there is a remarkable amount of research done on DM implementation in different hospital environments compared to other industries. In an example, a search using University of Eastern Finland's Primo database got around 2,500 results with search words "Daily Management" OR "Daily Huddle", where around 20 to 25 percent were medical-related studies or books (UEF Primo 2024). To compare the results, using the same search words on Karelia University of Applied Sciences Finna, the results showed around 9,000 articles. Of these, around 20 percent were medicine and healthcare-related studies. (Karelia Finna 2024.) The studies that were chosen for this literature review were selected based on the relevance of the subject. All of them were implementing DM in one way or another in different departments and sometimes even to whole hospitals (Zarbo, Varney, Copeland, D'Angelo & Sharma 2015). The healthcare research on DM is growing constantly, and therefore it is relevant to the thesis, as healthcare DM implementation shows the wide possibilities of the research versatility.

In general, the results of each implementation study are positive; not all present essential statistics of how successful the implementation was. It is common ground to say that the implementation was beneficial and that it should be implemented more to see even more changes in the future.

### 3.2 Example studies

In several hospital DM implementation studies, there were a few common variables such as the Daily Huddle and some forms of Plan-Do-Check-Act (PDCA) (Sano, Kajihara & Sakata 2017, 57; Zarbo et al. 2015, 123). Daily Huddle is a form of Daily management that has heavily, if not solely been adopted as the appointed name by hospitals and healthcare professionals. It refers to a way of Daily management that is more focused on information flow and following metrics on a daily basis. This creates awareness of what the situation in the department is. (Zarbo et al. 2015, 126.) Amongst the vast collection of Lean and DM research on hospital environments, eight studies were chosen. Choosing was done based on their methods, research questions, and findings.

In the eight chosen DM research papers, there were three main reasons for DM implementation: formal problem-solving, better care experience for the patients, and continuous improvement of existing processes. All of these three reasons can be narrowed under Total Quality management (TQM), which is the main objective of all Lean implementations. In these studies, only one study was directly connected as part of the quality improvement program (Burr et al. 2021). Considering that the studies were aiming to improve the quality of their designated areas, they also chose methods typical for quality improvements. The most common tools were DM, and key performance indicators (KPI) as metrics. Also, Visual Management tools such as visibility boards (Zarbo et al. 2014, 129; Donnelly 2016, 23-25) and DM kiosks were common. Their purpose was to compose the key metrics in one place. (Zarbo et al. 2014, 130.) Some other less-used methods were lectures and interviews (Sano, Kajihara & Sakata 2017, 60).

In the implementation studies that were chosen, there are some varieties in the duration of each study which then also affects the results accordingly. Studies lasted from two months up to two years. One year was the most common

among all the studies in the selection. The study “Daily Management Meeting in Healthcare Institutions for the development of control items and data collection” by Sano, Kajihara & Sakata (2017) describes that during the one-year study, they had 730 daily huddles where they raised 366 opportunities and resolved 88% of them within one week. The results are affected by the fact that the personnel of the hospital had some previous training on quality management and the researchers did give every participant comprehensive lecturing to ensure success and understanding of Lean philosophy as well as how DM works and how is it standardised. This tells that the implementation was successful and created good opportunities for participants to raise issues and solve them.

In a similar study “Resident-Driven Holistic Lean Daily Management System to Enhance Care Experience at a Safety Net Hospital” (Tresh, Cohen, Mmonu, Berdy, Barnas, Krombach & Breyer 2020), the researchers concentrated on the following metrics: improving access time to paediatric urology, treatment time for bladder cancer and operating room on time starts. This study lasted two years and resulted in 67 projects in various domains and settings. The implementation was able to improve the access time from 119 days to 21 days. Treatment time for bladder cancer is from 180 days to 105 days, and the operating room on-time starts from 61% to 71%. (Tresh et al. 2020, 56.) Based on the research it can be concluded that these results are concrete results of successful DM implementation in the healthcare industry.

### **3.3 Daily management case studies in industrial environment**

Within the research field of DM, it is ordinary to have research presented in the form of action research. This is because often researchers must measure and understand several aspects of the everyday actions on site. This creates the objectivity and reliability for their results. In the field of DM, it is exceedingly difficult to make new research based on just older studies and theoretical data, because DM is heavily relying on people and their behaviour. Although case studies are more common in the research field, there are some great studies that are made based on interviews and other forms of acquiring data.

Within the scope of the topic forty per cent (Azevedo et al. 2019; Rodrigues, De Sá, Ferreira, Silva & Santos 2019) of the studies (Azevedo et al. 2019; Dombrowski & Mielke 2014; Heikkilä & Martinsuo 2015; Rodrigues et al. 2019; Rodrigues et al. 2020) chosen were performing their case study by using an action-research methodology. Action-research methodology includes five steps: diagnosis, planning, implementation, evaluation, and conclusion. These five steps give the idea of “Learn by doing” (Coutinho, Sousa, Dias, Bessa, Ferreira, & Vieira 2009), where all the involved members are investigators and trying to solve the problem. (Azevedo et al. 2019, 1025.)

“Improvement of Production Line in the Automotive Industry Through Lean Philosophy” (Azevedo et al. 2019) is one of the studies where the researchers study and give suggestions based on their observations. The researcher’s objective is to study how they can reduce waste in the production scenario and enhance productivity at the same time. A case study is part of a massive production line acquiree, where the company is installing seven final production lines and seven pre-assembly lines based on the study results. (Azevedo et al. 2019.) Before making any massive changes, researchers conducted an analysis of the cycle times (CT) which they accounted for 20 workstation processes that need to be executed to finish the product. They observed and analysed all the processes and were able to get times and problem descriptions for each process. Based on the analysis, the researchers proposed five solutions. Those that were picked provided the company with 10.9% (2,159,000 €) savings from the planned investment. In the end, the study concludes that these results were possible because of observing, mapping, and thinking “Lean” (Azevedo et al. 2019, 1030).

In the second study “Lean leadership – 15 Rules for Sustainable Lean Implementation” by Dombrowski & Mielke (2014), the study argues that Lean Leadership is the missing component between Lean Toolbox and true continuous improvement. This is based on the observation by the researchers (Dombrowski & Mielke 2014, 565) that “-- after a few years, the Lean program of many

enterprises does not meet the expectations anymore.” They also provide a 4P model (Philosophy, process, People & Partner, Problem-solving), which composes the four necessary levels that are needed for sustainable and long-lasting Lean implementation. Due to only having a few holistic concepts about the topic at the time, researchers have used caution in choosing the literature. The study results and practical experiences of Lean implementation available have been used to increase the reliability of the results. (Dombrowski & Mielke 2014.)

After making the study, the results were as expected, and the researchers concluded that the approach of leadership is influencing the results of Lean implementation. Based on research that was carried out, “15 practice-oriented requirements” were identified by Dombrowski & Mielke (2014). These are the base of good leadership that can support Lean implementation and growth inside the organisation. Dombrowski & Mielke (2014, 570) point out that the effectiveness of these rules is based on theoretical understanding.

These case studies (Azevedo et al. 2019; Dombrowski & Mielke 2014; Heikkilä & Martinsuo 2015; Rodrigues et al. 2019; Rodrigues et al. 2020) provide a deeper understanding of the subject and of how complicated some things can be in practice, even if they are quite simple on paper. They were chosen based on two sets of criteria: first, they must be related to Lean or DM to still be inside the scope. Second, there must be different studies from different fields, as this creates a variety and wider range of possible results. The results varied from one study to another, but they all carried the same seed of Kaizen (meaning continuous improvement). A great fundamental idea of what DM and Lean are is summed up well with this phrase: “Daily improvement should become a natural behaviour of all employees and should be driven by a wish for personal development and the sense of achievement and not a monetary advantage.” (Dombrowski & Mielke 2014, 566).

