To Increase Employee Engagement in Lean Continuous Improvement

A Case Study at Fibo-Trespo

Sondre Støle

Hans Lundgård Ekeren

Supervisors

Bo Terje Kalsaas, University of Agder

Monica Briseid, Fibo Trespo

This master's thesis is carried out as a part of the education at the University of Agder and is therefore approved as a part of this education. However, this does not imply that the University answers for the methods that are used or the conclusions that are drawn.
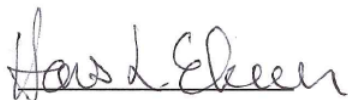
I

PREFACE

The master's thesis is written in the final semester of our M.Sc. degree in Industrial and Technology Management at the University of Agder, the Faculty of Engineering and Science, the Department of Engineering Sciences. The deliverable is structured as a report and accounts for 30 credits. The study was conducted during the period from January 2015 until May 2015. The research consist of a case study of Fibo-Trespo, a production company located in Lyngdal, Vest-Agder, Norway.

We have both gained an interest for lean philosophy during our time at the University of Agder and as exchange students at the University of Minnesota, Twin Cities. We contacted Fibo-Trespo, which is well known and recognized for their successful implementation of lean, in order to study their procedures and methods. Thankfully, they were willing to cooperate with us and dedicate time and resources to our study. During the time of the research, we learned how Fibo-Trespo succeeded through their lean journey and discovered areas for further investigation. During our research, we found that it was a need to study employees' engagement towards lean continuous improvement within the organization in order to improve Fibo-Trespo's performance.

We would like to thank our supervisor: Professor Dr. Ing. Bo Terje Kalsaas at the University of Agder for assistance and feedback during our research. He has provided us with valuable information and expertise in the field of lean philosophy as well as methodical input. We would also like to thank our key informant at Fibo-Trespo: Monica Briseid. She has provided us with a lot of information, planned interviews, meeting, and distributed an organizational-wide survey on our behalf. We truly appreciate all the guidance and assistance we have received during the time of our research. We would also thank all the other employees at Fibo-Trespo for being so welcoming and positive towards our research and for responding to our survey.

Grimstad 22.05.2015

Hans Lundgård Ekeren   Sondre Støle

EXECUTIVE SUMMARY

Fibo-Trespo produces laminate bathroom panel and countertops, in their production facilities based in Lyngdal. The organization started their lean journey in 2007, which has led to increased revenue throughout the years to follow. Today the organization is recognized as one of the leading organization within lean. Fibo-Trespo has gone through extensive changes since 2007, and our research seeks to determine if these changes has anchored into the organization's workforce. More specifically, our research takes a closer look at the organizations approach to lean continuous improvement, and the effect it has on the workforce. Through interviews and a survey, our purpose is to measure and increase engagement levels within the workforce at Fibo-Trespo with respect to lean continuous improvement. Engagement is a complex term, and several factors can affect employee's engagement level. When determining what theory to build this thesis upon, we consider the context, and emphasizes the factors that we have reason to believe are more relevant to the case studied. Furthermore, we look into what theory similar studies draw upon.

It can be argued that a lean production system is a more fragile production system. The reduction of inventory and buffers makes problems surface, and as we move in the direction of *1x1 flow,* the organization is relying on the knowledge within the workforce to tackle a variety of challenges (MacDuffie, 1995). Continuous improvement in the lean methodology can be compared to stepwise innovation, eventually generating new knowledge and value for the organization. To remain competitive in the international market, Norwegian companies need to specialize and rapidly adapt to changes. This leads to an increased focus on being innovative. Learning and establishing knowledge among employees is a focus in lean, but theory describing how the actual learning process takes place is missing (Kalsaas, 2012). The Nordic Model promotes the opportunity to make decisions, learn at work, and broad involvement from employees as factors for characterizing the working environment (Gustavsen, 2011). This thesis therefor includes and emphasizes learning in working life, a theory developed by Illeris (2012), which accounts for the missing perspective on learning within lean. Illeris points out that the most significant learning takes place where individuals meet the fellowship and shapes it, and vice versa. Motivation also plays an important role in developing exceptional people and teams that follow the company's philosophy. The internal motivation theories point to intrinsic factors as important, where the external theories emphasize extrinsic factors (Liker, 2004). Arguably, there is a motivational balance between rewards and recognition, and conducting the improvements itself.

The research utilizes the constructive research approach and is conducted as a theoretically informed case study. Our research process starts with an exploratory phase showing that the organization has succeeded with their initiatives, and has developed knowledge and a culture for improvement work among employees. However, findings also suggest that changes had not necessarily become transcendent. Through second hand sources and several meetings with our

III

informant and members of management, we were able to narrow down to a precise research question:

"How to increase employee engagement in lean continuous improvement at Fibo-Trespo?"

As we move into the main part of our research process, we develop semi-structured interviews that seek to get a more detailed perspective on employees' approach to improvement work as well as employees' level of engagement. Furthermore, we want to measure the level of employee engagement within the organization though an organizational-wide survey.

The survey bases on a concretization of relevant theory. Every question links to one or several models retrieved from our theory chapter. The concretization of theory makes it possible to determine areas to focus, as results from questions will point to a theory. With great help from the organization, we received a response rate of 87%, thus providing a holistic view of employees' engagement towards continuous improvement. The questions in the survey is concretized upon the following concepts:

- The Nordic Model.
- The Technical Organizational Learning Environment.
- The Social & Cultural Learning Environment.
- Motivational theory

The overall results from the survey is considered consistent and positive for the organization, as high levels of engagement are proven. In combination with other collected data, the survey results forms the basis to make several assumptions regarding this success. However, parts of the survey also provides data which points to variation and work pace, as factors that can affect engagement levels negatively. When analyzing these results, we have taken into consideration that running production can result in less room for variation, due to operators being bound to operate machines. The competence system at Fibo-Trespo serves as the backbone for learning and development of knowledge. Through appraisals, the organization builds a database containing one competence profile per employee. Several levels of competence can be reached, which ultimately affect employees pay grade. Results from the open interviews led us to take a closer look at this framework. More specifically, we propose changes to how employees are rewarded for conducting continuous improvements.

With support from relevant theory we have developed a construct, which is presented in form of a table, which is presented on the next page.

CONSTRUCT		
Measures	**Content**	**Results**
Quality assurance practice for general improvements.	A card that includes reflective questions to assure quality in general improvements. Utilized in a dialog between initiator and an accomplice.	Secure a level of value and meaningfulness in all general improvements. Avoid and prevent unnecessary and dishonest improvement initiatives.
Changing the competence system.	Removing numerical quotas for general improvements in each level of the competence system.	Altering the organization's basis for assessing employees, by removing a false indicator of employee performance. Ensures that general improvements are conducted on the right premises.
A recommendation to develop a proper standard for rotation within teams.	In fellowship, each team develops a rotation practice that reflects agreement among the members.	Secure that every team utilizes a rotation practice that ensures variation in work.
A recommendation to refresh knowledge within initial lean methods and tools.	Management arranges a seminar where employees have the opportunity to refresh their knowledge within initial lean tools and methods such as Operator controlled maintenance 5S Standardization SMED	Increases employees' ability to conduct more valuable and meaningful improvements, by increasing the understanding and knowledge within these methods.

TABLE OF CONTENTS

1. INTRODUCTION

Running a production company within a high cost country like Norway must be considered a challenge. According to the government budget, we are at the very top of the scale, in terms of labor-cost per hour in the world. For industrial workers alone, the average salary is 64% higher compared to industrial organizations within the EU (Arbeidsdepartementet, 2013). Meaning, that Norwegian companies must increase efficiency, deliver high quality, while reducing costs in order to remain competitive internationally and avoid outsourcing. Many lean initiatives have failed, as management mistake the production philosophy for a set of practical tools (Kalsaas, 2012). Companies fail to see the bigger picture, and that the transformation involves changing the organizational culture. Through relentless reduction of waste, organizations seek to increase their competitiveness, by running a leaner production process. The goal is to deliver high quality, while reducing inventory and optimizing capacity. Establishing flow, utilizing buffers and methods for leveling production is necessary to achieve a just-in-time production system.

Continuous improvement is an essential part of the lean philosophy, and can be considered the organizations efforts to improve their processes and procedures by utilizing scientific problem solving methods. Through continuous improvement lean organizations perform several gradual improvements that can lead to more extensive innovations. Being innovative involves the utilization of human capabilities within the organization in the creation of new knowledge. The working environment in Nordic countries promotes learning at work and broad involvement from employees. The organizational structure is often times flat, and places power to make decisions in the hands of the performer. Arguably, lean organizations depend on the knowledge and engagement of their workforce to increase business results and gain competitiveness. There are many claims that employee engagement is essential for an organizations level of success and competitiveness. Furthermore, the level of engagement within an organization is determined by the presence of several underlying factors. By establishing a work environment consistent of the right factors, employees will be engaged in their work, which means they will give a lot of themselves in their roles at work.

Fibo-Trespo is a production company located in the south of Norway, specializing in laminate bathroom panel and countertops. The company consists of 107 employees and had annual revenue of 484 million NOK in 2014. The organization started their lean journey in 2007, and is now one of the leading companies in Norway within lean production. However, the company's growth has slowed down to some extent the last couple of years. Since 2011, the revenue has increased from 400 to right above 480 million NOK. From 2007 until 2011, it increased from 214 million NOK to 400.

The unit of analysis is Fibo-Trespo, or in other words, the organization as a whole unit. The research itself covers Fibo-Trespo's approach to continuous improvement work, and the affect it has on the organization's employees. The background for the study is the tremendous changes

that Fibo-Trespo has gone through since the start of their lean journey in 2007. We wanted to see if these changes had anchored, and if Fibo-Trespo has managed to establish a culture for continuous improvement, among employees. Leading us to measure the engagement among employees towards lean continuous improvement. On what grounds are improvements conducted, and how could we increase engagement towards improving? In the exploratory phase, we gather our data through conversations and informal meetings with key informants at Fibo-Trespo. Thus, we arrive at our research question:

How to increase employee engagement in lean continuous improvement at Fibo-Trespo?

A research question of this nature depends on theoretical concretizing of the term employee engagement, as this is a widely discussed term by many social scientists and psychologists around the world. Kevin Kruse (2012) states, *"employee engagement is the emotional commitment the employee has to its organization or its goals"*. However, others are more critical of the term and states that it objectifies humans as tools of productivity (Keegan, 2014). In this study, employee engagement refer to an employee's ability to perform to the extent of their full potential in their given roles. Indications of engagement among employees concretizes into measures such as motivation, value of work tasks, abilities for self-development and learning, and social relations. We will describe this further in section 6.1.

Furthermore, we present a construct in shape of a list of initiatives and recommendations that we believe will indirectly; improve employee's engagement based on data from our research and theory. The construct includes improvement initiatives regarding some of the facilitations that currently exist within Fibo-Trespo in order to engage employees.

The methods and theories utilized in the thesis are recognized and agreed upon in the research communities. To map Fibo-Trespo's lean continuous improvement work we explain several methods, such as A3, KATA, 5S, SMED, and PDCA (Deming Wheel). Regarding employee engagement, we rely on Illeris' model for learning at the work place, and Herzberg's motivation theory. In addition, we include the Nordic model as described by Gustavsen (2011) and Amundsen, Kalsaas, & Knudsen (2014) as it explains the working environment and how work is organized in Nordic countries.

The thesis is based on a theoretically informed case study (Yin, 2014). The research follows the constructive research approach, a research method with the purpose of creating a physical solution/construct to the research question, adding new knowledge to the field of study. Through close collaboration with the organization, we have gathered qualitative and quantitative data to form an empirical foundation.

The cultural, environmental, and economical differences between the Nordic countries and the rest of the world is significant (Amundsen et al., 2014). These differences are important to consider when implementing lean philosophy. Kalsaas (2012) conducted research at 3B in the Norwegian production industry, where he points out the importance of involving employees

and promote participation in lean related work. Consequently, our study seek to address these differences and their influence on employee engagement.

The structure of the report bases on our research method. First, we describe our research methods and methodology as it contributes to the validity and reliability of the research. Secondly, our theoretical framework is presented as invaluable background information to understand how we can propose a construct for increasing employee engagement. Thirdly, we present Fibo-Trespo as organization and present a description of the case studied based on findings in our initial study. Fourthly, we present results from an organizational-wide survey and statistical data, where we intend to measure the current level of engagement among employees in lean continuous improvement work. Fifthly, we present our analysis and inferences based on case findings and theory as it builds up to a construct/solution. The construct is presented, followed by an evaluation and finally a conclusion. The evaluation focuses on relevance and functioning of the construct as well as an evaluation of the study, while the conclusion summarizes our research alongside propositions for further research.

2. RESEARCH METHOD

This chapter describes different methodological approaches that applies to the research during the timeline of the thesis. A combination of methodologies applies in order to get a holistic picture of the presented research. Our research divides into three different phases. Firstly, we utilize an exploratory research method aiming towards establishing a concrete research problem. This proved to be a time consuming phase of the research, as finding an area with practical relevance was a challenge. Secondly, we collect data through a quantitative survey and interviews, where we seek to investigate our research problem in an organizational scale. Finally, in the third phase of the study, we try to build bridges between our empirical data and theory to create a solution that aims at solving the research problem.

The layout of this chapter bases on the structure of the research itself and the constructive research approach. First of all the research design explains in greater depth, the different phases of the research and the approaches used to construct a solution to the research problem. Secondly, the research process is explained so the readers can fully understand and appreciate the work by following the process themselves. In the third gist of this chapter, the sources of evidence and data collection methods are presented and described in greater extent. The fourth gist deals with the quality of the research and the research design.

2.1 Research Design

The research design is supposed to illuminate common aspects between the collected data and the question of research (Yin, 2014). The character of the research and the research question itself is central in determining the design and method of research. In this thesis, the goal is to answer to how the object of research can improve their methods and ways of working within lean philosophy. Yin (2014) explains that case studies is a preferred strategy when it comes to answering the questions "how" and "why", when the researcher has lower control over events, and when contemporary phenomenon with real-life context is emphasized. The case study, as a way of conducting research, is often a preferred method when the goal is to contribute to knowledge of individual, group, organizational, political, social, and related phenomena (Yin, 2014). Based on our goal of improving the methods and procedures of an organization, a theoretically informed case study is appropriate for our research (Yin, 2014). The organization of interest is Fibo-Trespo and our research concerns lean continuous improvement and employee engagement within this field. Our research utilizes a constructive research approach as design for the case study, shown in figure 1. The constructive research approach is often used to define and solve problems, as well as improving an existing system or performance, with the overall objective of adding to previous knowledge (Oyegoke, 2011). The essence of the approach is to create one or several innovative constructions, which is abstract notions with infinite numbers if potential realizations (Kasanen, Lukka, & Siitonen, 1993). The constructs themselves, refer to human artifacts, such as models, plans, organization structures, diagrams,

and communication systems, and it is characteristic of them that they are invented and developed, rather than discovered (Kasanen, Lukka, & Siitonen, 1993). The constructive research approach is an appropriate research design when dealing with complex research problems, or ill-structured problems as Holmström, Ketokivi, and Hameri (2009) emphasizes in their research of design science i.e. constructive research approach. They explain ill-structured problems as research problems where the objective or the way of achieving the objective is little or not known, or disagreed upon by the researchers and exploratory research is necessary to obtain knowledge within the field.
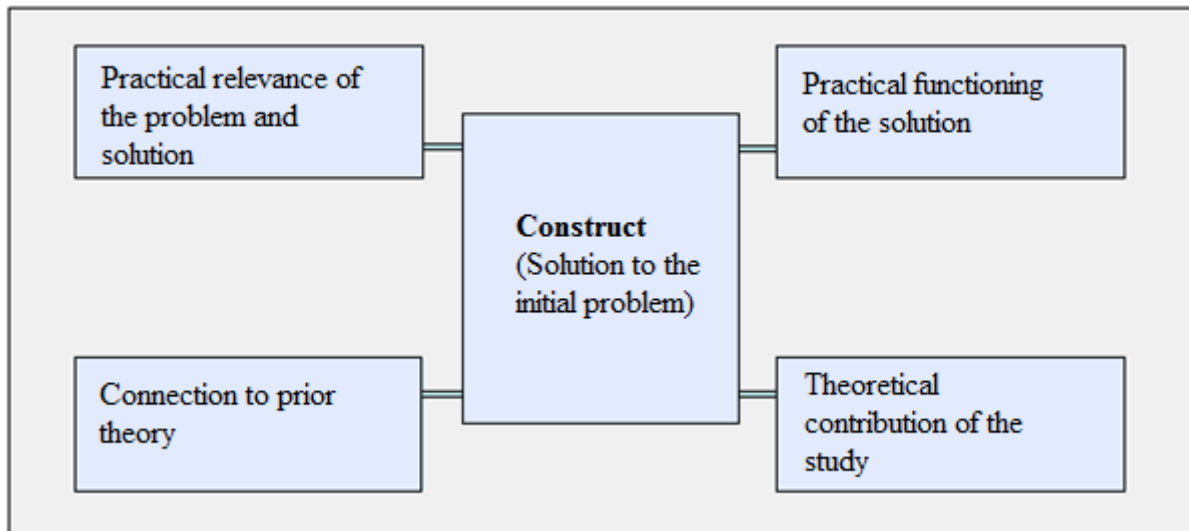

Figure 1: The constructive research approach. Adapted from (Lukka, 2003)

Close cooperation between the researcher and the organization of interest is critical to obtain a holistic view of the studied topic when dealing with exploratory research like the constructive research approach (Holmström et al., 2009). By this means, we have based our work on close cooperation with Fibo-Trespo, and we were given the time and resources we needed to conduct the study as desired.

2.2 Research Process

In this chapter, we present the chronological structure of the research process as stated in the constructive research approach. First, we describe our path narrowing down from a broad research area to a specific research problem within Fibo-Trespo. This means describing the practical relevance of both the problem and the solution and what benefits it entails for Fibo-Trespo. Additionally, we describe the connection between our research problem and prior theory in its given context. Combining this theory with our findings sets the basis for developing a construct. In the third subsection of this chapter, we shortly present our construct as it aims at solving the problem. Next, we discuss the practical functioning of the solution and the possible theoretical contribution of our research in terms of the construct.

Practical Relevance

Our findings through the exploratory phase show that Fibo-Trespo has succeeded well with their initiatives, projects, and has developed knowledge and focus on improvement work within the organization. However, our findings also suggest that the changes, not necessarily had become transcendent to the intended degree. With transcendent meaning that changes needs to reflect peoples work, in all levels of the organization. Our findings through archival records and meetings with employees correlated with what Fibo-Trespo's management had experienced, that there is a need to further improve how people in the organization think and act when approaching improvement work. Employees looking for ways to improve must become a natural habit, instead of something that needs to be crossed of a commotion list. From the findings in the exploratory phase of the study, which is further described in section 5.1, we were able to define our final research problem:

"How to increase employee engagement in lean continuous improvement at Fibo-Trespo?"

According to our exploratory research, it would be relevant to measure the level of employee engagement towards lean continuous improvement at Fibo-Trespo to see if the changes during their lean initiative have anchored in the organizational culture. We believe that a construct aiming at increasing employee's engagement will lead to greater performance in lean improvement work, thus increased performance in general, as the organization has proved static in terms of economical results the last couple of years. Our construct will also be of interest when it comes to implementation of lean methodology as we seek to emphasize the importance of engagement within a successful implementation of the lean philosophy.

Linking to Prior Theory

One of the more challenging aspects of the research was to establish what lies within the term employee engagement and finding literature that were relevant for our case as well as adapted to the Norwegian working environment. Theory regarding fundamental concepts within lean philosophy bases on early studies of the TPS by Womack and Jones (1990) (1996). More recent literature by Liker (2004) and Rother (2009) address challenges and reasons that organizations fail to implement and sustain the lean management system. Further, our study rely on lean literature from Nordic countries, which consider how Nordic organizations have succeeded in translating the philosophy (Johnstad, Giæver, Holtskog, & Strand, 2012) (Wig, 2014). Gustavsen (2011) and Amundsen et al., (2014) describes how Nordic countries are characterized by flat organizational structures, broad involvement, and a calm work environment. The characteristics typical for Nordic countries must be considered, as they influence employee engagement within these countries. The opportunity for learning at work is almost taken for granted compared to other parts of the world. Furthermore, learning is emphasized because of its missing aspect in lean (Kalsaas, 2012). We have relied on Illeris' (2012) model for learning at the workplace as fundament for investigating opportunities for

learning at Fibo-Trespo, where we have focused on the organization as it facilitates an arena for learning based on the physical and social- and cultural environments that exist within an organization. As in learning theory, we also find several aspects of motivation theory in engagement literature. Thus, we have relied on Herzberg's (1959) motivation theory. A theoretical concretization relates theory to specific survey questions, as described in section 6.1.

Construct

Our construct consist of a list of recommendations in order to increase employees' engagement towards lean continuous improvement. The recommendations bases on our case findings and theory in order to improve the current situation at Fibo-Trespo. Because our constructs are context specific, an understanding of the case description in addition to our theoretical framework, is necessary to appreciate our work. The finalized constructs are presented in section 7.2.

Practical Functioning

Due to limited time during our research, we have not been able to test the functioning of the constructs. This means that there is no guarantee that the presented constructs will work as intended, but we have discussed the functioning in further depth in section 7.3. However, successful constructs are important for Fibo-Trespo, as it will increase employee's engagement in continuous lean improvement work, which in turn can increase the organization's development and results.

Theoretical Contribution

Our findings bases on theories and methods in lean philosophy as well as the Nordic model, learning, and motivation. By combining these elements, we provide a construct that is context specific to Fibo-Trespo and their ways of conducting continuous lean improvement work. Thus, the main theoretical contribution of the solution is to improve the existing system and adding to previous knowledge within Fibo-Trespo. However, the solution and construct can prove useful for other lean organizations in Nordic countries who seek to create a more engaged workforce in continuous lean improvement work. We have discussed the theoretical contribution further in section 7.3.

2.3 Data Collection

The data collection methods used in this study bases on both qualitative and quantitative data. In exploratory case studies the researcher should use qualitative methods to get a holistic picture of the case and to get a deeper understanding of the subject studied (Ghauri & Grønhaug, 2005). Ghauri & Grønhaug (2005) emphasizes that qualitative and quantitative data collection methods are not mutually exclusive, but differentiated by the objective and field of research. In general, for inductive and exploratory research, qualitative methods are most useful, as they can lead us

to explanations and hypothesis building. Quantitative methods on the other hand, can be useful when several units are being studied (Jacobsen, 2005). However, quantitative methods are often criticized for not considering social relations between people and can appear individualistic (Jacobsen, 2005). On the other hand, quantitative methods, and especially surveys, can avoid this individualism by asking questions regarding the respondent's situation (Jacobsen, 2005). This way, quantitative methods are able to clarify if behavior and attitude varies from situation to situation. Thus, similar to qualitative methods, serve the purpose of establishing a more holistic perspective on the research object (Jacobsen, 2005). Therefore, qualitative and quantitative methods are suitable at different stages of the research (Ghauri & Grønhaug, 2005).

In the first phase, the research problem address something that needs additional information or is unstructured and unknown to the researcher, thus qualitative research methods are suitable. Yin (2014) describes six sources of evidence most commonly used in case study research. Documentation, archival records, interviews, direct observations, participant-observation, and physical artifacts. It can be extensive to utilize all six sources of evidence, as this requires a lot of time and resources and is dependent on the case study itself and the availability of information. Yin (2014) also points out that none of the sources can be ranked higher or lower than each other, as it is the variety of sources that creates validity in the collected data. Our initial research bases on evidence from documentation- and archival records, interviews, and direct observations. In the second phase, outcomes and analysis of what being discovered in phase one sets the basis for investigating a defined area through an organizational wide survey and low/semi-structured interviews, which can be found in appendix 10.1 and 10.2.

When it comes to creating a construct to a social study regarding human behavior and action in an organization and its technical framework, qualitative data collection is generally preferred (Ghauri & Grønhaug, 2005). However, there are also those who claim that quantitative data collection can provide just as good or even better results in human social studies than qualitative data (Jacobsen, 2005). The main difference in this discussion is that quantitative data represent numbers, while qualitative data represent words. We base our initial study on a qualitative approach i.e. words, but in the second phase of our study, we also rely on numbers in form of a survey. Jacobsen (2005) describes numbers as a way to concretize and simplify complex or abstract subjects, i.e. a more detailed and complementary meaning hides behind the numbers, which can be obtained by concretizing survey questions as well as through analyzing qualitative interviews. Since everyone in the organization is involved in lean continuous improvement and are objects to our research, it will increase the representativeness to conduct an organizational wide survey as well as conducting interviews.

Sources of Evidence

Our sources of evidence bases on explorative interviews/open meetings, received written information concerning routines/methods schemes, formal interviews/meetings, and a survey. These sources of evidence are described in further detail below.

Explorative Interviews/Meetings and Observations

Through several meetings with key informants, we obtain holistic and detailed insight concerning lean continuous improvement. We also observed the work at Fibo-Trespo in order to get an overview of their methods and procedures. Observing peoples work can be helpful when the researcher wishes to register human behavior rather than just being told what they do (Jacobsen, 2005). By observing the work, we also obtained multiple sources of evidence in the research. This exploratory phase created the basis for further data collection and research narrowing down to what later on became our final research question. Employees in managerial positions was prioritized as sources of evidence in the early stages of our research. Employees at lower positions in the organization can fail to see the future benefits of our research compared with employees with a more direct connection to strategy and vision. This approach however, cannot totally exclude our interpretations and explanations from subjective influence due to the lack of perspective in terms of not including employees in lower positions. Due to occupation of resources, we would rather involve production workers later in the process. The exploratory phase required a lot of processing in terms of large volumes of information concerning Fibo-Trespo's strategy, vision, mission, methods such as lean tools, Kata, A3, SMED, 5S, Learning in reading circles, organizational values, leadership, etc.

Documents and Archival Records

Data collection in the early stages of our research also consisted of receiving documents, presentations, archival records regarding Fibo-Trespo's history, ways of working, and procedures and methods. A lot of the information we received, had earlier been distributed to production- and line workers through organizational meetings or email. The information from these documents contributes to developing a research problem. However archival records and document research provide secondary data and are associated with situations where primary data are hard to obtain, but it is also used when the researcher wish to understand other's perception of the same phenomenon (Jacobsen, 2005).

Formal Interviews and Meetings

We conduct several low/semi-structured interviews (Kvale & Brinkmann, 2009) with employees from various levels of the organization to provide a holistic view. The interviews are conducted based on a constructed interview guide so that employees in all levels of the organization can respond on the same premises and speak freely about predetermined topics. Semi-structured interviews are more open and leaves more room for discussion than fully structured interviews, where the respondent answer specific questions, leaving little room for them to speak their mind (Kvale & Brinkmann, 2009). Jacobsen (2005) also states that exploratory research requires open or less structured interview forms to make sure that no crucial information is neglected. The objective of the interviews are for us, to get holistic picture on Fibo-Trespo's way of approaching continuous lean improvement-work and employees

engagement in such work. Based on the interview topics and the information that lies within, we are keeping the information from the interviews hidden to others in the organization, and names and roles of the respondents will not be used in the thesis. The results are presented in such a way that we do not threaten the anonymity of the respondents. As methods for gathering interview information, we have relied on taking notes as well as recording. This gives us the opportunity to go back and gather direct citations and sayings from the respondent from our case database, which can strengthen the report (Jacobsen, 2005). However, people can act reticent when they know they are being recorded. On the other hand, we offered the interviewees to review our notes.

Survey

A survey is a quantitative method for collecting data and the purpose of quantitative data collection is to gather information that easily can be systemized and standardized so that many units can be measured at the same time (Jacobsen, 2005). Measuring this phenomenon with a random sample of employee interviews can cause bias in the results, as they may not reflect the actual situation as good as if the whole organization respond to a survey. However, a survey requires the researchers to categorize and clarify central concepts before conducting the empirical study, and Jacobsen (2005) emphasizes three central elements in planning surveys. Firstly, concretizing concepts we want to measure. Secondly, developing questions that avoid unwanted results, and lastly, deciding if the survey should be conducted as an interview, over the phone, internet, or handed out physically in paper format. Our survey serves the objective of measuring employee engagement in lean improvement work. This is a vague and complex subject to measure and it needs to be concretized into questions that actually measures what we intend to measure. To develop questions we relied on theoretical concretizing (Jacobsen, 2005), which is further described in section 6.1 When the researcher wants to investigate complex phenomenon, like behavioral- or emotional aspects in a defined context, developing questions becomes harder and several levels of concretizing is often needed to be sure that the survey questions measures what they intend (Jacobsen, 2005). Our method of creating questions is shown in figure 2.
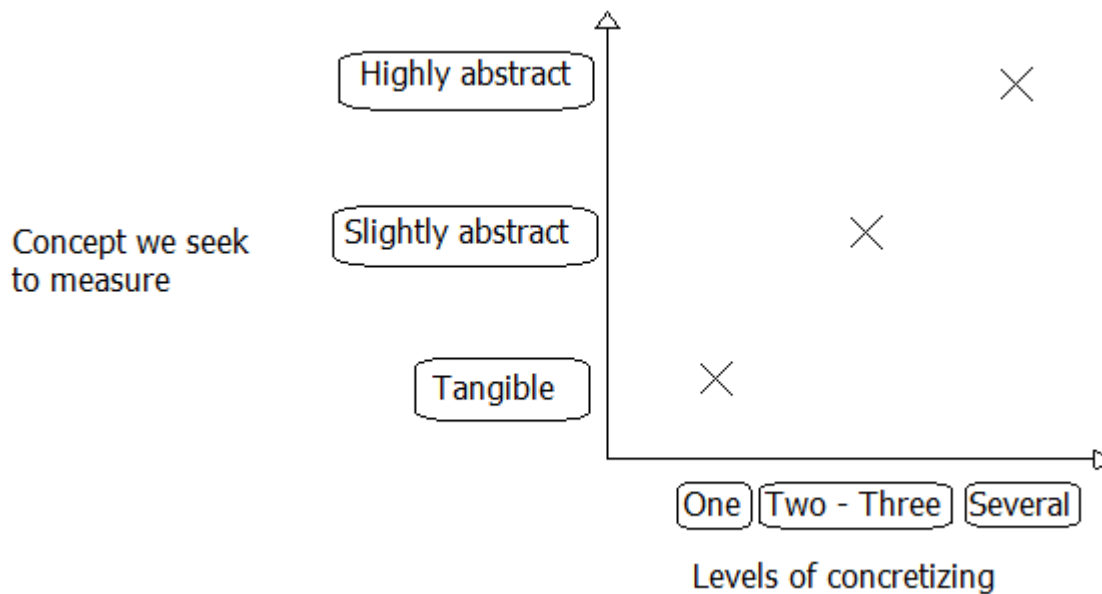
Figure 2: Concretizing Survey Questions (Jacobsen, 2005)

This process makes it possible to translate intangible information into numbers and statistics, which allows us to discuss, analyze, and draw conclusions regarding employee engagement in lean continuous improvement at Fibo-Trespo.

Our survey initially tries to categorize and divide the respondents in different groups through nominal and metrical measures. Nominal measures means asking questions where the respondents have to choose between different alternatives that divides them from each other, while metrical measures also defines the volume and the distance between the categories (Jacobsen, 2005). The intention is to differentiate groups in Fibo-Trespo and see if there is a difference in the engagement level according to these categorizations. Furthermore, we have relied on ordinal measures, where the goal is to measure the intensity in people's attitudes through claims that are developed through concretizing. Our goal by doing this is to get the respondent to prioritize different phenomenon in relation to each other. The answers to these claims as well as information from interviews will help us see which aspect of employee engagement that needs more attention in lean continuous improvement and how to develop our construct.

Our survey is distributed in paper format via Fibo-Trespo's management. This way of conducting surveys contain both benefits and disadvantages. Even though, conducting a survey in paper format can be a timely process in comparison to conducting it over the phone or internet, we also want a high response rate from the survey. Anonymity is also an important factor for the response rate and for the validity of the results. We want our respondents to feel that they keep their anonymity when they respond to our survey, and a paper copy in a sealed

11

enveloped increase this feeling especially in comparison to conducting personal interviews or interviews over the phone (Jacobsen, 2005).

2.4 Research Quality

According to Yin (2014), the quality of the research can be assessed through certain logical prerequisites that ensures construct validity, internal validity, external validity, and reliability. Yin (2014) emphasizes the importance of several tactics for judging the research quality. A good case study research should always try to minimize problems related to validity and reliability (Jacobsen, 2005). Thus, we seek to evaluate all methods of data collection with respect to both validity and reliability in order to establish high research quality.

Construct Validity

Construct validity can be controlled by identifying correct operational measures for specific concepts in the company being studied (Yin, 2014). In other words, construct validity is supposed to show that we actually measure what we are supposed to, that our methods for collecting data correspond with what we seek to answer and that our measurements are valid enough to support our construct or solution. During exploratory research we relied on multiple sources of evidence, as Yin (2014) points out, is a necessity in validating constructs. Bagozzi, Youjae & Phillips (1991) emphasizes the fact that measurement error is a particular issue when it comes to construct validity. Because the research findings are threatened by measurement errors, it is important to validate measures and disentangle the distorting influence of these errors before testing theory. Possible measurement errors related to construct validity can be divided into random and systematic errors, which can be method variance. Random errors can be errors associated with inference, while method variance relates to inconsistency in research methods (Bagozzi et al., 1991).

Observing production- and improvement work at Fibo-Trespo gave us a lot of insight in methods and procedures, but not enough to draw conclusions regarding their work. Other sources of evidence needs to correspond to the same phenomenon. By using multiple sources of evidence investigating the same phenomenon, you minimize the possibilities for measurement errors (Yin, 2014) (Bagozzi at al.,1991). However, there are possibilities for measurement errors in each of our methods for collecting data, which can weaken our conclusions and results in the thesis. It is possible that workers could act differently when they know they are being watched, which could cause bias in our measurements. At the same time, specific workers or operators at the different stations could influence our observations and we may suffer from subjectivity when observing people's work.

Information received from key informants can be affected by their knowledge, insight in the work, role, glorification, and subjective perceptions. The size of the organization also made us limit the amount of key informants, as it requires a lot of time and thus resources to cooperate

closely with researchers. However, the informants we talked to were experienced in the organization and they were helpful and willing to involve themselves in our study. By discussing similar context with different informants, we reduce the possibilities for measurement errors. Thus strengthening our construct validity.

Archival records is a secondary source of data, which may be biased or forged (Jacobsen, 2005). Additionally, the initial purpose of the collected data can differ from our purpose. However, archival records is not a major part of our thesis and we have tried to confirm received data from archival records through our informants, which again strengthens our construct validity. The use of multiple sources of evidence, also known as data triangulation (Cohen, Manion, & Morrison, 2002) is an attempt to explain more fully, the richness and complexity of a phenomenon by studying it from more than one standpoint. Through triangulation, the credibility and validity of the research increases.

Our research also relies on semi-structured interviews where we seek information regarding continuous lean improvement and employee engagement at Fibo-Trespo. This method for data collection can also include possible sources for measurement error. Errors concerning asking the wrong questions or halo effects (Thorndike, 1920) between the researcher and the interview objects can result in unwanted information or falsified information. By interviewing several people with the same agenda, we minimize the risk of method variance. Random errors can occur if for instance, leading questions are asked and our inferences bases on this. Therefore, we have carefully tried to avoid leading questions in specific directions.

The most important inferences for our contribution bases on interviews and survey results, which emphasizes the importance of the survey as well. Are we measuring what we intend to measure? Through the process of concretizing questions based on employee engagement and theory regarding formulating questions, response alternatives, and layout, we believe that our survey serves its purpose. We can support this during a concept validation (Jacobsen, 2005), where we seek to investigate compliance between the theoretical phenomenon and the specific indicators in each survey question as shown in figure 3. As the figure shows, parts of the theoretical phenomenon will always be omitted, as a complete operationalization of a complex concept is impossible. In addition, concretized questions can capture more elements than what we are looking for. However, through critical discussion and comparing with similar surveys we limit the possibilities for measurement error (Jacobsen, 2005).
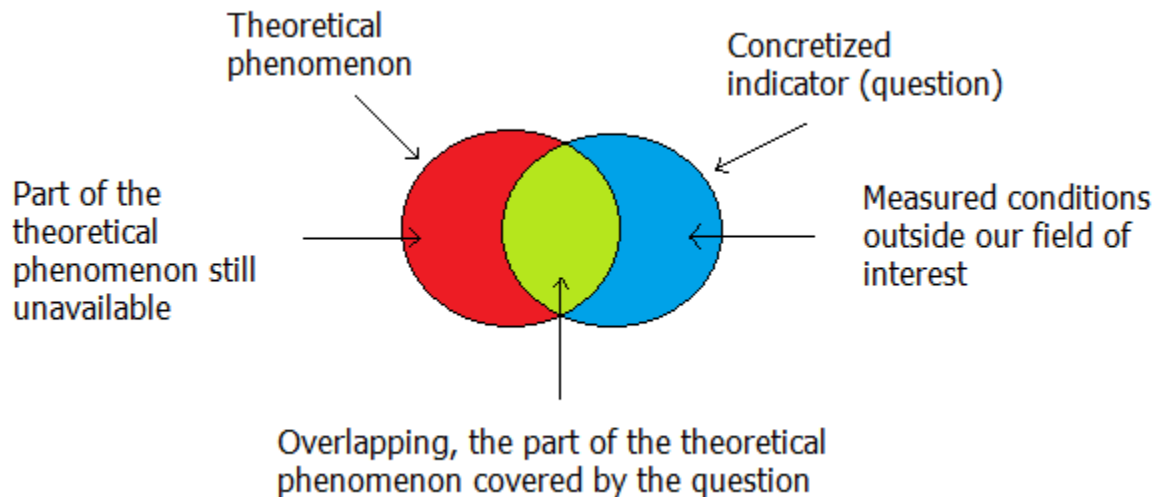
Theoretical
phenomenon

Concretized
indicator (question)

Part of the
theoretical
phenomenon still
unavailable

Measured conditions
outside our field of
interest

Overlapping, the part of the theoretical
phenomenon covered by the question

Figure 3: Compliance between theoretical phenomenon and operational definition (Jacobsen, 2005)

On the other hand, some uncontrollable factors can influence the survey and cause bias in the results. We cannot control all people's attitude or motivation to respond honestly or respond at all. Measuring employee engagement can itself cause bias in the results because employees with low levels of engagement are likely to be among those who does not respond to the survey. Nevertheless, we have based our survey on previous research in the same field, see Kalsaas (2012), and our key informant and the union at the organization has reviewed and approved it. Thus, we believe that the survey validity is strong.