### 3.4 Case studies in Daily Management and industry 4.0

Industry 4.0, better known as Smart Manufacturing, was introduced in 2011 (Dillingier, Bernhard & Reinhart 2022, 58-59) as the fourth Industrial Revolution. It introduced things like the Internet of things (IoT), Cloud computing, Cyber-physical systems (CPS), and many others that make manufacturing more automated and more dependent on data and information (Buer, Stranhagen & Chan 2018, 2).

When Lean philosophy and tools attached to it were introduced in the 1980s, all industries wanted to get their own piece of the action. When introduced, Lean became a standard art of the time. (Dombrowski & Mielke 2014, 570.) Thirty years after the introduction of Lean, the German Government introduced Industry 4.0 as a program to increase competitive advantages over the manufacturing industry (Kagermann, Helbig, Hellinger & Wahlster 2013, 77). After the Industry 4.0 introduction, there have been numerous studies and questions of the functionality, including questions like “-- How an introduction of Industry 4.0 will influence already established management practices such as Lean manufacturing?”. (Buer, Stranhagen & Chan 2018, 2.)

For example, in the study “The Complementary Effect of Lean Manufacturing and Digitalisation on Operational Performance” by Buer, Semini, Strandhagen & Sgarbossa (2020), the researchers study the relationship between Lean manufacturing, digitalisation, and their effect on operational performance. The study is executed with data from Norwegian manufacturing companies (n=75) that comprised many different sectors; amongst the three biggest ones are machinery (18.7%), chemical (16%) and fabricated metal products (12%). The study uses hierarchical regression analysis to evaluate the effects of independent variables as well as dependent variables. (Buer, Semini, Strandhagen & Sgarbossa 2020, 1983-1984.) The findings from the study speak on behalf of digitalisation as well as implementing Lean program. Buer, Semini, Strandhagen & Sgarbossa (2020, 1983) found that the length of the Lean program has a

massive effect on the effectiveness and rooting of Lean thinking inside the company. They also found that there is a strong correlation between Lean manufacturing and factory digitalisation. This indicated that the two are heavily co-existing and can have a much greater effect together on performance than just one of them. They complete each other while reducing weaknesses and waste in the process. Researchers note that this applies only when there is a long Lean program in place and high factory digitalisation.

In another study “Lean 4.0 - A conceptual Conjunction of Lean Management and Industry 4.0” by Mayr et al. (2018), the researchers studied the existing literature from three perspectives: Lean Management as an enabler for Industry 4.0, Industry 4.0 as an enhancer for Lean Management and a positive correlation between both topics. Based on these perspectives and the researchers’ findings, they proposed a matrix that has eight Lean methods and 12 Industry 4.0 tools. The proposed matrix describes what can be used with what method, the researchers also describe how Industry 4.0 and Lean methods can be implemented. (Mayr et al. 2018, 624.) The study concludes with similar results as the previous one (Buer, Semini, Strandhagen & Sgarbossa 2020), that Industry 4.0 and Lean Management complement each other. The study suggests that the Industry 4.0 methods can enhance the good methods of Lean. The study reminds that this is based on a purely conceptual level. It is also recommended by the researchers that this could be implemented in future studies as “how to implement Lean 4.0 in holistic concept”. Lean 4.0 is the best of both, encouraging the problem-solving philosophy at the same time, as industry 4.0 is being used with digitalisation to increase the transparency and predictability of the industry. (Mayr et al. 2018.)

### **3.5 Lean Manufacturing**

TPS was originally developed in the Toyota car production in the 1950s to reduce the amount of waste and make the production more efficient by Taiichi Ohno (Likert 2004, 22). Over time it spread to other industries as herein mentioned. After some time, the term Lean Manufacturing (LM) found its place in the

industry since it was the same idea and embedded the exact same concepts and tools as TPS and Lean do. In production, the DM is more focused on the Gemba Walks and the day-to-day operations running smoothly without any unnecessary disturbances.

Lean Manufacturing is an approach to manufacturing that aims to make the organisation more competitive by increasing efficiency and lowering the variability amongst the products. (Lu & Yang 2014, 2285-2286.) The study "The Role of Leadership in Implementing Lean Manufacturing", by Alefari, Salonitis & Xu (2017), highlights the fact that Lean can be considered a "Buzz" word that has been implemented everywhere. A few examples are given in the study: Lean software, Lean accounting, Lean entrepreneurship, etc. It is also highlighted that the goal is still the same as it has been in every Lean concept: maximising the customer value and minimizing waste along the way. The study is based on a systematic literature review and several (n=48) various semi-structured interviews with United Kingdom manufacturing companies. Interviews and a systematic literature review highlighted the importance of top management being on board with Lean implementation particularly in small to medium size enterprises (SME).

The study found that the main obstacle to successful Lean implementation was the lack of commitment from top management and the workforce. There was also a common theme of distractions and firefighting which took too much time and resources out of Lean. This study found that there was variation among the companies when it comes to Lean leadership principles and their applications of it. (Alefari, Salonitis & Xu 2017, 760.) The study concluded that in successful Lean implementation, there must be commitment from all levels of the company hierarchy. Clear vision and communication also enhanced the continuous improvement culture and aided in getting the implementation to stick. The top management must be the part of the company that shows the way for others and guides the success also with their actions. (Alefari, Salonitis & Xu 2017, 757-560.)

In another study “Transformation-Waves – A Brick for a Powerful and Holistic Continuous Improvement Process of a Lean Production System” by Intra & Zahn (2014) the challenges as well as the benefits of implementing the LPS in today’s business environment were discussed. Through literature reviews of existing concepts on the area identified some gaps that could have been studied and shown light on specific topics. As methods, they used the literature review and action-based research to come up with the concept of “transformation waves”. This emphasizes the idea of optimising entire areas, which can include cross-functional teams and multiple departments. The concept was implemented in action by a company called Man Truck & Bus Ag, which is a Europe-based commercial vehicle manufacturer. The study resulted in creating a brick-by-brick method within the Man truck & Bus Ag. This method means that there are four main “Bricks” that illustrate the four main concepts (Audits, workshops, ideas management system & Lean projects). That has helped the company in creating strong CIP. After implementation and the positive results, Man Truck & Bus AG started to implement the same “transformation-wave” all around the company’s manufacturing plants. The main result of this implementation was the inner motivation that the employees got. That alone is what can carry the Lean implementation onward for an exceptionally long time. (Intra & Zahn 2014.)

## 4 Information flow

Communication is the lifeline for organizations, but usually, communication with partners is the primary consideration as they are the core thing that supply materials and transport the material in or out. According to Holà, external communication is not the method the organization should be most focused on. It is internal communication, as the workers inside the organization keep it running. (Holà 2012, 109.)

Organizations function on information. Stop the information and the organization stops, too. Better organizations require better information. Worse information flows leads to worse functioning (Goh et al. 2014, 60).

Without proper information flow the employees of the organization do not have information to execute daily tasks. Therefore, proper internal communication may cause a lack of motivation and ineffectiveness in work tasks (Holà 2012, 108). This enhances the importance of information sharing. The information sharing should be transparent so everyone in the organisation knows what is happening and what the problem points are. Together, problems can be solved, and organizations can achieve more when information and knowledge are shared with others.

Studies of having transparent and flowing information in an organization have been made especially in recent years due to the rapidly changing global situation. The article by Li and her associates titled “Employee Coping with Organizational Change in the Face of a Pandemic: The Role of Transparent Internal Communication” as well as Ishtiaque & Habib’s study “Impact of Internal Communication in Organizational Development” were chosen as the backbone for this research. They both have studied the effects of information that moves in an organization (Ishtiaque & Habib 2023; Li, Sun, Tao, & Lee 2021). The effects of transparent and flowing information can be seen in employee satisfaction,

performance, and on what is the employee's relationship with the organization. (Ishtiaque & Habib 2023, 243; Li et al. 2021, 3). The studies conducted research by questionnaires to the employees where their satisfaction, opinions, and preferences were for information sharing (Ishtiaque & Habib 2023, 242; Li et al. 2021, 5). Li and her associates (2021) had a sample size of n=490 people and they used a structural equation model to analyse the answers. While Ishtiaque & Habib (2023, 242) had a sample size of n=100 people from whom they gathered answers with the help of a Five-point Likert scale to analyse the answers.