The constructive research approach is a method that require the researcher to create a construct to solve a given problem. Creating a solution of value requires a link between empirical data and theoretical knowledge that can be validated, which again requires minimal measurement errors in the data collection process. By taking all the possible measurement errors and social factor in consideration, we believe that our methods and procedures for conducting the study in total is valid.

Internal Validity

Internal validity revolves around the truthfulness- or intersubjectivity of the study (Jacobsen, 2005). The term intersubjectivity imply that if several persons agree on a description of a certain phenomenon it comes closer to the truth. I.e. the internal validity increases if several people agree upon content of the research (Jacobsen, 2005). Therefore, testing research methods and findings against others, as well as through a critical discussion is a way of assessing internal validity.

Our key initiative to assess internal validity is to confront our informants with our findings and get their opinion on our results. This way of achieving validity is called face validity (Jacobsen, 2005), which imply that the individuals being studied can recognize and acknowledge the

results immediately. Unfortunately, we were not able to involve as many people in this process as desired. Optimally, we would have confronted some of the production workers with our results, but both time and resources made this impossible. However, we were able to confront our key informant and people in the leadership of Fibo-Trespo, which we believe is sufficient, based on their insight of the studied subject and the size of the organization. Regarding research methods and approach, we have relied on feedback and guidance from our supervisor, who has great experience with similar research. We have also compared our study with previous research in Fibo-Trespo and similar research in general. Especially one study conducted in a similar production company, 3B Birkeland, where cultural and social aspects of the lean philosophy, such as employee engagement and involvement, were subjects of investigation, see (Kalsaas, 2012).

Internal validation through critical discussions of our sources of evidence and the information received through these sources increase the internal validity. Important elements in these discussions concerns of utilizing the right sources of evidence regarding the field of study and the truthfulness of the collected data. As mentioned earlier, triangulating the data through multiple sources of evidence strengthen the validity, which also indicate truthfulness, but this does not mean that our sources of evidence is the "right" sources of evidence. Through the exploratory phase with qualitative data collection, lean continuous improvement was our subject of interest. Accordingly, sources of evidence had to be determined on this foundation. Our key informant is specialized in the area of lean and have a lot of insight in the subject, thus a natural source of evidence. Furthermore, observations of lean continuous improvement work and archival records concerning this subject was necessary to confirm our perceptions from conversations with our key informant. Interviews are conducted with employees in different levels of the organization, who are all directly involved in lean continuous improvement. Thus, we believe that our sources of evidence in this phase of our research correspond with our initial field of research. Correspondence between interview results and survey results increase internal validity as well.

External Validity

External validity is all about generalizing the results from the research and see if they can contribute in a bigger population than what derives from the study itself (Jacobsen, 2005). Our research is context specific, which by itself decreases the external validity. On the other hand, Fibo-Trespo is a leading production- and process company on a national basis, when it comes to lean philosophy and methodology, and based on theory and literature concerning both lean and employee engagement, we believe that our results can be generalized to some extent. Our informant and the management at Fibo-Trespo also stated that engaging the workers is essential for them to continue their growth. Lean is a mindset, a philosophy, and way of thinking, rather than a set of tools. To successfully implement and operate a company through lean philosophy requires engagement from all its employees and leaders. Our construct provides a model for increasing engagement in lean continuous improvement specifically. Thus, we believe that our

construct can contribute in such context to lean organizations in the production industry. However, we have developed a construct focusing on a specific weakness in employee engagement at Fibo-Trespo. Therefore, adaptions needs to be made for others to appreciate our research. Our method of developing a survey, on the other hand, can be of good use as a template for other companies.

Reliability

The research reliability can be evaluated by examining if the research itself have influenced the presented results of the research (Jacobsen, 2005). The researchers can affect the people being studied, as well as relations and conditions that occur during data collection can affect the researchers. These characteristics are the same for both qualitative and quantitative research methods, but the sources of error that can affect the results can vary. Therefore, we have divided the reliability of our research into two categories based on our approach for collecting data.

Jacobsen (2005) describes two factors that can weaken the reliability: The data collection's effect on the results and sloppiness. When conducting interviews, especially low/semi-structured, the conversation tend to be shaped by either the researcher or the interviewee, both in style and content (Jacobsen, 2005). The same phenomenon can occur in observations as well. Since we rely on qualitative methods in the exploratory phase of our study, we cannot say for sure that others will reach the exact same results if they conduct the same study based on our initial research problem. To document our findings, we have as mentioned earlier, relied on taking notes and recording during interviews, taking notes from meetings and observations, and reviewed archival records and organizational documents and stored this information in our case database. Even though we have tried to get a comprehensive understanding on the case, we cannot guarantee that any information have not been overlooked. In conclusion, we believe that our method of establishing a focus area for our research is reliable.

Reliability through quantitative methods are concerned with repeatability (Jacobsen, 2005). Based on our final research question, our survey serves the purpose of measuring employee engagement in lean continuous improvement at Fibo-Trespo. This means that the questions are adapted to Fibo-Trespo's way of organizing work. However, problems that can affect the reliability in this case is concerned with the design of the survey. If it makes room for different interpretations among the respondents or contains leading questions, it can weaken the reliability because the results can vary. The respondent's interest and knowledge in the field can also affect the results and especially the response rate of the survey. The analyzing phase also includes elements that affect reliability. Sloppiness in analyzing the data can lead to misleading inferences and conclusions. Therefore, statistical perfection in the analysis is important to increase the reliability of the results (Jacobsen, 2005).

Finally, we assume the reliability to be of such character that other research within the same context will lead to similar results. Given our final research problem, an adaption of the survey

can be used as basis for the research, but results are likely to vary and our inferences and conclusions are heavily based on the fact that our research is directed towards Fibo-Trespo.

3. THEORIES AND CONCEPTS

In this chapter, we present different theories and concepts that are necessary to appreciate the research conducted in the thesis.

3.1 Lean

After the Second World War, Toyota developed a new concept of production with high focus on efficiency, productivity, and waste reduction. Today Lean production has spread across the world as other adopters seek to copy the success of the Toyota Production System. Womack and Jones (1990) describes Lean production as a contrast of mass production that had roots in Henry Ford's development of the production line and interchangeable parts. Because of the insatiable market demand for new cars, Ford had a unique opportunity to produce as many cars as possible. In the 1950's the market in Japan was a lot smaller and demanded diversity in products. The workforce in Japan did not accept being treated as a variable cost, and these important factors led to a new way of production (Womack et al., 1990). When Womack & Jones popularized the term with the Machine that changed the World and Lean Thinking, they described five steps to apply the Toyota Production System (TPS) to an organization: defining customer value, defining the value stream, making it "flow", "pulling" from the customer back, and striving for excellence (Womack & Jones, 1996).

From mass production to lean production, a new perspective of quality became known. With the customer in focus, it became clear that producing products that meet specifications is simply not enough, if the customer is not willing to pay for it, or if the product is launched at the wrong time. Within lean production, value-added activities and non-value-added activities are separated, where non-value-added activities should be removed and are defined as waste. Originally, waste was sorted into seven different categories: over-production, defects, waiting, transportation, inventory, Motion, and non-utilization of employees (Womack et al., 1990). According to Liker (2004) the heart of the Lean philosophy is relentless elimination of waste. In The Toyota Way, Liker seeks to explain the principles and the culture that lies behind The TPS, as many organizations fail when they adapt the philosophy. The problem is that the philosophy often is mistaken for a set of practical production tools that easily can be copied (Liker, 2004).

The term Just-in-time, from Japanese *Jidoka*, is described as the very essence of the Toyota Production System. The Just-in-time production system will "pull" goods, raw material, or inventory through the production line, when an item is removed one level down in the value chain. This term is also known as make-to-order, as nothing moves until an internal or external customer orders an item. When a customer places an order, it triggers a response upwards in the value chain of obtaining the raw material to produce. To establish a flow, the system must rely on the *takt time*, which is the rate of the customer demand. The focus within Lean

Production is to create stability and predictability, as a result of attacking the unnatural variation in the production system. The goal is to reach a state where no buffers, materials, or finished goods are needed to answer the demand of the customers (Kalsaas, 2012). On the path to reach this state, a range of tools are utilized to keep the production system flexible and capable of responding to changes in demand. The *kanban* system is a simple tool for signalizing when inventory or raw materials are low and a buffer needs to be refilled. The ultimate goal is to become independent of the kanban. Customers can be unpredictable, and to compensate, leveling production becomes essential. Avoiding over allocating particular resources while selecting the right product mix and production volume is key (Liker, 2004). In lean production, problems will reach the surface, and when they do, the operators are instructed to stop production. Dealing with problems right away instead of working around them, is a major part of the quality assurance system. Detection of problems and variation with help from basic visual tools located at the production line, instead of computer systems in a control room, puts operators in control of quality. It also keeps the operator close to the process, as one of the essential ideas is to inspect the problems first hand and dealing with them right away, compared to reading about them in a report.

Fredrick Taylor separated planning from execution and standardized work. As a pioneer, Taylor improved quality, but turned manufacturing jobs into mindless tasks that anyone could learn. In other words, the Taylorism failed to utilize the creativity and knowledge of its employees. Total Quality Management (TQM) serve as a response to the autonomy in labor, and seek to involve and engage the workforce.

Workers often misinterpret standardized work as a measure for efficiency, which can lead to issues of trust between management and workforce. People can feel monitored and compared to the standards for how they should perform, and it can result in inefficiency for several reasons. The intention behind standardization of work is quite different. It is of importance to develop a standard for how the process should perform, in order to improve continuously. When the process is stable and running according to the standard, it is possible to determine where there is room for improvement. When dealing with standardized processes, it is the operators of the process that should have the opportunity to continuously improve the process (Liker, 2004).

Scientific management relies on establishing best practice to perform specific tasks, and training employees to perform that task with perfection. However, Taylor's way of management is far from what we see in the western world today. Through Taylorism, tall hierarchal organizational structures developed, with strong walls between workforce and management. Today with improvement work in lean production, self-managing teams is key to utilize the knowledge and strengths, of the key asset in the organization, the people. Toyota spent a great amount of time developing and teaching the importance of standards and working systematically. Process operators are provided the opportunity to directly affect their own job description, as they are working on improvements at their own stations. The management's job

is to facilitate, mentor, and coach instead of control and measure. At Toyota, every employee is responsible for assuring quality.

Engaging the workforce is an essential part of the culture in lean production, which is reflected through the structure of the TPS, where people and teamwork are centered. Liker (2004) argues that the system in its whole support and encourage its employees to continually improve the processes they are involved with. In continuous improvement, Toyota emphasize the importance of teamwork, as it is how individuals coordinate, share knowledge, and motivate each other. By empowering excellent individuals to work in groups, the teams will excel in line with how Deming viewed the willingness of people; it is believed, that by challenging and respecting employees, they will thrive to perform for their organization (Liker, 2004). On the other hand, many models describe the many traps that can become reality in teamwork. Instances where people withhold knowledge, refuse participation, or actively sabotage, can hold back the rest of the team. These instances can often be a related to rewards and recognition that will be described further, later on. It can be argued that lean production is a much more fragile system, than a mass production system. With a lean production system buffers are removed, or at least decreased to easily identify problems, by making them reach the surface. When problems reach the surface, the system heavily rely on the workforce knowledge to tackle a variety of problems (MacDuffie, 1995). Therefore, the importance of teamwork, sharing knowledge, and listening to people's ideas and suggestions is a key within the lean culture.

The critical view of lean builds upon opinions that suggest that lean might affect the work environment by increasing stress and intensifying work. The decision making process in the Norwegian work environment is often characterized by broad participation of employees from different levels of the organization. Involving people in decisions can affect their motivation in a positive way, but on the contrary, it also demands more expertise and knowledge from the workforce. Furthermore, it is important to seek ownership of the lean culture, and alter the management system to fit with the relevant organization (Johnstad et al., 2012).

The Nordic Model and Lean Production

The Working Environment Act (WEA) describes how organizations should structure and organize work to meet the requirements that the Norwegian government has established. It emphasizes the ability for employees to affect their work routines, learning within the organization, and the needs for social relations at work. (Directorate of Labor Inspection, 2013)

The lean philosophy requires independent, collaborative, and responsible employees in order to retrieve the possible benefits of the management system. If we look at the Anglo-American culture, the gap between workforce and management is significant. The *hire and fire*-concept generates passive employees, only capable of executing orders from their leaders (Amundsen et al., 2014). In the other end of the scale we find the Japanese consensus and collaborative way of managing, which seek contributions from their workers. In the German culture the

independence and ability to collaborate, is anchored in the culture and expected of employees. Therefore, workers remain flexible, meet challenges, instead of remaining passive, and await orders. (Friel, 2005).

The Nordic way of managing is closer to the Japanese way, than the American way, but there are many differences (Johnstad et al., 2012). According to Gustavsen (2011), the Nordic model reflects flat organizational structures. A calm work environment, productiveness, specialization, and innovation characterize Nordic organizations. The utilization of human resources, involvement, and informal relations forms a system where managers facilitate guide employees to be creative. "Lean på Norsk" can be seen an attempt to combine the Nordic model with Lean management (Kalsaas, 2012).

(Amundsen *et al*,. 2012) argue that lean can lead to increased autonomy, meaning the opportunity for employees to make decisions upon work method, production goals, rotation, quality control, maintenance, etc. Furthermore, the authors argue that continuous improvement can contribute to learning, variation, and influence work conditions, which are considered important factors in the Nordic model.

Innovation Management

The increasing cost of labor leads to increased cost of running an organization within the process industry in Norway. According to the government budget, we are at the very top of the scale, in terms of labor-cost per hour in the world. For industrial workers alone, the average salary is 64% higher compared to industrial organizations within the EU (Arbeidsdepartementet, 2013). To remain competitive in the international market Norwegian companies need to specialize, increase efficiency, and rapidly respond to changes. Leading to an increased focus on being innovative.

The Norwegian government's definition of innovation can be read in their Report No. 7 "Et nyskapende og bærekraftig Norge" (2008-2009) (2008), and goes as follows: «*en ny vare, en ny tjeneste, en ny produksjonsprosess, anvendelse eller organisasjonsform som er lansert i markedet eller tatt i bruk i produksjonen for å skape økonomiske verdier.*» From this definition, it is clear that an idea's value-creation determines its label as an innovation. Remaining competitive through specialization demand increased knowledge at many levels of the organization, and being innovative often happens through combining knowledge from different business areas. The subject of innovation is often thought as a stepwise process of creating something new, when in fact, the process is often very uncertain and complex. It is not random; rather a non-linear process that can choose different paths every time it occurs (Van de Ven, Polly, Garud, & Venkataraman, 2008). Innovation does not take place in the moment, but as a reaction to underlying factors that has existed for a longer period. However, this does not necessarily mean that many incremental steps of improvement are insufficient of being labeled as an innovation. Ultimately, an innovative process must lead to creation of new knowledge in

some form. However, the lean literature lacks description on how the learning actually takes place, and what factors that needs to be present in order for learning to take place.

Kata Problem Solving

Through studies of Toyota, Mike Rother writes about his findings on how to manage and develop people, with a goal of improving the organizations results. Rother's definition of management holds some of the key concepts of what he has labeled, Toyota KATA: "*The systematic pursuit of desired conditions by utilizing human capabilities in a concentrated way*". The book captures the way managers and workers think, act, and react at Toyota, whenever facing a problem solving situation. (Rother, 2009)

However, it is not groundbreaking to describe the "ways" of Toyota; on the contrary, it has been done by many authors before. Through contributions like, Lean Thinking, The Toyota Way, Decoding the DNA of the TPS, authors has described what lies behind the success of the manufacturing company, and why western organizations fail to adapt. On the other hand, researchers argue that there is more to Rother's work (Rosenthal, 2010). It is also possible to draw lines from Kata to product development methodologies, like Lean Start Up and Design for Six Sigma (Rosenthal, 2014).

The word *Kata* stems from combat arts, and can be understood as the pattern that is exercised enough to become a part of how one should act in certain situation. Within lean production, Kata suggests a scientific way of problem solving. Much like A3, Kata utilize the PDCA cycle to iterate from a current condition to a target situation. From this understanding, it is also a way to explain how Toyota's employees approach any problem. It is a part of their behavioral pattern, culture, and way of thinking that is explained in a way that makes it transferable to other organizations. Along with Liker, Rother targets the cultural aspects and the more invisible parts of the TPS, which are more complex and involves certain social aspects. Ironically, when describing the more complex parts of the TPS, the author presents his own set of tools. (Rosenthal, 2010)

The Improvement Kata

When Rother talks about continuous improvement and adaption, he refers to being able to move through the unknown towards a new desired state. In other words, from a current condition to the next target condition, while being able to respond to changes, as shown in figure 4. When moving from the current condition to the target condition, problems and obstacles occur. The process of getting from the current condition to the target condition should be challenging. The target condition should be a state to strive for, and not just some easy fix. (Rother, 2009)

Small improvements lead to greater innovations, because every improvement aims at a target condition. Furthermore, every target condition aims at an organizational vision, so that the organized problem solving has a direction. Rother explains how the ideas like *1x1 flow* must be

viewed as visions, and not as tools to apply. Toyota has not reached a state of 1x1 flow in their factories, but they are working toward it, like a vision. However, by working towards 1x1 flow, problems and obstacles will surface. Moving towards 1x1 flow means creating a more fragile system, with less material. However, no one will be able to move from the traditional push system, directly to a pull system through the whole value chain. It takes time, and should be done one step at the time. *Kanban* is a necessary tool to be able to shrink inventory and progressively move closer to 1x1 flow. In other words, reaching 1x1 flow is the vision, but buffers are needed to compensate for fluctuations in customer demand. The purpose of the Kanban system is to eliminate the Kanban system. Working towards a vision provides consistency in management, as every improvement aligns with the organizational strategy. The Improvement Kata suggest applying one measure at the time to solve problems, as several countermeasures applied might increase variation. (Rother, 2009)
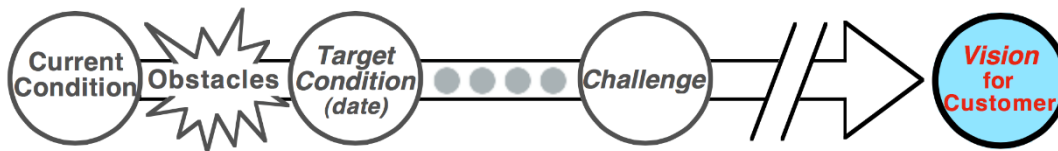

Figure 4: The KATA direction

The PDCA Wheel

Dr. W. Edwards Deming presented his modified version of the Shewhart Cycle, to the Japanese through his lectures, which led to their interpretation, the PDCA cycle (Evans & Lindsay, 2011). In Kata the PDCA cycle is essential, as it is how the improvement team works through the problems and obstacles, referred to as "the grey zone". Rother simply uses the cycle to explain the scientific way of working through the unknown, in the direction of the targeted condition.

The Coaching Kata

To understand how the improvement kata is taught to Toyota employees, it is necessary to determine who actually carries out improvement work. It is a common understanding that process operators and self-managed teams lead the work on improvements, because they are working at the production line, with the hands on experience. However, that is not entirely true according to Shimizu (2004) only 10% of all improvement activities (kaizen) at Toyota is carried out by the process operators and self-managed teams. Where team leaders, engineers, and supervisors carry the other 90% (Rother, 2009).

For the improvement kata to become a second nature of how people think and act, it is natural to teach the improvement kata while working on actual problems. A mentor, with sufficient knowledge and experience with the improvement kata, will serve as a facilitator for the mentee. Guiding and leading the student through the problem solving cycles, without interaction or intervention, but making sure that the right actions and measures are taken. The approach

23

ensures the learning by doing experience, as the mentee is solving the problems, but with proper supervision. Every mentee has a mentor, but every mentor has a mentor as well. The system provides a rigid structure for decision-making, as a mentor with more experience supports every employee. Related to a more practical example, mentors actions will depend on the mentee's behavior. Therefor the mentor's tasks will be unclear at first, but become evident as the mentee makes progress. When considering a measure to react to a problem in a particular situation, suggested by the mentee, the mentor will ask critical questions towards the proposed solution. Steering the student in the right direction, as the student continue to develop a more detailed plan to deal with the problem at hand. As the mentor guides the mentee to understand the improvement kata, the mentor also gains more insight. The mentee acts while the mentor facilitates, but the mentor is ultimately responsible for the outcome of the process. The mentor role requires patience, as the mentor must allow the mentee to make small mistakes and errors, as it offers great learning (Rother, 2009).

An essential tool when teaching the Improvement Kata is a card that consists of five questions. The purpose is to better define the current condition and the target condition, so that the problems and obstacles become more evident (Moen & Norman, 2006). The five questions should be answered in the listed sequence:

1. What is the target condition?
2. What is the actual condition now?
3. What obstacles do you think are preventing you from reaching the target condition?
4. What is the next step? (Start of the PDCA cycle).
5. When can we go and see what we have learned from taking that step?

The five questions are mainly a tool for the mentor to ask the mentee. By letting the mentee answer these questions, the mentor sets the mentee's attention towards the right areas. Between every mentor and mentee, there is a board similar to an A3 board. The Kata board will contain a challenge from the mentor, which originates from a challenge one organizational level upwards. The mentee will determine an area to focus, establish current situation, and target conditions when he fills the Kata board with information. From all Kata boards between mentors and mentees, a chain stretching from the top level of the organization to the bottom is created. Thus, aligning the overall strategy of the organization, all the way down to process level.

Focus Process:		Challenge:	
Target Condition Achieve by:	Actual Condition Now	PDCA Cycles Record	
		Obstacles Parking Lot	

Figure 5: Kata board

The approach of problem solving with guidance, is nothing new, and can be read about in *Managing to Learn* by John Shook (2008). However, Rother (2009) argues that it is rarely followed properly, and often replaced by theoretical training and lectures. To change behavioral patterns, practical training and learning by doing is superior to classroom lectures. However, changing organizational culture means changing the behavior of people in the organization. The road ahead is supposed to be unclear, and the first step is for the leaders to admit that they do not have the answer to everything. This unites people and allows them to feel safe when facing the challenges (Wig, 2014). By following and teaching the improvement Kata in all levels of an organization, through the mentor-mentee relationship, we can change the way people think, act, and react. Ultimately changing the behavioral pattern of those people, will lead to the wanted change in culture. (Rother, 2009)

3.2 Employee Engagement

There are many claims that argue the term employee engagement as essential for an organization's level of success and competitiveness. These claims can be held responsible for the increased attention towards this area of research (William, Schneider, Barbera, & Young, 2009). However, Saks & Gruman (2014) argues that there are concerns regarding the definitions and methods of measuring employee engagement. Furthermore, the research limitations complicate the action of drawing valid conclusion around the area.

From another perspective, it has to be recognized that the area of employee engagement, also known under workforce engagement, has been around since the first major article, presented by

Kahn (1990). The concept developed by Kahn (1990) builds on the presence of various psychological factors, such as safety, availabilty, and meaningfullness. The presence of these factors will determine how an employee perform at the given role. Several later contributions within the area, points to other factors that correlates with employee engagement. Later studies points to motivational factors, involvement, and satisfaction, along with the employee's relations to the organization (Salanova, Agut, & Peiró, 2005) (Hayes, Harter, & Schmidt, 2002). Organiztions that manage to increase their employees' engagement level, are likely to experience lower turnover rates, increased profit, and improve customer relationships (Xu & Thomas, 2011).

Various perspectives and angles have been used to explain the concept of engagement, as it can be viewed from the organizational level, as well as down at the individual level. Arguably, the overall organizational engagement is a sum of every individual employee's engagement, and must be considered. Therefore, it is important to be aware that people are different, and engaged by different factors (Rice, Marlow, & Masarech, 2012). Several studies point to different factors, items, or elements that collectively determine the level of engagement. There is an absence of consensus within the area. Thus, increasing the need to remain critical towards different sources. Drawing upon Kahn's study, May, Gilson & Harter (2004) conducted a study resulting in a three dimensional model, measuring engagement levels through a physical element, emotional element, and a cognitive element, where all three dimensions relate to the performance in the job role. Furthermore, The Utrecht Work Engagement Scale (UWES), developed in Holland, bases on the three previously mentioned dimensions. Related to several worker engagement factors, such as, vigor, dedication, and absorption, it measures and explains why employees will make an effort at their job. The study that the model builds upon emphasizes vigor, as the most important factor to achieve the sense of well-being, which can be measured by its own scale (Schaufeli, Bakker, & Salanova, 2006). Within business consulting, serveral organizations have developed tools, surveys and processes to measures employee engagement. From studying noteworthy management practices and how they are percieved by employees, Gallup researchers have developed the Worker Engagement Index (Rath & Conchie, 2008).

In search of "the good work" Gallie (2003) has pointed towards Scandinavia's way of organizing labor, when the author attempts to describe the quality of working life. The study compares European organizations to determine if people's experience of work is affected by cultural values and policies tied to specific societies. Furthermore, Gustavsen (2011) characterize the Nordic countries as leading within promoting freedom and learning in work. There seem to be a broad consensus around what factors that promote better quality in working life. However, there are various initiatives that were set to life to create it. By demanding drastic changes to job design, work roles, and worker involvement, the way of organizing work changed in the nordic countries. Lean were one of the main movements that gained foothold in this part of Europe.

A specific Nordic model has emerged from the collaboration between organized labor market parties and parties that maintain the value of the state. A collaboration maintaining both parties interests, forms a basis for good work. The nordic model's original purpose was to reduce conflicts and disagreements, to ultimatly increase productivity. With higher porductivity came an increase in wages, reduced work time, and initiation of welfare programs. The nordic model formed the basis and the right forum to bring forward criticism towards Taylorism. By asking critical questions towards Taylorism, the research to develop alternative forms of managing started. Lean emerged as an alternative way of manufacturing, that breaks with the monotony of mass production. In Scandinavia organizations were leading within efforts to improve the quality of the working life. Resulting in characteristics like variation in work, learning and development, participation, and influence describing the way of organizing work (Gustavsen, 2011).

The Nordic model has many elements that can relate to the engagement litterature. Involvement in job design and the ability to effect outcome are sentral in the Nordic model, and can also be seen in the Worker Engagement Index, in several sections. More precisely, three of the twelve statements, *Opinions count*, *Encourages my development, and Recognition for good work* (Harter, Schmidt, Killham, & Asplund, 2013) closely relates to the Nordic model. Futhermore, the Nordic model emphesize the possibilites for employees to learn, grow, and establish social relations. These aspects are also well represented in the Worker Engagement Index, and can also be related to several points in UWES. The lines that can be drawn between these models shows that the Nordic countries has to consider several aspects affecting engagement, to abide the work environment act.

Furthermore, the purpose of the siciological agenda is to integrate technology and various aspects regarding organizational structure, as a framework for what shapes the work environment in the organization. Within this theory the focus to create more humane work conditions and realize ideas of involvement and democrazy. Furthermore, the sociological agenda breaks with the traditional hierarchy that separates managers and workers. The philosophy promotes flat organizational structure, where decision power lies with the performer. The way of thinking forms a basis for the self-managed teams we often meet in Lean theory. These types of organizations are arguably more prepared and flexible to internal changes. Norway has played an important role in early projects as worker unions established initiatives to increase involvement and participation to create effective organizations. (Levin & Klev, 2002)

As shown, employee engagement is a composed term, which in literature is described in several ways. Engaged employees will offer the most of themselves in their roles at work. In the other end of the scale, the disengaged employee is "burned out". A term that relates to a state of mental weariness (Schaufeli, Taris, & Van Rhenen, 2008).

3.3 *Motivation*

Motivation plays a central role in engaging employees, and in lean philosophy, Liker (2004) emphasizes the role of motivation in order to develop exceptional people and teams that follow a company's philosophy. Toyota divides among internal and external motivation theories in order to motivate teams and workers (Liker, 2004). The internal motivation theories claims that people primarily get motivated by themselves, by intrinsic characteristics in their work, while the external theories assume that people are driven by external characteristics in form of rewards, punishments, and measurements (Liker, 2004).

The most acknowledged intrinsic motivation theories are in general concerned with people's needs as human beings. Maslow, and later on Herzberg, are central contributors in this area. Maslow describes *The Hierarchy of Needs* in his article *A Theory of Human Motivation* (Maslow, 1943). He defines a pyramid of human needs, where every human being starts at the bottom and moves up as their needs in each level gets satisfied (Maslow, 1943).

In organizational context, employees that are at the higher levels in hierarchy will be increasingly motivated intrinsically. Helping the employees reach the self-actualization level will increase the employee's at becoming more motivated in their work and better at what they do and strive for personal development. A feeling of belonging and self-esteem becomes crucial as a lack of such can decrease motivation. These two levels emphasizes the importance of an organizational culture. The lean philosophy intend to create such a culture that that allows social interaction with colleges both at work and through social activities outside of work hours (Liker, 2004). The lean culture also intend to challenge employees and involve them in decision making and problem solving to increase their self-confidence and move them in a direction towards self-actualization (Liker, 2004). A genuine intrinsic motivation in the workplace is a factor that can increase the engagement of employees as motivation itself is a factor in engaging employees (Salanova, Agut, & Peiró, 2005).

Herzberg, Mausner & Snyderman (1959) slightly modifies Maslow's view on intrinsic motivation by establishing two dynamic factors that affect motivation. Maslow's model is more general, while Herzberg focuses his studies towards a working environment. In his book, *The Motivation to Work* (1959) Herzberg describes the factors as *hygiene* factors and *motivation* factors. According to Herzberg, Maslow's lower-level needs can be compared to hygiene factors as their absence can lead to dissatisfaction, but at the same time, providing employees with more of them will not increase motivation. Some people also refer to these factors as *satisfiers*. Motivating your employees, require that you go beyond hygiene factors and enrich jobs to create intrinsic motivation. This includes recognition, feedback, responsibility, achievement etc. and can be compared to Maslow's upper-level needs (Herzberg et al., 1959). Herzberg two-factor theory is shown in figure 6.
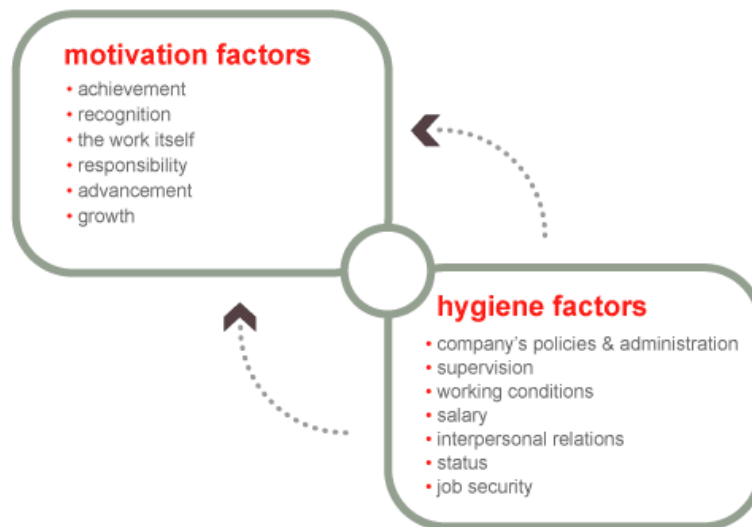
motivation factors
- achievement
- recognition
- the work itself
- responsibility
- advancement
- growth

hygiene factors
- company's policies & administration
- supervision
- working conditions
- salary
- interpersonal relations
- status
- job security

Figure 6: Herzberg's Two-Factor Theory (Herzberg et al., 1959)

To build this job enrichment within an organization where a major percentage of the work is conducted within production lines can be a challenge, since it often associates with mindless tasks and reputability (Liker, 2004). However, it is possible to make these tasks more intrinsically motivating by changing the traditional way of operating assembly lines. A production line where employees are able to rotate and feel ownership to a subdivision of the production can lead to a greater understanding of their role and the value they provide to the whole process (Liker, 2004). Toyota is a leading example of enriching employees and they have started organizing some teams around complete projects from start to finish, which according to intrinsic motivation theory can enrich the employees by empowering and challenging them. (Liker, 2004).

External- or extrinsic motivational theory refers to our tendency to perform activities for known external rewards, which can be both tangible and psychological, such as money or praise (Brown, 2007). Taylor and the Scientific Management theory claims that employees are motivated by salary and money, and this ideology emphasizes incentives based on results (Liker, 2004). This is a shallow way of looking at motivation, and does not cover other aspects of the extrinsic motivation, as we know it today. Toyota have adapted parts of this ideology, but instead of focusing on individual incentives for productivity, they base their incentives and rewards on how groups and teams are performing.

From a psychological point of view, extrinsic motivation involves participating for some kind of reward that is external to the process of participation itself (Brown, 2007). This seems contradictory to the lean philosophy and the aspect of acknowledging the value and purpose of your own work, which more closely relates to intrinsic motivation. Furthermore, extrinsic motivation in some cases can lead to a decrease of intrinsic motivation, due to a phenomenon

29

called the overjustification effect (Griggs, 2010). If conducting an activity by itself serves as a reward, i.e. intrinsic motivation is high, extensive rewards and prices can steal the attention away from people's original purpose of participating in an activity. Thus, lead them to believe that the reason they participate in the first place, is the result of external rewards rather than their own internal appreciation of the activity (Griggs, 2010). However, extrinsic motivation is not likely to impact intrinsic motivation if the extrinsic incentive depend upon doing something well, rather than just doing it (Griggs, 2010).

According to Illeris (2012), Motivation plays an important role in people's ability and willingness to learn and develop new skills. However, he criticizes the motivation theories for not being able to create understanding and facilitation of learning practices. Motivation theories have a tendency to categorize factors for motivation instead of focusing on different groups of people (Illeris, Læring, 2012). This leaves little room for facilitating learning based on individual and social factors (Illeris, Læring, 2012). On the other hand, it can be comprehensive to identify individual motivations of every employee in an organization, and categorization and generalization of the term is necessary to try to create a work environment that is more than an ideology.

3.4 Organizational Learning

Illeris' model explains learning in the working life by combining his own model for general learning with models for learning at the workplace (Jørgensen & Warring , 2002), (Bottrup, 2001), to endeavor a complete understanding of learning in working life.

The model for learning at the workplace operates with the terms learning environments and learning processes. Learning environments describes the opportunities for learning that exist within the material and social surroundings, while learning processes describes each employee's life span as a continuous learning process that builds on previous experiences and is guided towards future perspectives (Jørgensen & Warring , 2002). The learning process is critical for how each employee and groups at the workplace meet and exploits the learning opportunities that exist in the learning environments. Learning takes place in a dynamic relation between employees' learning process, the social & cultural learning environment, and the technical-organizational learning environment (Illeris, 2012).

The learning environments only serves as a framework for learning. However, the interaction between each employee and the learning environments creates learning. This emphasizes the importance of employees' backgrounds, experiences, and future perspectives to understand the dynamics in the interaction between learning environments and learning process (Illeris, 2012).

The Technical-Organizational Learning Environment

The opportunities for learning at the workplace depends on the content of the work, how the work is organized, and on which technology utilized. These conditions are included in the

technical-organizational learning environment. The technical-organizational learning environment decides which eligibility requirements the business sets for its employees- and which opportunities the system provides for learning in a broad perspective (Illeris, 2012). The technical-organizational system as a learning environment needs to be examined and divided into categories that better describes the opportunities the system provides for employees to experience their work as meaningful and important. When people feel obligated to involve and engage themselves on a personal level, they can create the opportunity to influence the content and the methods of the work, and thus develop a work identity (Illeris, 2012). The opportunities for social interactions at the workplace, the intensity, and stress related to work is also a part of the technical-organizational learning environment.

Illeris (2012) came up with six different categories for further explanation of the technical-organizational learning environment: 1) Division of Labor, 2) Work Content, 3) Work Disposal, 4) Opportunity to apply qualifications, 5) Opportunity for social interaction, and 6) Workloads. When labor is heavily divided, employees can lose their perception of the purpose and meaning of the work, which is the case in Taylorism (Illeris, 2012). The content of the work further relates to the meaning of the work and the individual learning process. Things that does not give any meaning to some individuals can be significantly meaningful to others, depending on their learning progress. Being a part of producing something of value or great usefulness can also create personal meaning, which can lead to great commitment and can constitute an important driving force for learning processes at the workplace. The opportunities to predispose work directly connects to form of leadership at the workplace in terms of making decisions based on dialog with employees or giving orders. The organizational structure also influence employees' abilities to predispose work. A horizontal decentralized structure makes a better platform for learning than a vertical bureaucratic structure. This also underpins the weaknesses of Taylorism when it comes to learning in organizations. The opportunity to apply employee qualifications at work depends on technological relations and division of labor. Employees that are highly educated often have better opportunities to apply and develop their qualifications than employees with lower education (Illeris, 2012). The opportunity for social interaction can lead to learning that takes place as a social process, as coworkers discuss, reflects and exchange ideas and experiences with each other. Schön (1987) points out how the interaction between an experienced coach and a student can stimulate the reflection-in-action of the student. A two-way communication can lead to open exchange of ideas, which can create learning. The dividend of the technical-organizational learning environment also depends on the scope and workload. There is little room for learning if the work demands high pace and intensity or if the work is one-dimensional and lacks variety. A prerequisite for learning in the technical-organizational environment is challenging work tasks and exercises that contain problems that promotes learning, as well as time to experiment, develop and try out new ideas. Unfortunately, many organizations lacks the time or the resources to conduct such activities (Illeris, 2012).