#### **4.1 Information sharing**

Information sharing is a key component of information flow, as without sharing the information of what is known, the information flow will not exist. That is why effective information sharing that is transparent and truthful is a cornerstone for a stable organization as well as getting higher profit. (Ishtiaque & Habib 2023, 243.) Having transparent information does not mean that everything needs to be shared. The point is that relevant information is shared with the employees. The information sharing does not need to be formal in fact. The ones who wait for the manager to come onto the shopfloor are usually the ones who do not receive information or are misinformed. (Čuić Tanković, Bilić & Brajković 2022, 10.) This also acts as one of the stepping stones for a well-functioning DMM as it does not need to be a formal meeting where preparation is needed.

The earlier-mentioned studies examined information sharing and flow from multiple angles. The two benefits of employee satisfaction and information sharing during change have been chosen for closer inspection from the studies due to their importance for organisation day-to-day communication. As the responses were analysed, a 75% (n=490) correlation was found between information flow and a positive relationship with the organization (Li et al. 2021,6). This is supported by 80% (n=100) of agreement and 20% (n=100) of strongly agreed answers (Ishtiaque & Habib 2023,244). Both studies received positive results where employees considered that having information moving from one person

to another is important. This confirms that having information flow in an organization is important for employee satisfaction, which in turn creates long-term workers for the organization. The same result is mentioned by Li and her associates (2021, 9), as they also conclude that information sharing helps manage relationships between the employee and the organisation.

Another important part of information sharing is when some planned or unplanned change happens in an organisation. The two studies differ on change management and its relation to information sharing. Li and her associates (2021, 9) used Likert scale and got a 19% (n=490) agreement, that information sharing helps changes on organization. Ishtiaque & Habib (2023, 243) received a 60% (n=100) agreement and 30% (n=100) strong agreement, that information sharing makes changes easier in the organization. The difference between the results can be explained by the different sectors. The studies were made in or by the different countries. The years the studies were conducted can also affect the results, as 2021 was much closer to the upbeat year of 2020, where pandemic and rapid instructions from health advisors took place. This means the employees who answered the questionnaire might have felt that information sharing was not enough to keep up with fast changes.

Even though there were differences in the answers, information sharing encourages employees to improve their relationship with the organization. Reduce uncertainty and make coping with the change easier (Li et al. 2021, 8) and putting resources into information sharing increases the value of the information shared (Ishtiaque & Habib 2023, 246). That is what both studies agree, on as the answers on both studies agreed that information sharing is important. Even though the voice of employees should be the number one thing for an organisation (Li et al. 2021, 4). DM could not function without information, and as stated above with information, changes become easier to bear and satisfaction with the job is higher. It can be stated that without information flow the DM and DMM would not be possible, as no one would share the information they have.

## 4.2 Visual information studies

Visual information is traditionally known as signs, markers, or colour codes on the shop floor (Kurpjuweit, GoReinerth, Schmidt & Wagner 2019, 1). They can be seen as safety measures or as an information board to tell information to the employees. Visual information can be first seen as a waste of time as it takes a lot of time to set up colour codes or signs on the shop floor. Visuality is needed in organisations as employees have too many questions and if they do not get answers to them, they do nothing or make stuff up (Galsworth 2005, 22). This can be solved with visual information sharing. The employees can have answers to their questions with the help of visual information. That can be a board of work schedule or colour-coded lines on the floor, which indicate walking paths.

Galsworth (2005, 31) defines visuality in a workplace like this “A visual workplace is a self-ordering, self-explaining, self-regulating, and self-improving work environment. Where what is supposed to happen does happen, on time, every time, day or night because of visual solutions”. That supports the earlier statements of how visuality can be used in a workplace and work as a supporting function to Daily management. Each organization has a different experience in implementing VM and sharing information visually. Even though an organization does not have much knowledge on how to visualize information, it can still succeed in implementing it. In this study, visual boards were implemented into the shopfloors of organizations that showed important information about the workday. Kurpjuweit and his colleagues' (2019, 4) analysis varied from the manufacturing industry to the medicine industry, and they also had varying experiences from low to high implementing Visual Management in the organisation. They collected the data using semi-structured interviews with the company managers. They were associated with the VM implementation, the answers were analysed with Schematic analysis.

This gives an extensive idea of how visual information can be used in many organizations regardless of their expertise and field of business. Surprisingly, organizations with little experience with visualisation managed the implementation process better than organizations with some or a lot of experience (Kurpjuweit et al. 2019, 3). This can be the cause of active participation of management that has the time to allocate to research to improve their processes, as they want to increase their organisation's revenue instead of fighting with other managers in the organization.

Usually, organizations with experience in implementing improvement plans such as Lean or VM are usually older and bigger organizations, which are “frozen” in time (Schultz & Klungseth 2022, 5). This can be the case for some organizations. Having top management support is easier when the thinking on the industry is more human-centric, e.g. in the hospital industry. This is regardless of the organisation's level of expertise in implementing visual information. Sharing is possible as seen in the study above, and it is done in a human-centric way, e.g. starting implementation with a pilot project (Kurpjuweit et al. 2019, 8).

The start of the implementation can be seen as hard if the employees do not have any previous experience looking at a board or screen that tells them about the factory's current situation. As stated in the study above, the experience does not define the success of the implementation of visuality. Goh and her associates (2014) used a survey to gather information from the shopfloor workers ten months after the implementation started from the case company. In the study named “A Visual Board to Facilitate Production Flow Regulation at Sequential Processes” Goh and her associates (2014) studied a three-shift in a day factory. It took from 7 to 30 days, where the average day count was 11 days, for the 6 operators to understand how to use a visual board to improve their work.

The difference in the day count to knowing how to use visual tools can be explained by the age of the operator. Younger operators can understand the visual board faster than older operators. Another affection factor is their education level or their previous work experience. Goh and her associates (2014, 92) also

noticed that the time needed for gathering parts from inventory reduced from 189 seconds to 96 seconds, which means a 93-second difference. It can be interpreted as a small difference, but when parts are gathered from inventory many times a day by multiple persons, it saves a lot of time that can be used for other tasks. All the employees even agreed that implementing the visual board reduced the time needed for specific tasks. They could see the production tasks immediately. (Goh et al. 2014, 92.) This means that with time every employee can benefit from having visibility in their workplace.

Even if the implementation starts well, it will not work for a long time without involvement. Kurpweit and his colleagues (2019, 3) also noted that employee participation and involvement is a key thing for long-term implementation. They help the employees understand how to better use visual tools to improve their work and in that way change their mindset. Schultz & Klungseth (2022, 6) and Kurpweit and his colleagues (2019, 12) both identified that employees' voices should be heard so they can affect how visibility functions in their workplace.

### **4.3 Gemba Walks to improve information flow**

Gemba Walk was introduced along with TPS and many other ideas that were introduced to the world by Toyota (Imai 1997, 21). This meant that managers go to the shop floor to observe, interact, and understand how the work is done (Romero, Gaiardelli, Wuest, Powell & Thürer 2020, 1). There are still things that need to be told to higher-ups that cannot wait until the next DMM, even though the organisation would have a working communication model and the information flow is sufficient and conveyed visually on a board or a screen. That is where the Gemba Walk takes place. Going to the shop floor helps managers understand how the process functions, as well as gives employees opportunities to speak with managers about problems in the process. Typically, Gemba Walk creates better relationships between blue- and white collars as it is not a formal meeting like a DMM usually is.

Gemba Walk is not something new, but there are not that many studies about it or its implementation in organisations. This can be due to the fact that Gemba Walk is not recognized as its own method for gaining more information and fostering better relationships in organizations. Nonetheless, three studies were chosen that concern the use of Gemba Walk in their organizations and what they have noticed it brings for them. (Romero et al. 2020, 4; Gesigner 2016, 1; Stolarska-Szeląg 2022, 64.) Gemba Walk can be accomplished through various methods, but the above-mentioned studies differ on what has been noticed to be the best way to do it and get the best results.

Gesigner (2016) found in his study “Experiential Learning: Using Gemba Walks to Connect with Employees”, that it is better to take a Gemba Walk without any note-taking tools to keep it informal. Romero and his associates (2020, 64) on the other hand discovered that Gemba Walks with digital tools such as cameras or smart sensors on the machines, offered better results from the Gemba Walk. This can be the cause of data gathering, as with sensors and cameras more data can be gathered and analysed. This can be used to identify bottlenecks and improved productivity. Finding the right type of Gemba Walk style can differ between organisations, but if data is taken into the walk, it can hinder the employees' first idea of Gemba Walk. Even though data can be gathered it should not hinder the main goal of communicating and knowing the process on the shopfloor (Romero 2020, 8).

A considerable part of information flow is to be aware of what happens on the shop floor of the organization. One example of the use of Gemba Walk is to use it for noticing safety risks. Romero and his associates (2020, 3) point out from his study named “New Forms of Gemba Walks and Their Digital Tools in the Digital Lean Manufacturing World” that Gemba Walks boost the morale of employees as well as the trust to speak with their higher-ups. This means that there is a benefit to going to the shopfloor and trying to understand the process. That is happening there, as it can be helpful in problem situations that can occur when difficulties are encountered. Truthful feedback from the employees will

help boost productivity and find bottlenecks, but it is even more important to focus on the people. As stated above, going to the shopfloor helps managers to identify safety risks. Gesinger (2016, 35) points out that with the feedback from the employees they can create safety rules and methods that better suit the needs of the employees and in that way decreases the risk of accidents.

These studies highlight the importance of knowing what the employees are doing and how the employees are doing. Walking through the shopfloor even gives a foundation for the managers to know what topics or problems may arise in the DMM. (Nicholas 2010, 415.) This is therefore an essential part of DM as is VM and information sharing on how well daily activities can be shared and managed. This is all connected to information flow and employees wanting to share the information from their workstation, which is a lifeline for effective daily meetings.

#### **4.4 Information flow during Industry 4.0**

Industrial Revolutions are more widely recognized by the term Industry X.0, where X represents the number of the Industrial Revolution. Each Industrial Revolution has brought new improvements through mass production technologies, systems, and advancements (Kaya & Aytaç 2023, 781). Usually, the focus is on production improvements, like how production became faster first with mass production and then later with the help of robots. One of the key things that keep the organizations going is information between people and different parties. Especially during Industry 4.0, communication has been made easier between teams and customers (Ayodeji, Aigbavboa & Sylvester 2021, 30), as more communication methods have been introduced to organisations. Likewise, telecommunication as well as digital devices help transfer information between people.

Even though improvements in each Industry X.0 have been the subject of considerable research, the information flow between people has not received as much attention. In the study by Kovaitė, Šūmakaris & Stankeviciene (2020, 179)

named “Digital Communication Channels in Industry 4.0 Implementation: the Role of Internal Communication”, the authors studied the different communication methods offered by Industry 4.0. For part of the study they chose 12 experts from different sectors to rank different communication methods and analysed the answers using Kendall’s coefficient of concordance. They found (2020, 180) that during the actual use period, the chosen experts ranked social networks and blog posts as the best communication methods. Instant messaging services got the third-best placement. The effectiveness of these communication methods can vary between organizations. Communication with blog posts will not necessarily be the most effective way for a small organization. All the listed methods do improve the communication between employees to share information, as some of them are one-way communication methods, while some are two-way communication methods. (Kovaitė, Šūmakaris & Stankeviciene 2020, 184.)

One-way and top-down communication are both effective ways to share information. Especially the two-way communication method was not that common in the early Industry revolutions (Men 2014, 263). Nowadays, the blue collars share information with the white collars, and they have opportunities to improve and give feedback by themselves. That was not terribly common before Lean practices and later Industry X.0 thinking, even though digital advancements give employees and managers more ways to communicate. Kovaitė and her associates (2020, 185) noted that physical communication methods, like face-to-face communication, are still more effective than communication through digital tools. Men (2014, 263) also agree that two-way face-to-face communication helps communication practices, especially in DM practices. Some tools like visual boards can be digitalized, and they can offer the benefits of displaying accurate and real-time data. This is thanks to technological advancements from Industry 4.0. (Kovacs 2022, 22.)

## 5 Methodologies used in the thesis

This thesis is conducted as an exploratory case study that aims to explore a phenomenon utilising data while conducting the study it followed the methods and standards of qualitative research. As Zainal (2007, 3) says “A pilot study is considered an example of exploratory case study.”

According to Zainal (2007, 3) many exploratory case studies start with preliminary data collection to form the research questions and hypothesis. As part of the case study, Benchmarking and a visual board were used as data-collecting methods. Commonly, this model of a case study uses some general observation-based questions to open up a door for further examination of the phenomenon (Zainal 2007, 3). In a case study, there are five common methods of collecting data, namely: interviews, observations, documents, surveys, and artifacts (Hassan 2024). For this case study, the most relevant data collection methods were interviews, observations and artifacts. These methods were relevant because of the opportunity to spend time with the employees on multiple levels and learn what solutions would be beneficial for the environment. In each method, notes were gathered. These would be referred to when advancing in the study.

The qualitative method is the right way to go when the variables are not known (Karnia & Zitterkopf 2024, 5). Based on observations the qualitative method was the more beneficial approach, as qualitative data gave more useful results instead of quantitative data. This approach gave information on what were the proven working methods for DM and information flow on the benchmarked factories. A qualitative method is for analysing written records of observations, open-ended questions and interviews. This means that the standard descriptive and inferential statistical methods cannot be applied as the data is qualitative (Karnia & Zitterkopf 2024, 2). The disadvantage of qualitative methods compared to other methods is that getting reliable and consistent data is

characterized by the subjective observations of the researchers. This makes the quantitative method better when considering the objectivity of cases where many studies are carried out (Karnia & Zitterkopf 2024, 6).

The methods used in this thesis are a systematic literature review, benchmarking and a visual board. This is because they have strong qualities like adaptability and reliability. Adaptability assists in keeping the visual board relevant, as the environment can have numerous changes during the boards' existence. The reliability of previous studies was essential, since they would guide this thesis to fill relevant gaps in the research area. Studies were chosen because learning from the past would guide new research and a visualisation of a process had benefits that would show concrete progress. The above mentioned tools create a foundation for research, planning and execution as they have their own roles.

The foundation for research is built based on the fact that a systematic literature review aims to collect information from many studies and combine them as one clear picture. Based on the studies it was possible to construct an own idea and direction for the thesis. Benchmarking makes it easier to see how others have defined their success factors and what could be learnt from them. It was chosen as the mapping out method as it can be used without locking specific KPIs while being still able to compare different KPIs in various sectors (Tuominen 2021, 88). Based on the previous models by other researchers, an adaptation of the letters was made to have the best fit for production. This played a crucial part in the piloting stage, where the letters gained their meaning from users. This is why visual board was chosen as the data mapping method for the implementation. Visual boards are used in organizations to clearly show the status of production, task assignments and problems on the production so everyone who goes past the board would have the information at hand (Intra & Zahn 2014, 583).

## 5.1 Systematic literature review

A literature review is a form of producing an idea or comprehension of a collection of books and studies related to a specific field. A literature review can often be explained as a research method. In this method one is aiming to study the original studies. This method is used to collect, understand, and evaluate previous studies to produce new information and studies (Vilkka 2023, 43).