The Social & Cultural Learning Environment

According to Illeris (2012), the social and cultural learning environment is where learning takes place in affiliation with social groups and processes. Traditions, norms, and values in the informal fellowships are crucial factors for establishing a learning environment. The understanding of this social dimension builds on several different theories, such as Lave & Wenger (2003). Lave & Wenger (2003) states that learning takes place as a negotiation of meaning and development of identity in connection to daily work. It is important to distinguish the difference between work fellowships to get a complete understanding of the social & cultural environment. Illeris (2012) presents three different perspectives that analytically describes the different work fellowships with respect to an economic, political, and cultural view. Illeris named these perspectives work fellowship, political fellowship, and cultural fellowship.

Work fellowships occur due to execution of shared work tasks. It sets the basis for developing personal emotional relations between coworkers. The creation of work fellowships and learning depends on what level the coworkers experience a common meaning with the work and develop personal relations through proximity and identification. Learning in work fellowship primarily concerns of becoming skilled, more efficient, deliver high quality, and making fewer mistakes in compliance to the fellowship's criteria. In production companies, decision-making often bases on product-economic considerations (Illeris, 2012). This means that ground workers or employees with lower education lacks opportunities of learning because they expect to perform specific given tasks efficiently. Political fellowships establishes around the battle for control, power, status, and making an influence on the workplace. Learning in the political fellowship concerns learning the fellowships' norms, language, solidarity, and collective action. It also concerns the individuals' ability to understand themselves and the role of their work as it contributes to something meaningful, not only for the organization, but also in social context (Illeris, 2012). In other words, employees in a community can have their own terminology and master complex tasks, which people outside of the community finds very difficult. Cultural fellowships form based on common values, norms, and beliefs that connects groups at the workplace. Cultural aspects are prerequisites for an immediate common understanding within a group of employees. Cultural differences have many layers and dimensions, such as gender, generation, ethnicity, and social background.

These three types of fellowship build on theory and analysis. In practice, they exist within each other and are hard to separate. Distinguishing the fellowships help to understand the conditions for learning that exist in the social & cultural environment.

Employees' Learning Progress

Employee learning progress depend on their experience from earlier in their life span (Jørgensen & Warring , 2002). Learning characterizes on basic attitudes towards work, created

through socialization in family, education, and later work experience. The term learning progress consider learning as a process that takes place in different social contexts through life, or as a "learning track" (Dreier, 1999). Simultaneously it is also a process where individuals develop a work identity or a profession- or field identity through their learning progress.

3.5 *Individual learning*

In Illeris' (2012) general model for learning, which is individually orientated, he differentiates three dimensions, the cognitive, the psychodynamic, and the surroundings/society. The educational system is an example of the surrounding/society dimension. Employees acquire learning between the cognitive and the psychodynamic dimensions, which is the interaction with society, while work identity locates in the area between the cognitive and emotional dimension. The cognitive dimension includes content- and sense making aspects, as well as individual skills. Learning takes place through receiving new impressions and information in interaction with the environment, tied together with results from previous learning on the applicable subject.

Figure 7 presents a comprehensive model for learning in working life, by combining the model for learning at the workplace and Illeris' (2012) general model for learning. The model for workplace learning has its baseline on the bottom, at the social- and society based level, while the third angle, which includes individual learning process, points up towards the individual level. Vice versa, the general learning model has its baseline on top, at the individual level with the surroundings/society-dimension pointing down at the social level. The work identity is created through influence from both the work itself as a part of the social level, and due to the individual learning processes in terms of the cognitive and psychodynamic dimension. The learning environment, and the possibilities or boundaries that this environment sets for learning, as well as the individual learning process, influence the workplace practice. This means that both work identity and workplace practice mutually consist and depend on each other. The objective surroundings/society is present in the subjective experience and understanding, and characterizes at the same time the subjective perceptions and actions (Illeris, 2012).
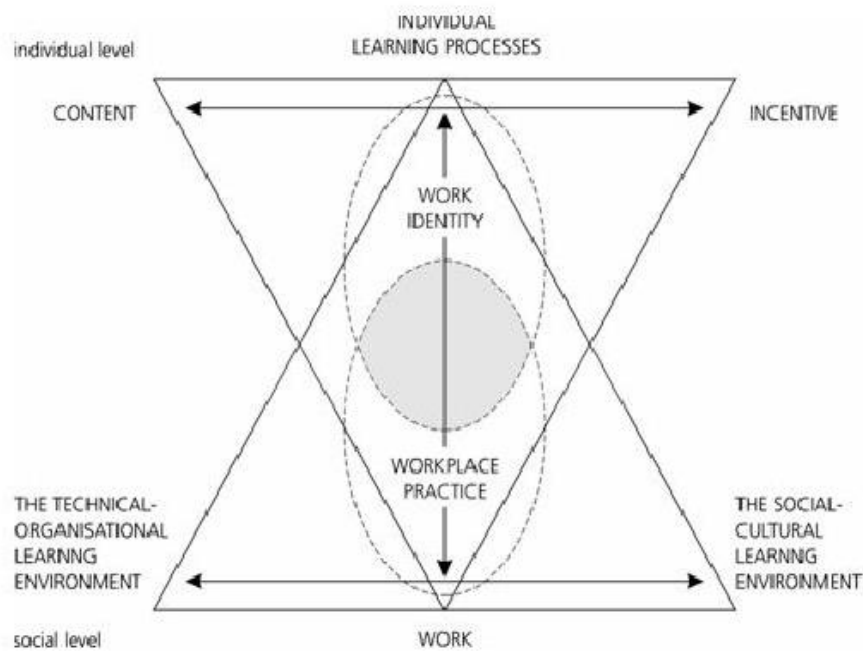
Figure 7: Learning in working life (Illeris, 2012)

The overlapping between the two areas is where the most significant conditions for learning in working life takes place. This is where individuals' identities influence and develops the fellowships' practice, and the fellowships' practice shapes each individual's work identity. However, it can be hard for organizations to identify employee's work identity, and alter it in a way that matches the desired work practice (Kalsaas, 2012).

4. FIBO-TRESPO

Fibo-Trespo AS is a producer of laminate bathroom panel and countertops, which is located in Lyngdal in Vest-Agder, Norway. Fibo-Trespo's products are specially designed to endure wet and moist conditions and they do not require the use of plasterboard, sealant or tiles. Their products are approved without the use of membrane. The company initially arose in 1952 to paint fiberboard for a company called Wallboard, today known as Huntonit. Until recently, Fibo-Trespo has been a part of the Byggma Group, along with Huntonit and five other companies. However, Fibo-Trespo was acquired by Bluebird Holding AS, which is owned by FSN Capital Fund IV, during the time of our research. The company is mainly distributing products in the Norwegian market, but has also started an international expansion (Reite & Nodeland, 2015).

Figure 8: Picture of Fibo-Trespo's facilities

Fibo-Trespo used to share their production premises with a competing company Alloc AS, but this cohabitation ended in 2007, when Fibo-Trespo moved to brand new premises, a couple of kilometers away from the old one. Since Fibo-Trespo's relocation, their revenue has increased from 280 million NOK (2008) to 438 million NOK in 2013. Today Fibo-Trespo has 107 employees in total. Fibo-Trespo recently became a member of the Eyde Network. The Eyde Network is a cluster of organizations from the south of Norway, that seeks to increase competitiveness through collaboration. The network provides research, innovation, and leadership guidance to its organizations.

Fibo-Trespo started changing their ways of working in 2007, after their relocation. Management was not happy with where the organization were heading at the time; facing low ROI, efficiency, productivity, and results. In 2009, Fibo-Trespo started their journey to become a lean organization, which has been a revelation for the organization. In just about five years, they improved remarkably. Today efficiency and productivity is high, results are improving, and the organization is one of the leading Lean-organizations in the country. Fibo-Trespo has been nominated to several awards, including winning the price for lean-firm of the year, by "TPM-Lean brukernettverket", in 2012. Furthermore the company recieved "Kompetanseprisen" in 2013, and has become a leading lean organization in the Norwegian production industry.

A short overview of Fibo-Trespo's product flow is shown in figure 9 in order to provide a simplified illustration of the production.
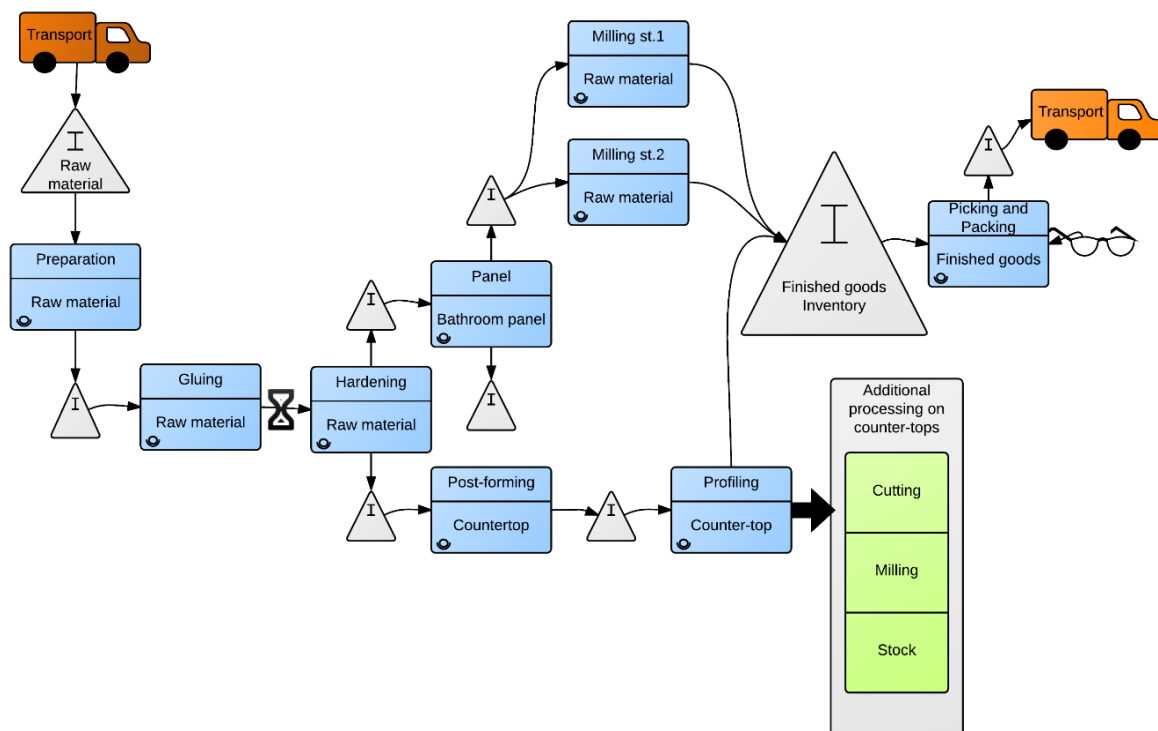
Figure 9: Simplified product flow at Fibo-Trespo

4.1   Lean History

Half a year after the relocation, the CEO realized that changes were needed. An unhealthy culture had anchored in the organization, and within half a year in their new facilities, old habits started to show. A messy and unorganized work environment was undeniable. After a major cleanup in December 2007, it became clear that initiatives were needed to create a healthy environment, as the current work environment could be a potential threat to the safety of

employees. In the factory's production line, a Health Environment- and Safety initiative was launched, but the effects of this initiative proved to be low and superficial.

In 2009, after studying the TPS, management approved that lean would become the new way of managing the organization. Along with an approval from the executive team in Byggma AS, the project was included in the budget, and Fibo-Trespo became a pilot project on lean, within the Byggma group. The company entered, in collaboration with Samarbeidsutvikling AS, to determine what areas to focus on. Several pilot projects were launched at the different stations along the production line. Starting out with 5S, shortening machine downtime and operator controlled maintenance. In the first nine months of approaching the lean culture, the organization achieved higher productivity and efficiency, and at the same time new areas for possible improvements were identified.

A goal of reaching 85% Overall Equipment Efficiency (OEE) within 2014 was set, and at the time, the current OEE's were between 40-50%. Furthermore, 24-hour meetings were established for daily performance indications and discussions around critical overall success factors. Later in 2009, a lean consultant, with experience from the Volvo factory in Arvika, was hired to increase knowledge and expertise among leaders and managers. The focus of developing knowledge regarding tools and methods within the entire workforce, shifted towards establishing expert leaders and managers. Furthermore, a common understanding that too many lean adaptions fail as insufficient funds and resources are spent, was established. Early on, the management developed the "Operativ visjon", a vision to strive for and a state to reach within 2014. Already in 2010, the organization was given a prize for that year's best TPM/Lean organization. Between 2011 and 2012, the overall lead-time was reduced from 10140min to 7000min, by relentless removal of waste. From a negative annual profit in 2008, to approximately 15.5 million NOK in 2009, and doubling their results the following year, the lean initiative has made great impact on the organization. The CEO has emphasized the engagement within his workforce, and stated that the magnificent results are not a product of facilities and machines, but people and their knowledge. However, from 2012 to 2014 the results have been good, but more or less static. Today the organization is working on their next lean initiative, obtained from Mike Rother's book, Toyota KATA. The goal is to provide a provident direction and educate employees to see the usefulness of improvement work. More than before, continuous improvements will be steered in a direction serving the organizational strategy.

5. CASE DESCRIPTION

The unit of analysis is Fibo-Trespo, or in other words, the organization as a whole unit. However, the research focus is directed towards two major aspects. The first aspect encompasses lean continuous improvement and how it is practiced. Furthermore, the underlying framework that needs to be present and determines how improvement work is practiced. The second aspect is the engagement of employees in the organization. To narrow the field of research, our focus is drawn towards the intersections of these two aspects, employee engagement in continuous improvement.

Employees at Fibo-Trespo look for areas to improve and implement changes in several ways. We are looking at the most relevant practices and methods that are utilized when dealing with improvements. From light rapid improvements to more complex problem solving practices, the procedures change. Therefore, the need to describe and categorize different ways of dealing with improvements is necessary and shown in the following subsections. The main categories are what we have named general improvements, A3 problem solving, and improvement Kata. Furthermore, several arenas for discussing problems and identifying focus areas are described. The culture for improvements and how it has been thought, developed, and anchored in the workforce, will be described. Several aspects of the organization that not directly ties to improvements or improvement work are described, as they indirectly affect how improvements are handled. Organizational structure, roles and responsibilities are examples of these indirect factors.

5.1 Continuous Improvement at Fibo-Trespo

In the following subsections the three major practices are explained. It is beneficial to describe how improvement work is practiced, before explaining the organizations culture, strategy, structure, and such. By understanding how Fibo-Trespo works on improving in a practical relevance, it is easier to understand the more underlying aspects of improvement work.

General Improvements

General improvements at Fibo-Trespo, are often simple rapid improvements, identified and conducted by individuals. General improvements are tied to an improvement list at each department's board. Often times, an operator will identify an area with room for improvement, and write the suggested improvement on the general improvement list. The identifier of a possible improvement is set as responsible, and the head of the department or the responsible employee will enter these improvements into the general improvement digital database. On the general improvement sheet and in the database, improvements are kept "live" while being worked on, but can also be set in an "idle" state if necessary. In several cases, improvements have been set idle as they depend on a preliminary improvement or needs to wait for resources.

Other times it can be too extensive to solve at the time, or the improvement is simply not relevant anymore.

General improvements are often times related to 5S work, more specifically, updating standards or marking and organizing tools and equipment, meaning that General improvements often relate to less extensive problems. Every department receives a kr.30.000 budget, dedicated to fund needed equipment or tools to conduct these improvements. Management must approve any improvement with a cost over kr.10.000. When costs exceed kr.10.000, managers demand that employees prove the needs and benefits in a greater extent, in order to receive funding.

Essential for general improvements and the surrounding framework, is the intention behind it. It is meant to be operator controlled; employees stand free, and are encouraged to identify improvements. It is an individual task, meaning that there is always one responsible employee, but it is possible and quite common to seek advice.

The internal definition of a general improvement is somewhat unclear. More specifically, there is uncertainty regarding requirements and scope of general improvements. To elaborate, requirements are based on what an employee determines as extensive enough to be deemed a general improvement, meaning that the definition of general improvements is determined by the identifier. This practice has led to several interventions by leaders and managers. Improvements related to a problem that can be solved immediately, bigger improvements split into several smaller ones, or improvements that could lead to sub-optimization, are examples of situations were management have interfered. Even though management in several occasions has interfered, there is no existing procedure for controlling general improvements.

A positive effect with few limitations is that a lot of ideas are generated. In 2014 the General improvement database contained over 10 000 implemented improvements. On the other hand, no limitations combined with recognition on the number of completed improvements, can lead to improvements with low value. As more comprehensive challenges tend to demand more effort and resources, the lighter challenges are the ones who are tackled. The frequency of improvements has undoubtedly been high, and the goals for how many improvements should be conducted, increases continuously.

The number of improvements is emphasized in several settings and often brought forward as a performance indicator. Furthermore, several rewards are given if the wanted average number of general improvements per person, per department is met. As an example, four general improvements in average per team member, per team is needed three months in a row, for that team to earn a meal paid for by the company. Furthermore, four general improvements are needed for an employee to advance to step one in the competence system, which will be described in more detail later in this chapter.

The idea is to get operators to act on their own knowledge, and spend the funds properly towards improvements. The results have according to management, been very positive. The budget is

more than enough to get the right effect, and the operators seldom spent the full amount during a month. The organization catches the voice of their workforce, and from the operator's viewpoint; resources are allocated when dealing with continuous improvement.

The framework provides a high tolerance for what can be considered an improvement, which assures high creativity and open-mindedness when looking for areas to improve. However, it also lowers the requirements towards each improvement. It is also safe to say that the potential for improvement was at its highest in the beginning, when they were easier to identify.

Evidence also suggests that not everyone participate to the wanted extent when it comes to general improvements, and some will not conduct any at all. Through our interviews we experienced the various opinions towards general improvements. When some employees resist working on improvements, others have to step up in order for the fellowship to receive their rewards and recognitions. Several sources suggest that frustration has emerged among workers. For a department to reach its goal every employee has to have at least one improvement during a week. From our open interviews, it appears that operators with several improvements have logged improvements in the names of the operators with no improvements. Both management and operators confirm these incidents. The possible reasons for these events will be discussed in section 7.1.

A3 – Problem solving

The A3 method is used as a problem solving technique, and utilizes the PDCA wheel to iterate from a current situation, to a desired state. The organization is using A3, when there is an evident problem or potential for improvement that takes more than a general improvement to solve. It is driven forward by a selected team, and not by one individual. In many ways, it is a more comprehensive method of continually improving. Comparing A3 and general improvements, A3 consist of several improvements with a more variable scope. Furthermore, the improvements within the A3 all aims towards solving the same problem.

Every department is, according to management, meant to have one open A3 at their board at all times. The process of opening a new A3 at Fibo-Trespo starts with one or several employees identifying a problem or potential area for improving. The initiator becomes the owner of that particular A3, and picks a team of employees to help work on the problem. Potentially anyone can become attached to the A3, but the focus and idea, is gathering the right set of employees to solve the problem. The right competence, hands-on-experience, and proximity to the problem are important factors, when selecting a team. But no exact procedure exists for selecting the team. A3 meetings are held every week to discuss the progress, and identify gradual improvements, which are assigned to individuals. The idea is that every individual gradual improvement, sets the team closer to the target situation, and several gradual improvements will eventually solve a bigger problem.