The foundation of a systematic literature review is based on precise, systematic, and repetitive methods, also known as protocols. These methods are observed as non-biased, generalisable, and credible in producing results. A systematic literature review aims to find the results with a broad search process and find the most relevant and best-quality results available. The goal is to synthesise the known and unknown information and identify in which direction the knowledge is developing (Vilkka 2023, 43). A systematic literature review aims to collect information from many studies and combine them as one clear picture. This is usually a difficult task to do if there is not a team around since there is so much to go through. It is possible to use a rapid review as a shortcut to exclude certain areas and topics whilst still keeping it within the methods of systematic literature review. The rapid review focuses heavily on the research question and what is around it. This can cause difficulties in finding suitable studies since the research question becomes narrow. (Vilkka 2023, 44.)

A systematic literature review was used in the following way: the subjects were divided into two, and the key elements necessary for the review were defined. These included for example the keywords and research questions. After the initial determination came the execution of the searches and analysis along the way regarding what types of studies would be accepted and what types not.

## 5.2 Benchmarking

Benchmarking is a way to find the best standards for a process, service, or product and learn from others, how to achieve those better standards or “best practices” for improving. The idea of benchmarking is, why re-invent the wheel when one can just look at what others are using as a wheel and adjust the way of doing to the proven method. (Bhutta & Huq 1999, 254.) The same thought was behind the origins of benchmarking when the comparison process was first associated with the term benchmarking. Henry Ford founded the term Benchmarking just before he started the assembly-line manufacturing of cars. Ford investigated how animals were moved from worker to worker on a conveyor belt and wanted to use the logic in the manufacturing industry. Nowadays, this is known as the assembly-line method. Slowly benchmarking started to generalise as others in the manufacturing industry wanted to match the success of Ford. (Cole 2024, 10.)

In this case, benchmarking was done as an internal benchmarking inside the organization. There are many different types of benchmarking, such as internal, competitive and functional benchmarking. Choosing the benchmarking method should be based on what is wanted from the results. (Cole 2024, 11.) Internal benchmarking made it possible to get as much information as possible regarding how DM practices were functioning within the organization’s other factories. This gave an insight into what KPIs were used to track the daily performance related to DM and information flow. Internal Benchmarking gave a better understanding of the company’s processes and what has been proved to work in other factories inside the organization. This brings us back to the foundation thought of benchmarking: why reinvent the wheel if it is not necessary?

### 5.3 Visual Board

Visual boards are used in organizations to clearly show the status of production, task assignments, and problems in the production. Everyone that goes past the board will have the information at hand. (Intra & Zahn 2014, 583.) Usually, the boards are used in co-operation with DM. The aim is to strengthen the message of DM and to ensure that everyone has the same information. Information coverage should be independent of what day or shift someone is working on. The visual board is modified to fit the organization's needs. This means that there are quite a few variations of the board available. To achieve the best results in implementing the board, the board needs to be studied so that the right elements are chosen to be showcased on the board.

One variation of the visual board is Recognized as SQDP, where the acronyms stand for safety, quality, delivery, and productivity. The metrics are purposefully put into categories. This is to quickly evaluate each area and to allow the workers to make corrective actions, on the correct area if the previous markup indicates that the requirement was not satisfied. (Protzman et al. 2018, 275.) The board is broken into categories so that it is easier to identify problems in certain sectors. This makes it easier to identify where to put more resources, to ensure that the markups are above the set level. Planning and executing the corrective actions would not take more than a few minutes on a day-to-day basis. Pointing out the problem points on the board encourages the employee to communicate the problems and do root cause analysis on their own to fix the problem points independently. (Protzman et al. 2018, 274.)

## 6 Phases of the thesis

Research on the topic started early in January 2024 when the initial plan was created, and a systematic literature review was chosen as the knowledgebase method. Before the end of February, the literature review was finished, and the focus shifted to planning and executing the benchmarking, which took place during May. Benchmarking was followed by the implementation period which started at the end of May and lasted until early July. During May and June, the methodology segment and the terminology were constructed. After the implementation period ended, the results and conclusions were written, and the thesis was proofread and finalised.

During the preparation, the visual board and training materials were created to enhance the learning of new processes and bring new visuality to the equation. Since both white-collar and blue-collar workers were seen as valued parts of successful implementation, two sets of materials were created to train white-collar and blue-collar workers. After the initial visual board was created for training purposes, another visual board was created to take place in an assembly line. The purpose for creating two boards was that not all employees had been in the training at the start of implementation. They would be taking part shortly after starting implementation. Throughout implementation, KPIs and other parts of the board were changed to better fit the environment.

The implementation was executed in the following work environment inside the UPM Plywood mill in Joensuu. The assembly station is located in the middle of the mill and is essential in producing the plywood for later stations. Nine active employees work in assembly per shift. The working environment is fast-paced and demands constant situational awareness. The assembly station itself has three assembly machines and is located on the ground floor. The assembly station is surrounded by forklift routes, which makes it easier to keep materials stocked up.

## 6.1 Preparations and making the visual board

While doing the preparation, it was recognised that there was a clear benefit of spending time with the community that was taking the visual board into their everyday life through work culture change. This was also recognised by some earlier studies (Men 2014, 264) which had utilised different ways of VM in their DM practices. Through research, it was recognized that there are specific models of visual boards that are proven to work in certain working environments (Zarbo et al. 2015). This led to the discovery of the QDIP+ visual board and other similar models for specific use cases. This encouraged to study this VM method more and eventually led to multiple Benchmarking visits through the organisation in different business functions. Benchmarking visits took place in the Savonlinna UPM Plywood factory and in Tampere UPM Raflatac which represent two different business functions within UPM Kymmene Oyj. These visits took place during May 2024.

Even though the benchmarking visits uncovered that there have been some attempts to make visual boards, it was clear that the scope was not as extensive as the case study was proposing. Although the visual boards were not in a key position, there was some learning regarding the open communication and problem-solving techniques. These were taken into consideration while preparing the visual board and its problem-solving section.

The visual board itself originated from the QDIP+ style of visual board but was adapted to fit better in the plywood factory environment. The visual board aimed to bring the systems and forms already in use to life. Bringing the forms to life meant that anyone bypassing could see and contribute to the board when necessary. Based on the observations from previous forms of gathering data and boosting productivity, a digital prototype was made to represent the idea of the visual board that was about to be brought to life.

Tammikuu	Helmi	Maa	Huhti	Touko	Kesä	Heinä	Elo	Syys	Loka	Marrasku	Joulukuu
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25	1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25
Kuljetus	Ympäristö	Ympäristö	Ympäristö	Ympäristö	Ympäristö	Ympäristö	Tuotantotila	Tuotantotila	Tuotantotila	Tuotantotila	Inventaario
Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari	Mittari
Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu	Ammu
Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma	Ma
Ti	Ti	Ti	Ti	Ti	Ti	Ti	Ti	Ti	Ti	Ti	Ti
Ka	Ka	Ka	Ka	Ka	Ka	Ka	Ka	Ka	Ka	Ka	Ka
To	To	To	To	To	To	To	To	To	To	To	To
Pe	Pe	Pe	Pe	Pe	Pe	Pe	Pe	Pe	Pe	Pe	Pe
La	La	La	La	La	La	La	La	La	La	La	La
Su	Su	Su	Su	Su	Su	Su	Su	Su	Su	Su	Su

Picture 1 First version of Digital Daily Management Meeting Visual board.

Based on the digital visual board and feedback received, the creation of the first version of the KYLTTI visual board was started. With the help of KYLTTI, the training of employees could be started. This would assist in the adaptation of KYLTTI in the implementation phase.



Picture 2. Picture: Iiro Kankkunen. KYLTTI Visual board before starting the implementation on the factory floor. Picture taken 30.5.2024.

After the initial digital version of KYLTTI was approved, the physical board was created and put into its place in the centre of the plywood factory.

## 6.2 Training for Daily Management practices

Many new things are brought to workplaces without prior information, which creates immediate change resistance. To combat the usual way of introducing new things, training sessions were held for white- and blue-collar employees to spread information about the upcoming change on DM. This ensured that every party involved in the implementation phase would have the same information. A total of five training sessions were held. This ensured that there would not be any information caps, which would cause issues during the piloting of new DM practices. The training sessions were also used to gather feedback from the employees, so the DMM practices would fit their needs. As mentioned by Kurpjuweit and his colleagues (2019, 10), active feedback and involvement are crucial for functioning DMM, which is why two-way communication was prioritised during the training sessions.

One training session was held for the white-collars and four sessions were held for the blue-collars, as there are four work groups in the piloting department. Topics during the sessions were the basics of DM, DMM and showcasing of the new visual board, which will come to the piloting department, and lastly a demonstration of how DMM should be held. The idea was to start with a presentation on the basics of DM and DMM practices. This meant that there would not be misunderstandings about what happens during DMM and what is required from the individual employee. It also entailed what benefits an employee could expect when sacrificing a small amount of time to upkeep the DM practices to help coworkers know what has happened and what are the main problems stopping them from working productively.

Along with the theoretical side, there was also the demonstration phase. This was done as a workshop within the same training session. A study made by Schultz & Klungseth (2022, 6) noticed that workshops help the transition phase of the employees when introducing new things, as it enforces two-way communication between the workers and workshop keepers. Two-way communication is what was wanted from the training sessions, to know how the DM methods could be tailored to the needs of the piloting department. The workshops were used to gather KPIs, which would be tracked on the visual board. Employees were divided into small groups to discuss the KPIs they wanted to track using the visual board. The flow of DMM was also covered, with help from the workshop keepers. Later on, the employees rehearsed how to hold the DMM, ensuring that the use protocol was known. When the visual board came to the factory floor, each employee had the knowledge to read and use it.

Reactions to the training sessions were mixed; the main issue that all groups had was the extra workload that comes from upkeeping the visual board, as someone needs to keep the DMM and update the board. This in a sense is true, as the employees need to take a little bit of time to mark down the problems and mark up their performance in line with the KPIs they wanted to the board. The benefit of sacrificing a small amount of time was to help coworkers know what the current situation is. It was not clear to the employees immediately after the training sessions.

### 6.3 Implementation

At the beginning of the implementation, the majority of the training for work groups was held. The DMM was arranged primarily at the start of every shift on the three-shift cycle within the plywood factory. Since all KPIs are not known at the beginning of shift, the production's situation would be marked up dynamically, during shift to the KYLTTI visual board. The implementation started on 31.05.2024 and ended on 05.07.2024, meaning that the implementation period lasted five weeks. During the implementation period a total of 80 DMMs were observed, from which 15% were guided to ensure the proper use of the visual board.

The DMMs were held using communication headsets, as all the employees use those to communicate with each other. Each department has its own radio channels, so only that department's employees heard the DMM. This ensured that other important communication from other departments would not be jammed because of the DMM. This assisted in keeping the meeting as a fluid conversation. The duration of the DMM was a maximum of 15 minutes and happened during the time when the employees were working. The DMM took place 15 minutes after the shift started. In DMM the metrics of each sector were gone through, e.g. was there enough veneer for the whole shift or is everyone in the department using safety equipment. This ensured that the employees would have a safe working environment and enough material to work at the workstations.

The concept of continuous improvement was visible during the implementation phase, as the DMM practices and visual board were constantly evolving according to the needs of the employees. Along with the feedback and needs of the employees in the piloting department the visual board was developed to fit the environment. Based on the improvement feedback, the changes to the board were made within a day of the feedback. Fast changes to the board were used as a strengthening factor for making change in the working environment from

the perspective of a blue-collar. Even though the feedback was listened to, there were minor difficulties during implementation. The two biggest challenges were the commitment of the employees to attend DMM and the cohesion of the enhanced DMM practices to the already existing meeting structures. They appeared as scepticism and lack of commitment from some of the employees towards using the new methods. The challenges were undertaken by promoting the benefits and practicality of the new DM methods.

## 7 Results

Study produced two sets of results, one dealing with benchmarking results and the other with implementation results. The results are similar in some ways but also different in others. The main difference is that the benchmarking results were qualitative and the implementation results were quantitative. A common factor between the results is the desire to improve information flow and make it more effective. This shows in a productivity increase as well as in more Kaizen actions.

Benchmarking is used to find standards on how others are doing the same thing and learning from the best in business. One method is internal benchmarking, which was used to find standards of DM. Two UPM factories were benchmarked, namely the UPM Plywood factory in Savonlinna and UPM Raflatac in Tampere. A list of 40 qualitative questions was used as the questionnaire to measure how the DM practices serve the employees of those two organizations.

Benchmarking visits to the two factories offered useful insights into DM and information flow. DMMs were held in both factories, with the key difference being that the meetings were not held daily. The common practice of DMM is when it is being held every day or in every shift. In both factories, the schema was to focus on the production status and problem points. The idea of DMM was to keep it as short as possible and standardize the contents, so the same things would be gone through every meeting. Even though the meetings were not held every day, the flow of information was found to be effective between blue collars and white collars. Information flow is enforced by digital means as after the meeting ends, the meeting's notes are shared with everyone in the organization.

Both benchmarking subjects had a history with visual boards. Raflatac had a different take on the visual board, as it only focused on development ideas.

Each of the employees could write down problems and their ideas to the board, and every Monday the board would be gone through and evaluated if the ideas are possible to be implemented. The ideas would be ranked according to how much resources it would take and how big of a difference it would make to the production. Only after that would it be discarded or approved. The Savonlinna factory on the other hand had tried implementing visual boards, but using them was challenging and their use was halted. However, workers here are using Power BI report on a daily basis. This could be seen as a result of an extended development from the physical board. In both factories, it was noted that digitalization helps day-to-day communication. Savonlinna Mill used Power BI and Excel sheets as well as communication headsets to communicate information to others. Raflatac used Power BI and Microsoft Teams to communicate. This ensured that information or problems found their way to the person responsible for them. It also cuts the “middleman” from the information flow as each person has access to Teams and can easily find the information meant for them. Using digital tools helps to make the day-to-day information flow faster and saves time, which is especially important in the daily operations of an organisation.

In addition to Benchmarking results, the main results are gathered from the implementation period. As part of the study, the implementation period was initialised. Peters et al. (2013, 347) describe implementation research as working within the world's conditions and trying to make sense of it. This means that the aim is not to create an environment where the world has no influence, but rather to work with those limitations and influences and see what the results are. The results of the implementation largely deal with the results obtained during the research period. These were collected using a visual board. A comprehensive set of results was obtained during the long implementation period. The implementation period lasted five weeks and contained 85 DMMs from which 80 were observed. During implementation, the observations were divided into three main times: morning shift, evening shift and night shift. These observations took place at each shift's beginning. The shift situation data was marked to the visual board, which was then collected and visible to each by passer. From the visual board, four types of data were collected as quantitative. The quantitative data is collected from visual board's four main areas: the shift data, the month data, the

year data and solved problems data. The shift, month and year data are divided into three main options: green, red or empty. Green means that things are going as wanted and everything is good on that part. Red means that there have been some anomalies and interruptions deviating from the wanted results. Empty means that the answer could not have been marked and therefore was left empty.

Weeks	Time frame	Markings in total on shift collectors	Markings in total on month collectors	Markings in total on year collectors
Week1	31.5.2024 - 6.6.2024	315	42	0
Week2	7.6.2024 - 13.6.2024	357	42	0
Week3	14.6.2024 - 20.6.2024	357	42	0
Week4	21.6.2024 - 27.6.2024	345	42	0
Week5	28.6.2024 - 4.7.2024	357	42	1
Total		1731	210	1

Table 1. Visual board results summary.