Even though A3 is a defined tool within lean, there are countless ways of conducting this problem solving technique. Even within the organization the ways of approaching A3 work, varies from each department and team. However, the most common practice, according to managers and operators, is to work with one A3 until the desired state is reached. When reaching the desired state, the A3 is shut down in favor of opening a new one. However, one team in particular has made great progress without closing down the A3, but kept it open for much longer periods. By changing the target situation, and often further improving within the same area, they have established an efficient team culture. Employees within this department are arguably more engaged than others, and problem solving has become a way of thinking. Furthermore, the team is working on the A3 on a more regular basis, with more frequent and less extensive measures. The approach has anchored itself, as the leader and members of this particular department has developed the way of working. In the other end of the scale, a less positive trend occurs. During our open interviews, it became evident that several departments did not have an open A3 at the current time. The reasons however, vary from each department. One department had started practicing Kata, instead of A3, where others had no good explanation.

A3 is a bottom up problem solving approach, which starts at the operator level at Fibo-Trespo. Identified problems are strongly related to individual's perception of their own work environment, and will therefore be based on the operators' knowledge and skill in identifying these areas with room for improvement. The rest of the organization is intentionally kept up to date on every department's A3-work, through the 24-hour meeting, which will be described in more detail later in this chapter.

As a specific A3 example, the changeover times at the milling department, where the lock mechanism at each panel plate is made, where reduced from 16 minutes to 8 minutes. The team, consisting of four operators, was responsible for analyzing and describing the current situation and which areas could be improved to reduce the changeover time. One of the several improvements conducted to reach the target condition, was a video analysis of the different operators and their movements, to establish a best practice. Spaghetti diagrams were used to map the movement, which showed several ways to perform the same tasks. When a best practice was established the team moved on to the next potential improvement, and continued this practice until 8-minute changeovers were reached.

Improvement Kata

The Improvement Kata is like A3, a problem solving technique utilizing the PDCA wheel to iterate from a current situation, to a desired state. However, both from a theoretical perspective, and Fibo-Trespo's practical implementation, there are several differences. Kata is a top-down approach seeking to link the overall strategy of the organization to the problem solving practices. From Fibo-Trespo's vision, their CEO picked out a challenge that the organization should work towards overcoming. The initial challenge is reaching 100% order controlled

production. This challenge sets the stage for the first of several coaching processes, as the CEO has coached his managers to establish their own target conditions. These targeted conditions must align with the challenge of 100% order controlled production, so that when they are reached, it sets the organization a step closer to reaching the challenge. Furthermore, every challenge consists of several target conditions, which are more detailed and less extensive. The target situation should be achievable within 1 - 6 weeks. Figure 10 illustrates how challenges link the organizations strategy to process level improvements.
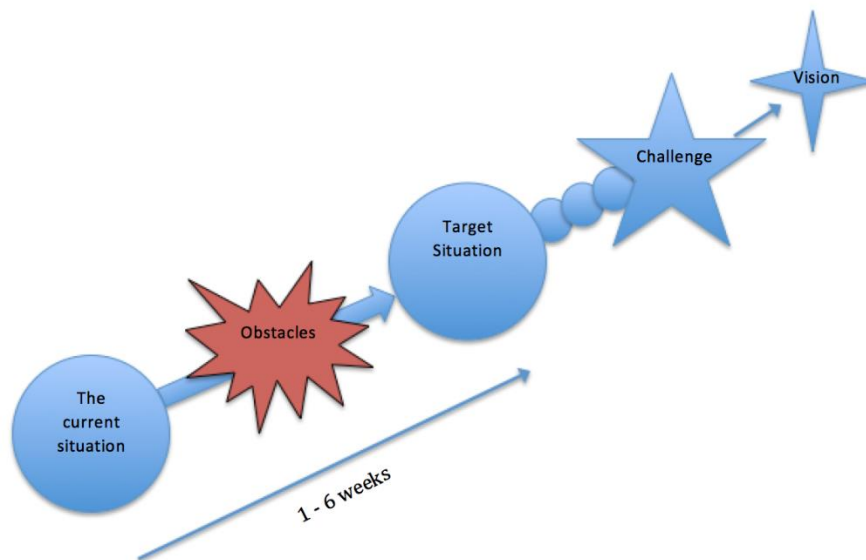
Figure 10: Linking challenges to strategy and vision through the improvement Kata

To explain in more detail how the Kata boards work between the different levels and departments at Fibo-Trespo, we have chosen to simplify the organizational chart. In other words, the simplified version does not account for all the details, but it explains the essential relations that the improvement Kata builds on. Furthermore, there is a coach/learner relation between the different organizational levels. Figure 11 shows the four different organizational levels and the coach/learner relationship between the levels.

Organizational Levels:	Simplified Organizational chart with Kata boards:
CEO – Upper management: The CEO selects a point from the "operativ visjon" that aligns with the overall vision. This point will be the challenge in every Kata board.	
Management level: Receives coaching from the CEO to determine several areas to focus on in order to reach the challenge. The manager will look for areas for several departments.	
Leader level: The department leaders must map the current condition and the target situation within a smaller focus area, for the department to contribute towards the challenge.	
Operator level: The operators will work to tackle obstacles within a focus area to approach the target situation.	

Figure 11: The KATA board chain

From the top and downwards, actions and areas of focus, become more specific. With this chain, every improvement project is linked to the overall strategy. Done correctly, it provides the direction that the management is looking for in improvements. Operators still maintain their freedom and responsibility, but are facilitated to identify improvements of greater value. Compared to A3, Kata provides a more structured framework for improvement. Management has the opportunity to guide continuous improvements and align it with strategy. Furthermore, the organization plans to establish a more frequent focus, than with A3.

Kata relies on a coach learner principle to establish the content of each Kata board. As a fictive example, a manager would serve as a coach for a department leader. The department leader would be the learner in this example. The manager would guide the department leader to identify an area to focus on, describe the current situation, and describe the desired state. Furthermore, obstacles that are keeping the organization from reaching the desired state should be mitigated through experiments in shape of scientific problem solving. A major challenge has been for the coach to steer, guide, and facilitate instead of giving solutions and showing the learner the answer. Often the more experienced employee will act as the coach, and the coach will see the solution before the student. In these cases, it is tempting to give away the answer, but according to theory, higher learning outcome is gained when the students develops a

solution themselves. A Kata board will exist between each coach and each student. The board contains the following sections at Fibo-Trespo:

1. **The superior/coach establish a challenge aligning with the current vision (challenge achievable within 3-6 months).**
2. **The student identifies an area with improvement potential.**
3. **The student defines the desired state in this area (achievable within 1-6 weeks).**
4. **The student describes the current situation in terms of obstacles keeping them from reaching the desired state.**
5. **Choose an obstacle and run it through the PDCA wheel.**
6. **Unsolvable or irrelevant obstacles can be set in an idle state.**

The organization is currently at a stage of introducing Kata, as the new problem solving technique. According to management, the external lean consultant introduced them to the book "Toyota KATA". The initial focus and reason to look into Kata, was to gain a more consistent focus on improvements. From the fact that Kata is a method currently being thought or implemented, gives us less specific data towards the initiative, as we can only see what is intended.

24-hour meeting

The 24-hour meeting is an orientation that takes place every day in a specific location at Fibo-Trespo. Managers and leaders from each department will attend the meeting to discuss operational status within the latest 24 hours of production. Consequently, to keep every department's key performance indicators and A3 or Kata progress up to date. The daily meeting also serves as an arena to discuss areas to improve and put new suggestions at the board. Another purpose is to inform the department leaders on topics from other departments, contributing to see the whole picture. A Gemba[1] card is moved between the department's boards every day, to determine which department who will present their latest work on improvements from an A3 or Kata board. When 13 days has past, every department has presented their latest work, and updated the others on their progress.

Improving in teams

At Fibo-Trespo, every employee is a member of a team that is formed by what department they are a part of. Employees will often have been, or is at the moment, a part of an A3 team, which is put together to provide interdisciplinary knowledge and expertise. Dealing with general improvements one person will as mentioned always be responsible for the relevant improvement, thus the responsible person is also the one that is rewarded. However, in the open

---

[1] Gemba as is a Japanese word that means "the real place", a key component in the TPS. The purpose of Gemba is to identify problems where they actually occur (Southworth, 2012).

interviews several informants state that occasionally, more than one person is involved in these improvements.

Culture for improving

Due to our focus on engagement it is necessary to describe the culture for continuous improvement at Fibo-Trespo. As explained in the section on lean history, the organization started with what can be characterized as the direct opposite of a lean culture. The current situation describes a different organization, where standardization and order characterizes the facilities. The focus on conducting improvements is evident in several contexts.

As a part of Fibo-Trespo's methods of measuring employee performance, the ability to conduct a number of improvements is emphasized. More or less, it is a demand for those employees who want to develop their careers, to be able to identify and conduct improvements. Management has attempted to provide operators the opportunity as well as the ability to improve their own environment and routines. Both operators and management is determined that looking for areas to improve, has become a way of thinking. Not only when time is dedicated to deal with improvements, but also while performing regular tasks, like operating a machine. Furthermore, time is devoted every day to focus on improvement related work. However, the amount of time dedicated often depends on the rate of production, as in busy times, when customer demand is at a peak, there will not be time. Production is naturally the main focus. From the exploratory phase we can only suggest time as a possible resource scarcity, which will keep employees from working on improvements. When it comes to equipment, tools, and knowledge there is a broad consensus that resources will be allocated if requested.

This former aspect also brings us to another point in the improvement culture at Fibo-Trespo. In many ways it is the employees that request, that ultimately will receive. In the open interviews several operators stated that if they were to ask for resources, they would almost always receive. Managers focus on the more willing and more engaged employees. From what we learned by exploring, different skills and personalities plays a role in determining which employees management will focus on developing. But from observing and interviewing, the willingness and engagement level is ultimately the most important factor at Fibo-Trespo.

Through the exploratory phase and open interviews it became clear that the meaningfulness and seeing the value of conducting improvements has become a challenge for several operators. Several employees state that there is no point in conducting improvements when they do not improve anything. These cases are related to general improvements, and more specifically 5S. From how employees are recognized and rewarded from general improvements, the pressure to constantly improve is always present. To retrieve rewards and recognition, employees identify what some argue to be useless or low-value improvements. Furthermore, managers report that

45

some employees indicate that there is a need to refresh the knowledge of the initial learning initiatives, such as 5S and operator controlled maintenance.

Several operators and managers at Fibo-Trespo have emphasized the organization's visual management. In 2007, Fibo-Trespo did not measure their performance compared to today, nor had they developed standards to follow. Today numbers, metrics, and performance indicators are on display for everyone to know how well the organization is performing. Moreover, management is visible to the employees. Operators confirm that management is more than ever, visible in the factory. At Fibo-Trespo decisions are not made from the office, based on numbers. Decisions are made at the factory floor together with operators, based on people's knowledge, what they see, and production numbers.

The improvement culture at Fibo-Trespo is affected by their system for rewards and recognition, which is an important factor to engage employees. Often, individual rewards and recognition are based on financial incentives through the competence system, described in the next section. However, the collective rewards are often related to non-financial incentives. The organization will pay for a dinner and send teams to visit other best practice companies, host department breakfast, or host team building events to show appreciation for the efforts of a group.

Fibo-Trespo has, like many lean organizations, a facility characterized by visual elements. Visual elements are important tools to display important measures, key performance indicators, standards, etc. Moreover, it can be argued that visualization plays a major role in recognition for good work. Boards, posters, and encyclopedia will statue good examples and recognize the more engaged employees. The visualization shows the honest picture of performance at all times. Furthermore, it forms a basis to compare performance across the different departments, teams, and individuals at all times. As an example, "green" OEE numbers reflect a successful shift, while "red" numbers indicates that the team did not meet the objective of the day.

Depending on leadership style, a lot of recognition is given within teams and departments. However, from the open interviews, it became evident that the ability to give recognition for good work varies. Recognition is also given to teams that request more, by letting them run as test pilots for projects and new initiatives.

The fact that some operators and other production personal are bound to operate machines or perform repetitive tasks leaves less room for variation. However, Fibo-Trespo offers their employees the possibility to receive training in other areas and departments. Management has expressed that this is an ongoing process to develop the workforce to be able to operate on more than one station. A flexible workforce will benefit both the organization and the employees. It gives operators the opportunity to request transfers to other departments, to work on different stations. From managers it is a wanted practice, as it creates more certainty, and a replacement will exist if someone is absent. We do not have insight to every employee's competence profile,

but from our open interviews it became clear that rotations were not an uncommon practice. Furthermore, operators that master several stations, have a deeper understanding of how the whole system works. These operators will think of the supplier/customer relationship that lies between every department. In our exploratory phase and through interviews, both operators and management describes the situations that can occur between departments. Similarly, during shift change, everything needs to be in place, in order for the next shift to be able to start producing quickly. Some teams also have rotation practices during their shift to create diversity in work. This however, is not the case in every team.

Competence system

Fibo-Trespo's competence system is the backbone of their framework for learning and development. Through the annual employee performance appraisal, the head of the department assesses each appurtenant employee, following the organization's standards for competence. The standard for evaluation of competence, states that every employee will run through the procedure annually, which means that the organization is left with one competence profile for every employee in the organization. The competence system consists of three different steps possible to achieve, and each step has a pay-rate that can be added to the employee's hourly wage. The competence system has been developed in collaboration between the union and the HR-manager at Fibo-Trespo.

The competence system is based on certain steps and levels, where several levels are needed to reach a certain step. These levels are described in detail in Fibo-Trespo's standard to ensure a common and justified understanding of what is expected to reach the different levels. Operators responsible for training or the nearest department leader can approve level 1 and 2. However, level 3 and 4 needs approval from the leadership group. The standard sets the following requirements to reach the different levels (see table1 on the next page):
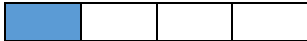
Level of competence	Detailed level description
Level 1:	Has received theoretical information regarding work routine, practice and tasks. Able to perform the job with help from supervisor. Can work as extra personal in the relevant department.
Level 2:	Has received sufficient training to perform expected work without assistance. It is not expected that the employee will tackle all challenges that may arise from deviations, but should know enough to apply the most necessary countermeasures and immediate measures. Will know whom to contact for assistance in the different situations.
Level 3:	Masters the procedure, practice and tasks well, and know what is expected of the process. Familiar with problems that occur, the cause of these problems, and how they should be handled.
Level 4:	Masters all parts of the work routine. Understands well how the different parts of the work together and how they affect one another. Will know how to solve any problem that occurs and has better than average knowledge within the area. This also includes the ability to teach others.

Table 1: Levels of Competence

Furthermore, the different steps in the competence system can be reached by obtaining certain levels in several areas. The steps within the competence system are described in further detail, in the standards and procedures for the competence system. The demands to reach each step are as follows (see table 2 on the next page):

Steps of competence	Detailed step description
Step 1:	Must have competence level 3 on at least one machine/area. Must also have competence level 2 at another machine/area. Has implemented at least 4 general improvements per month. Been through reading circles.
Step 2:	Been at step 1 for at least a year. Must have competence level 3 on at least one machine/area. Must also have competence level 2 on at least two other machines/areas. Has good knowledge on the customer/supplier relation within the relevant department. Has implemented at least 4 general improvements per month. Must have level 3 knowledge within 2 lean methods/tools.
Step 3:	Been at step 2 for at least a year. Must have competence level 4 on at least one machine/area. Must have competence level 3 on at least to other machines/areas. Possess leader competence and serve as a role model for others. Must have level 4 knowledge within 2 lean tools. General lean competence at level 3. Must be a driving force when it comes to general improvements

Table 2: Steps of Competence

In addition, several requirements have to be met in order to become and stay a team leader. Team leaders must achieve and stay at step 2, be able to give presentations at the 24-hour meetings, and be able to lead and make decisions from a quality perspective as well as the human perspective. Team leaders are rewarded with an extra rate added to their salary, which is independent from the steps in the competence system.

To achieve the required level of knowledge within a lean tool the employee must be able to initiate and properly implement the tool without assistance from others. The tools that are included in the competence system are:

- 5S (includes updating standards)
- A3
- Operator controlled maintenance
- SMED

Every employee is evaluated annually, and can advance to the next step of competence. However, it is also possible to move down the latter, meaning that employees must keep their knowledge up to speed, to prevent a reduction of pay.

The competence system can be considered the opportunity for every employee to request learning and show that they want to develop their own skills and knowledge. Management has also provided an overview for what is expected from each employee:

Area	All employees				Shift Supervisor				Department Leader				Management			
5S	�															

Table 3: Expectations of Competence with respect to employee positions

*The demands for each level in this table are equal to the levels in table 1.

(blue)	Must be at the proper level.
(grey)	Should be at this level.

These standards secure a common and united understanding of the level of competence the organization is aiming for. Furthermore, employees become aware of their skill level, but also where they should work to improve. The reward system creates incentives to motivate the employees to develop. On the other hand, the competence system is based on individuals and can form competition. If the organization allocates sufficient resources for learning and growth, this competition can be healthy. If resource scarcity becomes the case, it can force management to determine who will receive training and who will not, which can create significant differences in level of competence.

Learning and Training

Fibo-Trespo has through the years of developing their workforce, implemented several learning and training initiatives. Employees that initially showed resistance towards lean initiatives have in several cases changed their perception as their knowledge has developed. Fibo-Trespo has emphasized the development of engaged leaders and managers. When Fibo-Trespo first started approaching the lean methodology, they invested a lot of time learning about the different tools jointly as an organization. After this initiative, performance increased, but mostly because insignificant changes were needed to see results. The organization, in collaboration with their lean consultant, realized that their training had to start with managers and leaders, as it is important to develop leaders and managers that understand and see the value of lean, in order to engage the rest of the organization. As we have studied the organization, it is clear that they

have spent a lot of resources developing their managers and leaders. Furthermore, the organization has taken one step at the time, to ensure a common and full understanding of principles and methods, before implementation. In table 4 the most relevant training initiatives, what they encompass, and whom they concern is listed.

Learning Initiative	Time period	Participants	Purpose/content
Lean leader training.	1,5 hour every week.	Department and team leaders.	Increase leader's competence. Learning to manage people.
School of improvements/ Lean leadership.	4-month training course, with exam. Equivalent to 15 credits.	Department and team leaders.	Increase knowledge regarding continuous improvement and lean leadership.
Reading circle through interdisciplinary groups.	17 weeks.	All employees.	Built on the content of the book "Ledelse for lærende organisasjoner". Lean translated and adapted to fit the Norwegian society and culture.
Lean LEGO simulation workshop.	1 Day.	All employees.	Understand the concepts of pull/push, flow, and the Kanban signal system. Balance product mix, reduce batch size, changeover times, etc. See the costs of inventory.
Lean method training.	Various time periods, dependent on experience and choice of method.	All teams receive training depending on what method they are working with.	Training and implementation with coach in the relevant tool. In the previous section, these tools are listed as bulletpoints
Introduction program.	Within the 6 first weeks of employment.	Every new employee.	See how every department operate their stations, from commodity purchase to inventory of finished goods. Also includes participation on 24-hour meeting.
Introduction and basics of continuous improvement and teamwork.	Unspecified	Department teams.	Develop basic understanding regarding the importance and idea of continuous improvement and how to practice it through teamwork.
Kata training.	Ongoing (coaching and problem solving will happen daily).	Every employee (not every employee has been through training, but will eventually).	Understand the Improvement Kata, the chain of Kata, and the coach/student practice. Also includes practice in filling out and understanding the use of the Kata boards.

Table 4: Learning Initiatives

6. SURVEY

We conduct a survey at Fibo-Trespo as a part of our research. The purpose is to measure employee's level of engagement in lean continuous improvement. The survey bases on theory regarding learning, motivation, and the Nordic model.

6.1 Survey Development

In order to get as many people as possible to respond to the survey, the amount of questions has been limited. Since the theoretical aspects in many situations overlap, single questions can point to several theoretical aspects. An example of this phenomenon is asking for people's ability to learn in their work. This indicates conditions related to Illeris' model for learning in the technical organizational environment, motivation in Herzberg's theory, and aspects regarding the Nordic model.

Theoretical concretization

Theoretical concretization is necessary to measure engagement in the right terms, and be able to develop relevant questions, that are properly grounded in theory. Even though previous examples of engagement surveys exist, we have made an effort to set the term engagement into the context of the case. Meaning, that we have carefully considered the case studied and the external factors affecting Fibo-Trespo.

Through, the Nordic model we account for cultural and societal aspects that form the working environment in the Nordic countries. Characteristics found in this model must be carefully considered when measuring engagement in an organization in this part of the world. Arguably, people in different organizations are engaged by different factors. Therefore we also take into account how the organization is structured and their culture. More importantly, measuring employee engagement by itself is nothing new, but measuring engagement towards continuous improvement is not a common approach. Continuous improvement by itself is more a tangible term, in comparison with the more abstract term engagement. When combining these terms the concretization becomes more relevant.

The Nordic model

Theory	Survey
Quality of the work tasks	I have variation in my work tasks
	I can impact the work pace
	I can influence my own work practice
	The workloads are acceptable
	My improvement work adds value to the organization
Participation and consultation	I have the authority to conduct improvements
	I understand others tasks and the organization as a whole
	I enjoy working in fellowship with my coworkers
	Improvement work is self-driven
Training and career opportunities	I get a feeling of learning at work

Table 5: Concretization of the Nordic Model

The Technical- organizational learning environment

Theory	Survey
Division of labor	I have variation in my work tasks
Work content	I get a feeling of learning at work
	I know what's expected of me
	I am bound to operate machines
Work disposal	I can influence my own work practice
	My work task are clearly defined
	Leadership listens to suggestions
Opportunity to apply qualifications	I have sufficient knowledge to preform my work tasks
	I have the authority to conduct improvements
Workloads	I can impact the work pace
	The workloads are acceptable
	Participating in improvement work increases the workload

Table 6: Concretization of Illeris' Technical- Organizational Learning Environment

53

Theory	Survey
Work fellowship	I enjoy working in fellowship with my coworkers
Political fellowship	My improvement work adds value to the organization
	I have an understanding of my role in a holistic context
	I understand others tasks and the organization as a whole
	Improvement work increases efficiency in the organization
Cultural fellowship	Age, Period of employment

Table 7: Concretization of Illeris' Social & Cultural Learning Environment

Motivation (Herzberg)

Theory	Survey
Administration	The organization facilitates arenas for learning and competence building
Supervision	Leadership leads by example
	I know where to seek assistance regarding improvement work
Interpersonal relations	I enjoy working in fellowship with my coworkers
	I would recommend the organization as a work place for others
	I understand others tasks and the organization as a whole
Achievement	I get a feeling of learning at work
	I can influence my own work practice
Recognition	Leadership listens to suggestions
The work itself	I have variation in my work tasks
	The workloads are acceptable
	I can impact the work pace
	Participating in improvement work increases the workload
	I actively think of improvement in my daily work
Responsibility	I have the authority to conduct improvements
	I know what's expected of me

Table 8: Concretization of Herzberg's Motivation Theory

The survey categorizes people through some initial background questions; trying to illuminate different opinions among employees based on social and cultural groups, such as age and time of employment. These factors can point to Illeris' theory regarding cultural fellowships for

creating a learning environment. If opinions differ between the groups, it can indicate that improvement initiatives should point towards some groups in the organization rather than others.

The survey consists of twenty-two questions or claims, on which the respondent has to determine his or hers level of agreement. The response alternatives are developed based on a Likert scale from one to five, where agree, somewhat agree, neither agree nor disagree, somewhat disagree, and disagree act as measures. The survey also consist of six background questions, where two of them aims at categorizing the respondents as mentioned earlier, while the last four of them includes whether or not the respondents are bound to operate machinery or if they have participated in learning-circles, Kata training, or A3 problem solving. The reason behind these four questions is to see if there are any correlations between employees' level of engagement and participation in training and learning activities or the fact that they are bound to operate machines.

Based on the exploratory phase of the research and information from the informant, there is reason to believe that most of the employees have participated in learning-circles and A3 problem solving. Kata training on the other hand, is a relatively new initiative that has been rolled out during the time of the research. The amount of employees bound to operate machinery is an interesting measure since it indicates people's possibilities for variation in their daily work, which can affect the opportunities for learning (Illeris, 2012) and intrinsic motivation (Herzberg et al., 1959).

6.2   Conducting the Survey

The survey targets Fibo-Trespo organizational wide. All departments, production, sales, and administration are asked to answer the survey, as continuous lean improvement work is relevant for every employee. The organization consist of 107 employees. The response consisted of 97 surveys, which equals to a 91 % response rate. However, four of the responses were invalid, as some of the questions where left open. This leaves 93 valid responses, which equals to an 87 % response rate.

The Survey was conducted in a period of approximately two weeks from when it was distributed until all responses were handed in. We chose to distribute the survey in paper format based on conversations with supervisor, key informant, and methodological theory regarding surveys in order to receive the highest possible response rate.

For both developing the survey itself, and analyzing the data, we relied on SurveyXact, which is a complete software for surveys. Since the survey was handed out in paper format, the analyzing became comprehensive, thus all data had to be plotted into the system manually.

6.3 Survey Results

In this chapter, we present the results from the survey. We rely on trends and patterns in the data to illuminate interesting findings regarding continuous lean improvement work and employees' engagement based on theory in chapter 7. First, we present the results from the background questions, secondly, we present results according to theoretical concretizing and finally, we present interesting individual findings by comparing different variables in the data.

Background questions
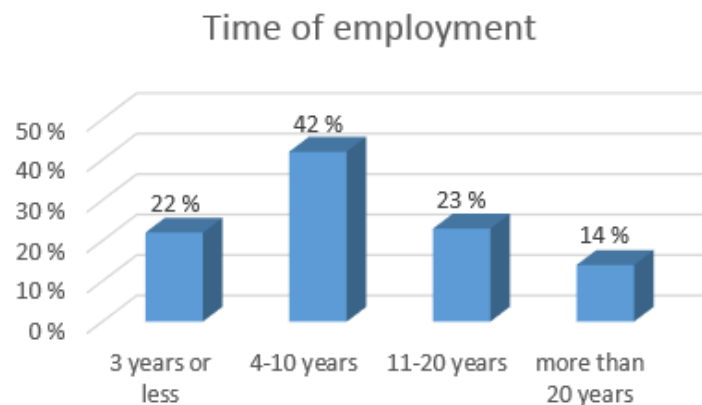
Figure 12: Time of employment

Among Fibo-Trespo's employees that responded to our survey, almost half (42%) have been employed between 4-10 years, While only 14% has been employed for more than 20 years. This diagram is supposed to categorize the employees for further discussion of the results.
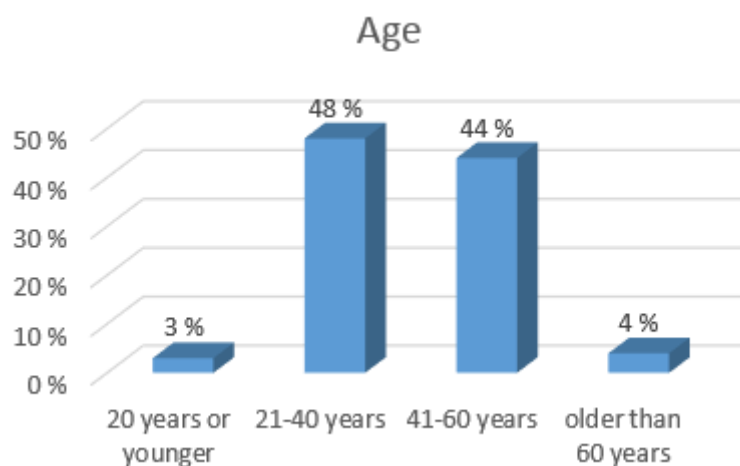
Figure 13: Employees' age

Initially, smaller intervals were preferred in this categorization, but considering the amount of people employed in the organization in total, it would decrease the feeling of anonymity among

the respondents. However, it turned out that only 3 % fell in the category that was 20 years or younger, and 4% in older than 60. Considering the representativeness of the survey, it would not be valid to make assumptions and conclusions based on these categories, as well as it will be easy for the organization to recognize these respondents. The rest of the employees are divided almost equally between the categories 21-40 years (48%) and 41-60 years (44%).
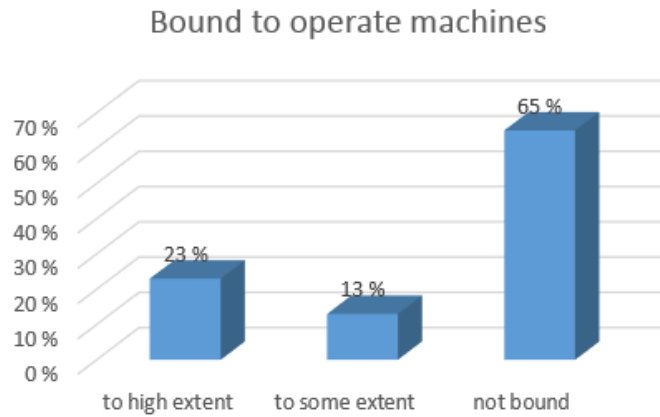
Figure 14: Employees bound to operate machines

The question inquiring about employees feeling of being bound to machines indicates opportunities for variation in their work. 65% of the respondents said that they were not bound to operate machines, while 23% said that they were bound to operate machines to high extent, and 13 % to some extent.

The following diagrams shows the respondents participation in learning circles and A3 problem solving, as well as if they have received Kata training. The same amount of respondents that have participated in learning circles and A3 problem solving (87%). Kata is a relatively new initiative, and we were told that not everybody had received training in this methodology. However, our results show that 47% of the respondents have received Kata training.
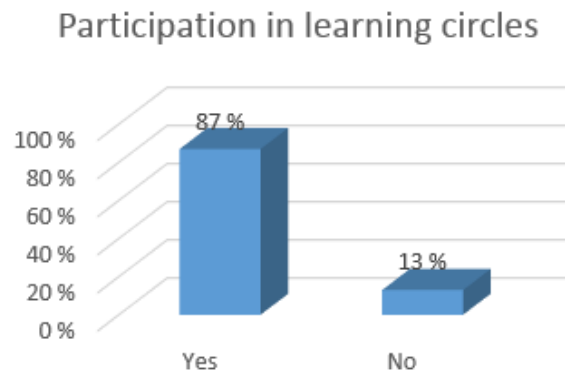
Figure 15: Participation in Learning Circles

Participation in A3 Problem-solving
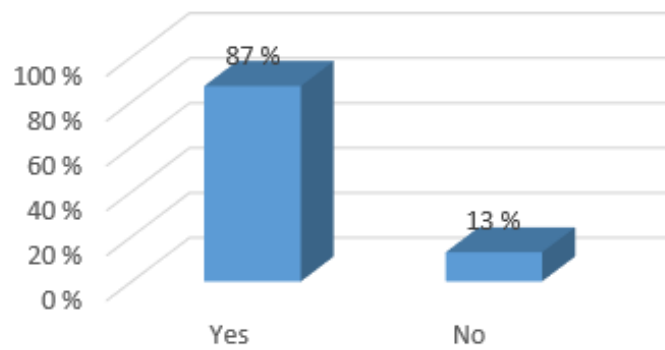
Figure 16: Participation in A3 Problem-Solving
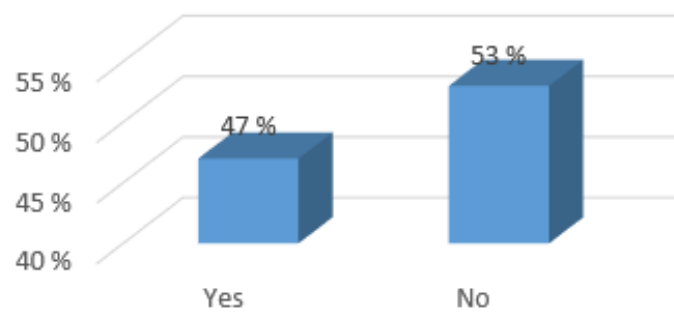
KATA training

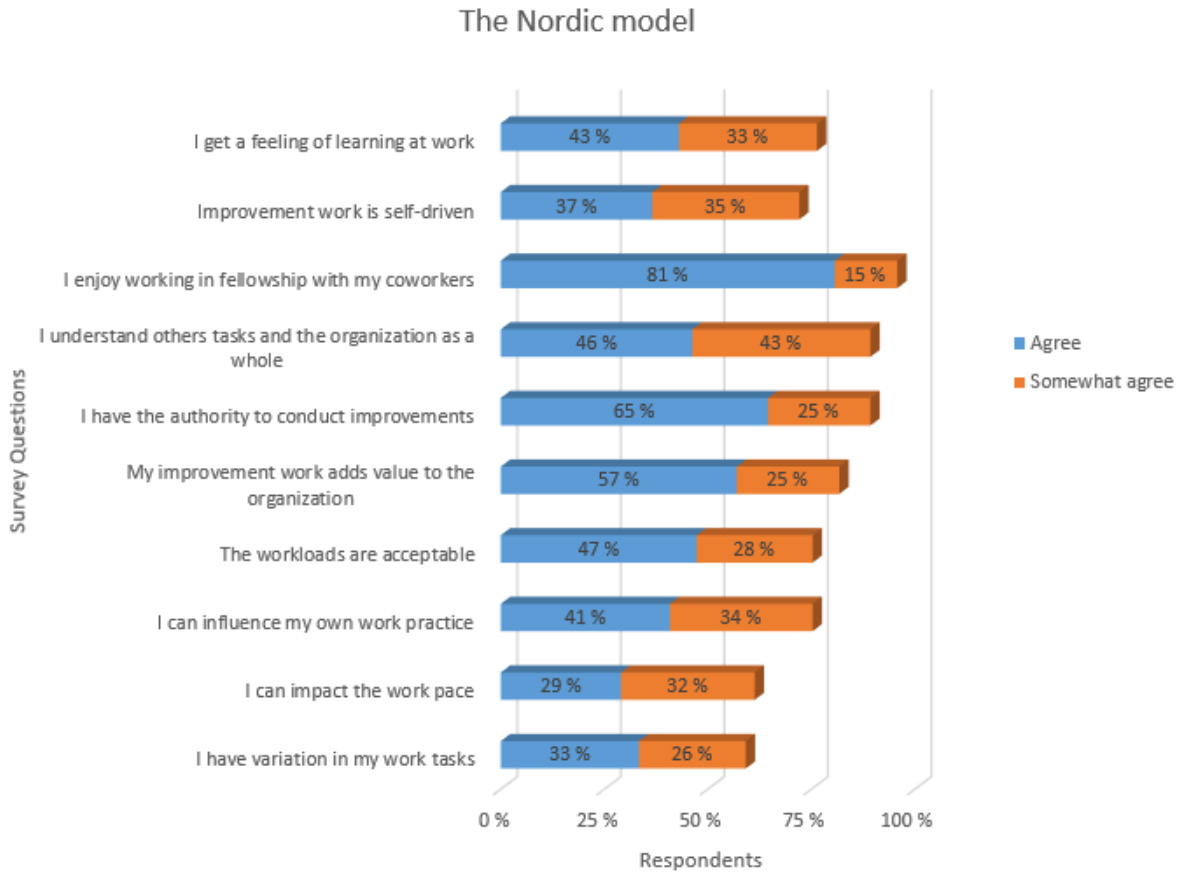*Figure 17: Participation in Kata Training*

Figure 18: The Nordic Model

According to the Nordic model and the concretized questions within, the results show that the employees at Fibo Trespo for most of the claims agrees or somewhat agrees. 81% agreed that they enjoy working in fellowship with coworkers, while 15% somewhat agreed on the same matter. One of the claims that scored low according to elements in the Nordic model was regarding employees' opportunities for variation in work tasks and dictation of work pace. By combining agree and somewhat agree, these two elements scored below 60%. 21% disagreed or somewhat disagreed that they had good opportunities for variation, and 25% disagreed or somewhat disagreed that they could impact the work pace.