Table 1 provides the results gathered from the visual board arranged by week. Markings from shift collectors are noticeably growing from the first week due to some changes in KPIs. For example, some KPIs that would need special equipment to get the information were taken away, and some KPIs were added. They were employee suggestions and seen as useful measures. After the first week, the marking amounts are similar due to the low number of big changes. There is a minor slouch during the fourth week when there were some difficulties starting a new week on the visual board.

Weeks	Time frame	Green shift collector	Red shift collector	Empty shift collector	Green month collector	Red month collector	Empty month collector	Green year collector	Red year collector	Problems solved
Week1	31.5.2024 - 6.6.2024	144	23	148	31	4	7	0	0	6
Week2	7.6.2024 - 13.6.2024	237	45	75	32	4	6	0	0	6
Week3	14.6.2024 - 20.6.2024	250	36	71	33	3	6	0	0	3
Week4	21.6.2024 - 27.6.2024	250	36	59	30	6	6	0	0	5
Week5	28.6.2024 - 4.7.2024	238	51	68	33	2	7	1	0	3
Total		1119	191	421	159	19	32	1	0	23
Average		223,8	38,2	84,2	31,8	3,8	6,4	0,2	0	4,6
Standard Deviation		45,05	10,62	36,15	1,30	1,48	0,55	0,45	0,00	1,52

Table 2 Visual board results shown in Excel.

In total there are 1731 markings: 1119 are green, 191 are red and 421 are empty. The largest number of markings were made between the second and

third week of implementation. In comparison, the smallest number of markings came during the first week. Table 2 shows a more detailed table of what results were gathered from the visual board. In the table, it is visible that the empty shift collectors number gets drastically smaller after the first week. This is due to the changes in KPIs to better suit the environment. In the first week, the large number of empty shift collectors can be explained by misunderstanding from the filler's side on when to erase the fields on the board. This means that two days out of six are missing. Most empty shift collectors are purely a result of the fact that assembly is on a cycle that does not work on Sundays. This means that three shifts on Sunday and one shift on Saturday are constantly empty. These were kept in calculations, since the factory can still at any point change it so that Sunday is a working day amongst others.

In Table 2 the standard deviation is presented based on the collected results from the visual board during the five-week period. The standard deviation is calculated in order to contextualize the mean and how big quantity of the data results fit inside what field. Commonly, standard deviation forms a bell-shaped figure which demonstrates the deviation of data from a sample's mean (Lee, In, Lee 2015, 222). In Table 2 the largest deviation is on the green shift collector, where it is 45.05, and the smallest comparable value is in the green month collector shown as 1.30. The largest difference between these results is the scale of the results received: the green month collector stays below 40 but the green shift collector reaches up to 250 which is more than six times larger. Although the scale of results is different, it is not the only thing affecting the high deviation. It can be observed from Table 2 that the largest factor is that the smallest result is 144 and the largest is 250, creating a gap of 106 between the results.

Comparing the green and the redshift collectors, it is visible from Table 2 that red is six times smaller than green. This is due to the fact that there are only a few main problem areas based on the visual board. These main problems are the quality of raw materials and machine breakdowns in production. In Table 3 the categories are separated and shown more in detail regarding how the markings are divided. From Table 3 we see that the quality category has over 36% of its markings as red, indicating the raw material side. The second largest

category is the inventory where more than one-fourth of the markings are red, which is an indication of the quality and amount of raw material available. It is important to keep in mind that the assembly is in the middle of the plywood-making process, which makes it sensitive to problems from previous stages. The third largest category is productivity, where the machine breakdowns are measured and seen. This is a noticeably large portion, as it is one-fifth of the markings in that category.

Category	Week1	Week2	Week3	Week4	Week5	Sum	Share of category
Delivery Green	36	46	44	44	40	210	85,71
Delivery Red	0	5	7	7	11	30	14,29
Environment Green	47	50	50	50	51	248	98,39
Environment Red	1	1	1	1	0	4	1,61
Quality Green	13	29	36	36	39	153	63,40
Quality Red	1	17	13	13	12	56	36,60
Productivity Green	29	38	45	45	41	198	80,81
Productivity Red	6	12	5	5	10	38	19,19
Safety Green	24	33	34	34	34	159	99,37
Safety Red	0	1	0	0	0	1	0,63
Inventory Green	17	30	29	29	20	125	73,60
Inventory Red	5	4	5	5	14	33	26,40

Table 3. Breakdown by category from the visual board results.

On top of the quantitative method, results were also gathered by qualitative methods using observations and informal interviews with the employees. These observations and informal interview results were conducted without a script and a recorder. Based on the observations the employees were hesitant to commit to a new solution and to the visual board. This was due to the previous solutions and results from them. During the informal interviews in the first weeks, it became clear that the solution would have to show how it benefits the employees. This meant that before they would be ready to embrace it into normal practices there should be something to show for. The hesitations of the first week were

temporary and were forgotten after three weeks, and fifteen problems were solved, as shown in Table 2. The observations showed that communication between the employees was effective since the problems that occurred were solved at a fast pace and the information from it reached the other shifts by word of mouth. Based on an informal interview the communication was improved by having the problems visible on the visual board. This assisted in keeping the information available even after the shifts had changed.

The results were expected as a whole, but there were a few surprises. There was only minor resistance to the idea that the training would assist in learning the new solution, and the visual board easier was expected. Likewise, the visual board would spark up some actions amongst the white-collar workers, which would assist in making the DM a permanent working habit. However, part of the results were unexpected: for example, the DMM would only take under five minutes when there were no issues. This indicated that the use of the visual board was understood and did not interrupt the normal work. It was also unexpected that the employees would be proactive in using the problem-solving side of the visual board, so fast and solve problems in co-operation. As the results were primarily expected, they were what was aimed for.

## 8 Discussion

This thesis was executed as part of Karelia University of Applied Sciences Industrial Management Degree Program. It was made as a case study to the UPM Plywood Joensuu mill. The purpose of this thesis was to research how Daily management can improve proactiveness and information flow as well as how training affects the implementation of Daily management. The thesis included training for the employees involved in the pilot and an implementation period of five weeks.

Thesis project proceeded as planned at the start. The vision was that a standardized DM model as well as Lean ideology could be brought to the UPM Joensuu mill. Part of the DM was Gemba Walk, which would promote spirit amongst the employees. This was observed to be unnecessary on its own since safety walks that served the same purpose have already been implemented. DM practices would constantly evolve to better fit the needs of the employees. When the implantation ended the Lean ideology was sustained even after implementation. The backbone of thesis should stay the same so that the research questions would be relevant throughout thesis. The desired results were to bring new Lean ideology to the mill and deploy the DM practices successfully. This would then result in creating a guidebook. The guidebook would explain how to expand the same practices to other departments of the mill.

Some problems were encountered during thesis project. At first the problem was that the source gathering was bothersome because access to many important sources was restricted. Another problem was that the UPM Plywood Joensuu Mill had previous experience with implementing Lean ideologies to its daily operations. This caused the employees to be doubtful about upcoming changes.

Nevertheless, the timeline was followed as planned for almost the entire process. It started from beginning of January and lasted till end of July. One setback to the timeline was encountered when the implementation phase could not start at the earlier agreed time. It caused a ripple effect to happen, and this delayed the thesis project compared to the original timeline. The sharing of the workload was divided equally throughout the thesis. The topics for the knowledge base of thesis was divided into two along with the observations during implementation.

Observations during implementation supported earlier studies, which indicated that adding a visual board would create better engagement from the employees (Zarbo et al. 2015, 132). This would make the information flow better due to the visual clues (Galsworth 2005, 43). This was observed to be true in this thesis, as the problem-solving engagement was greater than expected. Earlier studies also suggested that support from top management (Alefari et al. 2017, 757-760) and training (Sano et al. 2017, 58) beforehand would be a key to rooting the new Lean practices in the company. This was observed to be true during the implementation period in the fast acceptance of new DM practices by employees and support for development.

The ethical side was taken into consideration when gathering materials from previous studies, by using peer-reviewed articles from multiple sources to ensure the reliability of previous results. While constructing the thesis, ethicality was considered by following the characteristics of scientific work ethic, for example by using inclusive scientific writing. In practice, the pilot group taking part in the implementation was randomized, which ensured objectivity as well as that researchers had no previous connection to the pilot group. During the thesis, there were no methods requiring personal information collecting. This meant that restrictions regarding personal information collecting were not necessary to consider. Informal interviews were held on the discussion level, and information from them was not collected.

Even though there are previous studies on the matter, there is a lot to study within this field. Since a majority of the studies are conducted in health care, it

would be beneficial to conduct similar case studies on other fields like manufacturing. Based on the subject of this thesis, future research could be conducted on the metal manufacturing industry. It would be interesting to study this subject from an Industry 4.0 perspective or by using different target groups within the organisation.

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## Benchmarking questionnaire

1. Päivämäärä \*

2. Kirjaaja \*

- Opinnäytetyöntekijä
- UPM Henkilökunta
- Muu

3. Benchmarkattava yritys \*

- UPM Plywood Joensuu
- UPM Plywood Savonlinna
- UPM Raflatac Tampere
- Muu

4. Miten edellinen implementaatio meni ja miksi se päättyi?

5. Miten usein aloitteita käsitellään, miten niitä käsitellään ja miten ne tulevat esille? (YHTEINEN)

6. Näkyykö Leader standard work (standardisoitu johtamisaikataulu) jollain tavalla? Millä tavalla? (YHTEINEN)

7. Minkälainen vaikuttamismahdollisuus henkilökunnalla oikeasti on asioihin? (YHTEINEN)

8. Onko teillä aamupalavereita? (Jos on, miten ne toimivat) (YHTEINEN)

9. Mitä ja miten osastotauluilla olevia tietoja esitetään? (YHTEINEN)

10. Miten paljon työntekijöiltä tulee aloitteita? Millainen käsittely aika aloitteilla? (YHTEINEN)

11. Toteutetaanko Gemba kävelyitä ja miten usein/kuka? (YHTEINEN)

12. Miten monia palaveri luokkia/tasoja on? (YHTEINEN)

13. Miten laatua tarkkaillaan ja mitä häiriöille tehdään? (LAATU)

14. Miten reklamaatiopalaute näkyy ja vaikuttaa? (LAATU)

15. Miten laatua parannetaan ja millä työkaluilla? (LAATU)

16. Näkyykö työntekijöiden osallistuminen parannusprosesseissa? Miten? (LAATU)

17. Millaisia tunnuslukuja mitataan? Miksi? Miten? (LAATU)

18. Miten riskien lieventäminen tehdään ja kuinka usein? (TURVALLISUUS)

19. Miten ja milloin turvallisuutta tarkastetaan ja parannetaan? (TURVALLISUUS)

20. Miten teknologioita hyödynnetään turvallisuuskysymyksissä ja niiden lieventämisessä? (TURVALLISUUS)

21. Näkyykö työntekijöiden osallistuminen parannusprosesseissa? Miten? (TURVALLISUUS)

22. Kuinka optimoidaan läpimenoaikaa ja vähennetään odotusta ja varastoa tuotantotiloissa? (KULJETUS)

23. Kuinka pysytään kartalla ulos ja sisään liikkuvan materiaalin tilasta tehtaan tiloissa? (KULJETUS)

24. Millaiset odotusajat rajoittavat muita toimintoja? (KULJETUS)

25. Millaisia teknologioita näissä prosesseissa hyödynnetään? (KULJETUS)

26. Millaisia suorituskykyilmaisimia (KPI) tässä luokassa käytetään? (KULJETUS)

27. Näkyykö työntekijöiden osallistuminen parannusprosesseissa? (KULJETUS)

28. Onko käytössä 5S? Mitä 5S-ideologioita on hyödynnetty? (YMPÄRISTÖ)

29. Miten jätehuolto tehdään ja millaisia kehittämistoimenpiteitä on tehty? (YMPÄRISTÖ)

30. Millaisia suorituskykyilmaisimia (KPI) tässä luokassa käytetään? (YMPÄRISTÖ)

31. Näkyykö työntekijöiden osallistuminen parannusprosesseissa? (YMPÄRISTÖ)

32. Millaisia suorituskykyilmaisimia (KPI) mitataan? (TUOTTAVUUS)

33. Miten resurssien käyttö maksimoidaan ja mikä voi aiheuttaa sen epäonnistumisen? (TUOTTAVUUS)

34. Hyödyntääkö työnantaja erilaisia teknologioita pullonkaulojen minimoimiseksi? (TUOTTAVUUS)

35. Näkyykö työntekijöiden osallistuminen parannusprosesseissa? Miten? (TUOTTAVUUS)

36. Miten mitataan, onnistuiko työvuoro vai ei? (TUOTTAVUUS)

37. Kuinka minimoidaan varastot ja maksimoidaan tuotanto? (VARASTO)

38. Miten valmiita tuotteita käsitellään varastossa? (VARASTO)

39. Miten työntekijä voi vaikuttaa oman työpisteensä varastoon? (VARASTO)

40. Mitä KPI:itä käytetään inventaarion arviointiin ja miten tekniikkaa toteutetaan (VARASTO)

41. Kommentteja



**Visual board on factory floor**



## Shift collector markings

Weeks	Time frame	Markings in total on shift collectors	Markings in total on month collectors	Markings in total on year collectors
Week 1	31.5.2024 - 6.6.2024	315	42	0
Week 2	7.6.2024 - 13.6.2024	357	42	0
Week 3	14.6.2024 - 20.6.2024	357	42	0
Week 4	21.6.2024 - 27.6.2024	345	42	0
Week 5	28.6.2024 - 4.7.2024	357	42	1
Total		1731	210	1

## All collector markings

Weeks	Time frame	Green shift collector	Red shift collector	Empty shift collector	Green month collector	Red month collector	Empty month collector	Green year collector	Red year collector	Problems solved
Week 1	31.5.2024-6.6.2024	144	23	148	31	4	7	0	0	6
Week 2	7.6.2024-13.6.2024	237	45	75	32	4	6	0	0	6
Week 3	14.6.2024-20.6.2024	250	36	71	33	3	6	0	0	3
Week 4	21.6.2024-27.6.2024	250	36	59	30	6	6	0	0	5
Week 5	28.6.2024-4.7.2024	238	51	68	33	2	7	1	0	3
<b>Total</b>		<b>1119</b>	<b>191</b>	<b>421</b>	<b>159</b>	<b>19</b>	<b>32</b>	<b>1</b>	<b>0</b>	<b>23</b>
Average		223,8	38,2	84,2	31,8	3,8	6,4	0,2	0	4,6
Standard Deviation		45,05	10,62	36,15	1,30	1,48	0,55	0,45	0,00	1,52

## Markings breakdown

Category	Week 1	Week 2	Week 3	Week 4	Week 5	Sum	Share of category
Delivery Green	36	46	44	44	40	210	85,71
Delivery Red	0	5	7	7	11	30	14,29
Environment Green	47	50	50	50	51	248	98,39
Environment Red	1	1	1	1	0	4	1,61
Quality Green	13	29	36	36	39	153	63,40
Quality Red	1	17	13	13	12	56	36,60
Productivity Green	29	38	45	45	41	198	80,81
Productivity Red	6	12	5	5	10	38	19,19
Safety Green	24	33	34	34	34	159	99,37
Safety Red	0	1	0	0	0	1	0,63
Inventory Green	17	30	29	29	20	125	73,60
Inventory Red	5	4	5	5	14	33	26,40