The Technical Organizational Learning Environment
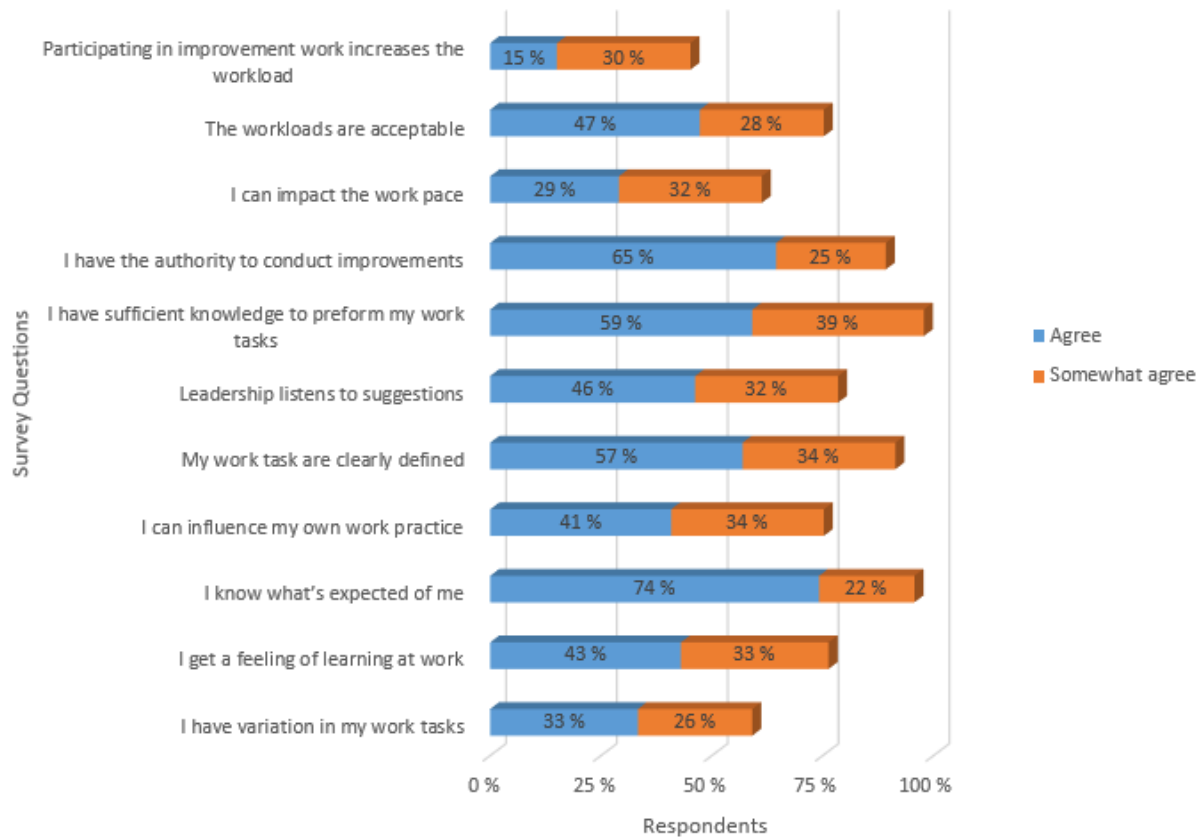
Figure 19: The Technical- Organizational Learning Environment

The technical organizational learning environment include some of the same questions as for the Nordic model, such as the questions regarding variation in work tasks and the ability to dictate work pace. The question regarding increased workloads through participation in improvement work is kind of an opposite measure in this table, and 45% agree or somewhat agree to this claim, 26% neither agree nor disagree, and 29% disagree or somewhat disagree that improvement work increases the workloads.
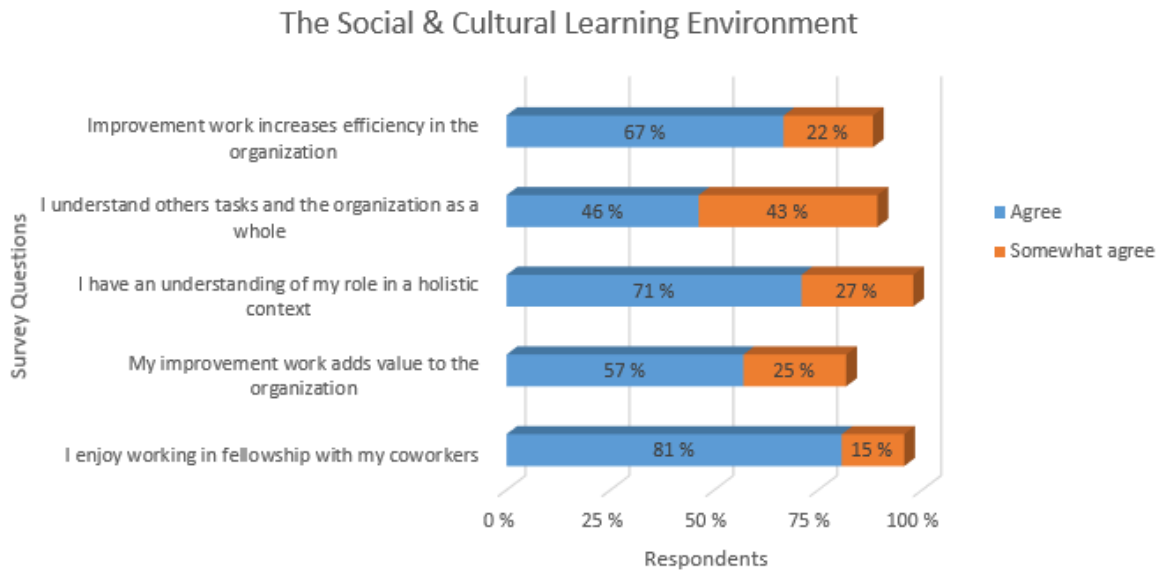
Figure 20: The Social & Cultural Learning Environment

The overall results in questions regarding Illeris' social and cultural learning environment are positive, and all of the questions score above 80% with agree or somwhat agree combined. The lowest scoring measure in this category concerns employees' perception of whether or not the improvement work adds value to the organization, but 82% still agree or somewhat agree that it does.
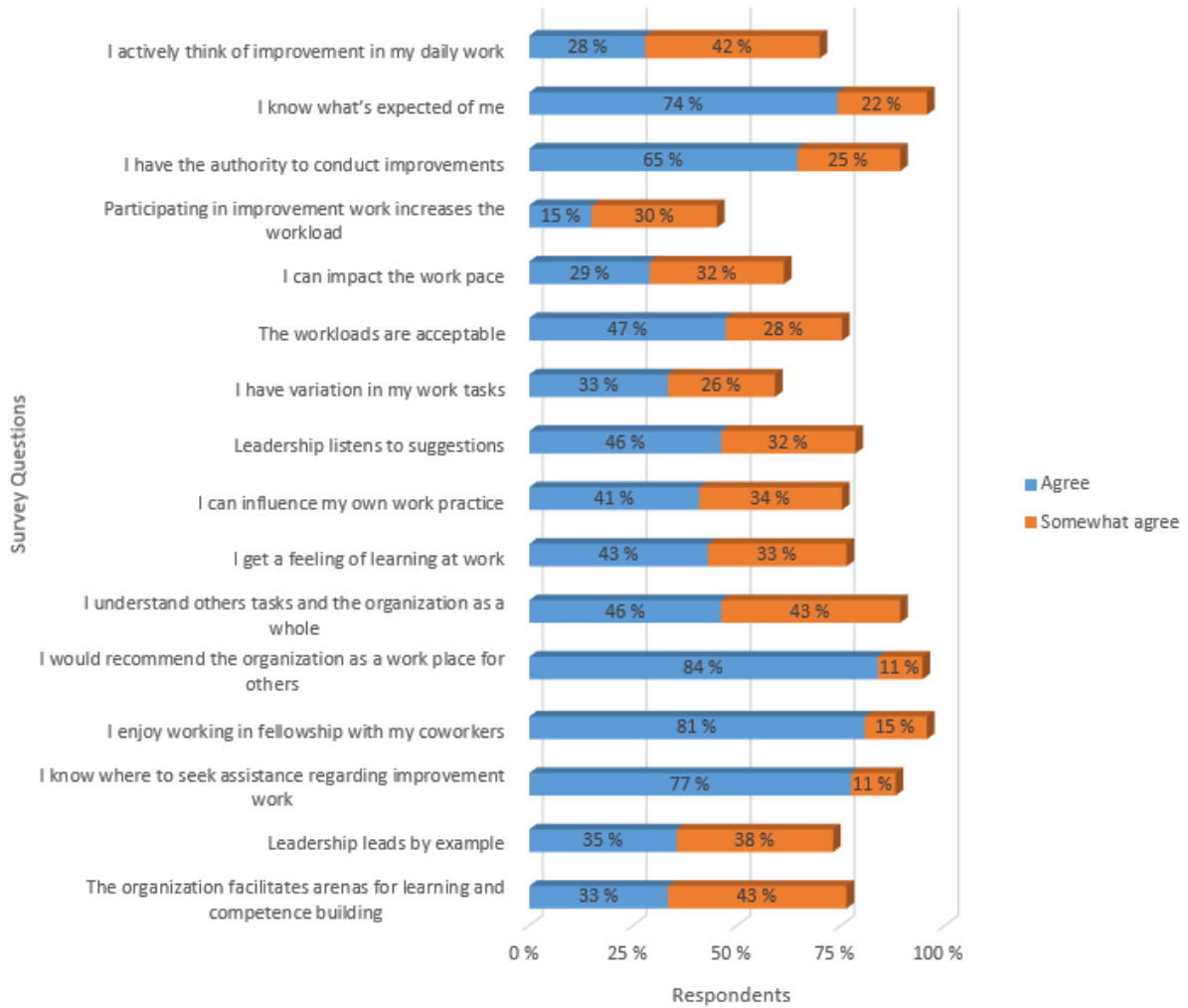
Motivation (Herzberg)

Figure 21: Herzberg's Motivation Theory

A lot of the factors from other theoretical categories is included in Herzberg's motivation theory. Overall the results are positive. However, the claims regarding variation and workpace once again scores relatively low as well as a fair amount of the respondents agree or somewhat agree that participating in improvement work increases the workload.

Employee's opportunities for variation in work combined with whether or not they are bound to operate machines
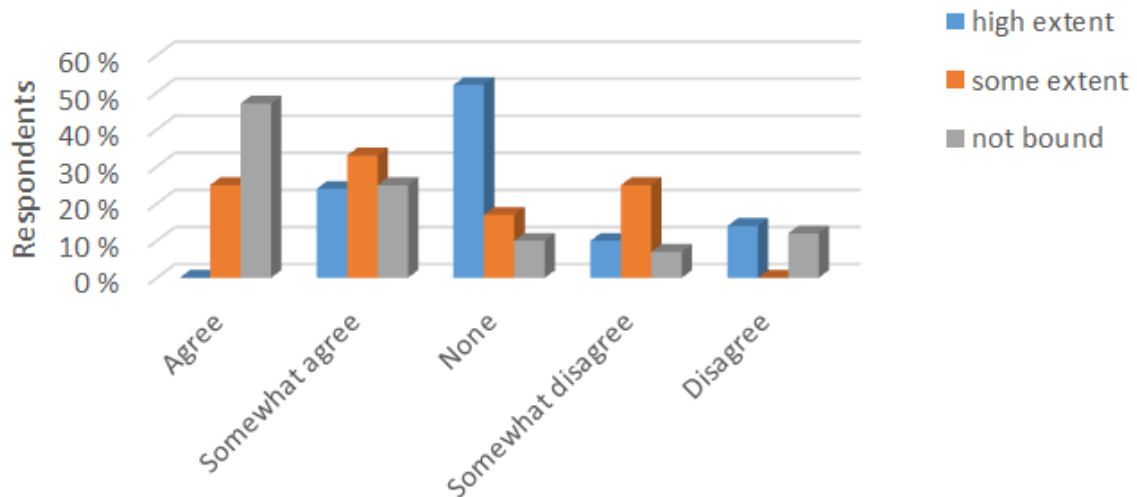
Figure 22: Employee's Opportunities for Variation in Work combined with whether or not they are bound to operate machines

An interesting measure is to see if whether or not respondents that are bound to operate machines have more or less opportunities for variation in their work. As we see from figure 22, zero respondents that are highly bound to operate machines agree that they have variation in their work, while 24% somewhat agree, 52% neither agree nor disagree, 10% somewhat disagree, and 14% disagree. Among the respondents that to some extent are bound to operate machines, we see a more equal distribution, even though zero percent disagree that they have variation in their work. The respondents who are not bound to operate machines seem to have a higher feeling of variation in their work, which is natural. 47% of these respondents agree that they have great variation in their work.

Employee's opportunities to impact work pace combined with whether or not they are bound to operate machines
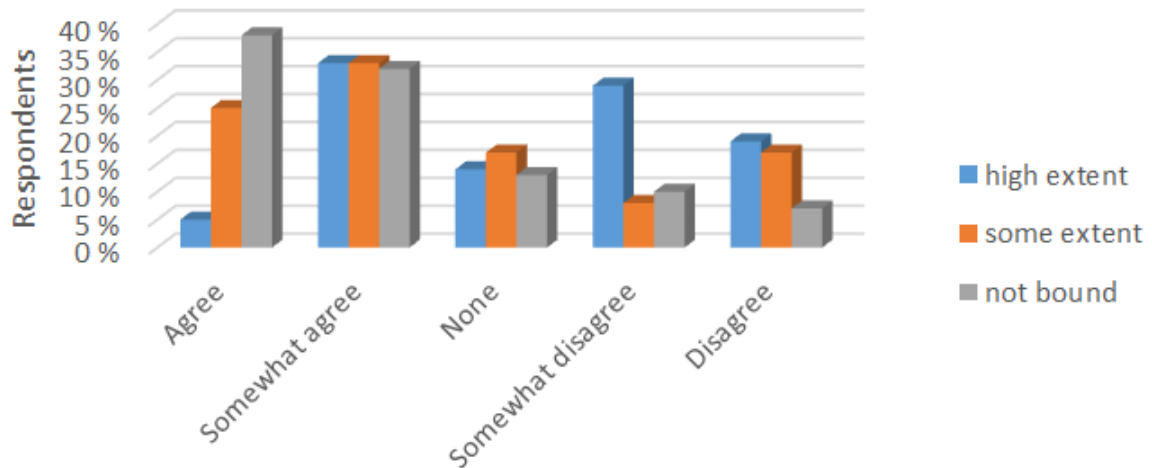

Figure 23: Employee's Opportunities to Impact work pace combined with whether or not they are bound to operate machines

By combining the respondent's opportunities to dictate their own work pace, with how bound they are to operate machines, we see an even higher correlation. Among those who are highly bund to operate machines, 38% agree or somewhat agree that they can dictate their own work pace, while 48% either disagree or somewhat disagree. Among those who are not bound to operate machines, 70% agree or somewhat agree that they can dictate their own work pace, while only 17% disagree or somewhat disagree.

In both these situations it is necessary to mention that the amount of respondents that claimed to be highly bound to operate machines was 23%, those who are bound to some extent was 13%, and those who are not bound to operate machines was 65% of the respondents. See figure14.

7. ANALYSIS, DESIGN, AND VERIFICATION OF THE CONSTRUCTS

In this chapter a construct is presented based on the results of the engagement survey and open interviews. The purpose of the construct is to increase employee engagement in continuous improvement work at Fibo-Trespo. The main parts of the construct rely on making alterations in the competence system; more specifically changes in the existent framework for rewards and recognition. Furthermore, we will present a discussion based on both qualitative and quantitative data. Positive results will be discussed and presented, as they are of great importance. However, to be able to present a construct, in form of a list of suggested changes, the areas where we have found room for improvement must be emphasized. Towards the end of the chapter the construct is presented in a table, followed by a more detailed explanation of the measures.

Our observations and experience with the organization through the exploratory phase, gave the idea to conduct a survey that would map the organizations approach to lean continuous improvement. From the open interviews, meetings with our informant within the organization, as well as input from our academic supervisor, we also decided to measure the level of engagement. Firstly, because the level of engagement will determine how much employees are willing to give in their roles, when working on lean continuous improvement. Second, because a concretization of theory in relevance to engagement, would make us able to relate questions to different theories. To elaborate this would make us able to see what areas that the organization has succeeded in establishing a framework that leads to engagement, and also what areas that might be improved. However, our intention was never to reveal low levels of engagement, but shed light to the areas with lower engagement levels. In fact, our expectations of engagement among employees were relatively high even before conducting the survey. But in line with the ideas of the lean methodology, there is always room for improvement.

The organization has showed early on that working in improvements is part of the daily routine at Fibo-Trespo. Several operators have stated that they think differently, now than before, when they are operating machines. During inspections at Fibo-Trespo operators demonstrated their knowledge regarding various lean tools and performance metrics hanging on each department board, by providing comprehensive explanations. The fact that operators were able to explain the purpose of metrics and tools and how often they were updated, indicates that they possess sufficient knowledge to make these tools and metrics vital and valuable. From our perspective these experiences gave reason to believe that engagement levels were high.

It must be considered that lean continuous improvement work provides variation and the opportunity to change work routines. Operators explained that they work on improvements when time is available, or when time is devoted. Meaning, that work related to lean continuous improvement, serve as a break away from regular tasks. This can affect the results, as

engagement might be higher towards continuous improvement work, than regular work. In other words, it was not unexpected to see good results in terms of engagement in lean continuous improvement.

The response rate of 87%, must be considered high, and can by itself tell us something about the level of engagement within the organization. The approach of printing out copies must be considered a successful way to reach as many respondents as possible. The management at Fibo-Trespo feared a low response rate if the survey were to be conducted electronically, because of a limited number of computers and high variation in computer skills. No incentives were given for participation. The high response rate increases validity in data, and secures that the data reflect a holistic view of the organization, and not just a sample.

An Overview of Survey Results

From theory we know that engaged employees offer the most of themselves in their roles at work, and that in the other end of the scale we find the "burned out" employee that is disengaged at work.

The survey results show a high level of engagement and that employees at Fibo-Trespo give a lot of themselves in their roles in improvement work. Overall results from the survey show that, the workforce at Fibo-Trespo takes great pride in working on continuously improving. The opportunity to improve their own and others work routines and practices, has been embraced. Working on 5S improvements, standardization, and operator-controlled maintenance has become embedded in the culture at Fibo-Trespo.

From a theoretical standpoint and from the organizations own standpoint, it is acknowledged that Fibo-Trespo is still at the beginning of their lean journey. However, compared to other organizations, it is safe to conclude that Fibo-Trespo is one of the more experienced lean production organizations in the Norwegian industry. In 2014 the organization won "Kompetanseprisen" for the level of competence within the organization.

In the survey the initial questions categorize employees by age, participation in various learning initiatives, and whether or not they are bound to operate machines. The main questions capture the different aspects of engagement towards improvement work. When structuring the survey results by age, participation, and years of employment, the data is very consistent. In other words, there are no distinct differences in engagement, between the different intervals of age. Furthermore, answers grouped by participation and years of employment, does not show any interesting trends. This indicates that the organization has succeeded in involving and has achieved broad participation from the workforce. More specifically, there are no indications that one group of employees show any particular resistance, or significantly higher levels of engagement.

It is important to keep in mind that an engagement survey might be answered, only by the engaged. On the contrary, the response rate tells another story. The main questions are built on and relates to several different aspects that ground in theory. A lower level of agreement in several questions related to the same theory, would suggest an area to further investigate. The results show a high level of satisfaction among workers in most of the areas covered by the survey. In the next subsections the results will be discussed in further detail.

7.1   Analysis

In figure 20, results from the survey questions in relation to the social & cultural learning environment are displayed. The results are highly positive, and show that the organization has succeeded in establishing good norms, traditions, and values. Additionally it reflects that employees have a common understanding, and that a culture for improving has anchored in the organization. The consistency in answers across the different employee segments underpins the common understanding and shared visions. From observations and second hand sources, we have reason to believe that the organization has succeeded in preserving the personal and social relations in continuous improvement. Most of the improvement work at Fibo-Trespo is done through teamwork, or by individuals collaborating with others. Furthermore, several initiatives have been launched to create an environment where people thrive together. Visits to other best practice organizations, dinners, breakfast for the operators made by leaders, and several joint learning initiatives are some of the initiatives that create a community. In open interviews several employees have stated that if they have an idea for arrangements, managements response will often be very positive, in terms of funding and supporting the arrangement. Additionally, the response on questions related to meaningfulness and worker perception of their work, is consistently positive. Looking at the survey alone, answers suggest that that the employees see the value that improvement work generates for the organization.

The consistency of results from the survey, and the previously discussed common understanding, is strengthened by what we have learned through observations and interviews. As mentioned, one of the first factors that captured our interest was the fact that people with various backgrounds, from different departments, and from different levels of the organization had a common understanding of work regarding continuous improvement. However, the depth of knowledge is variable, but the insight usually covers the necessary for the given role. During observation managers asked their operators to explain every piece of information on the white board at their department. Several operators explained not only how standards and metrics worked, but also the purpose of these.

During interviews, learning/training initiatives were discussed. People were mainly satisfied, but would want refreshment sessions within certain methods and tools. Through open interviews the Kata problem-solving method was mentioned, a method that is not even implemented to its full extent, but still every person interviewed had knowledge of what the concept entails, showing that employees are interested and curious to learn more about lean and

continuous improvement. However, there were a few areas with less agreement or different opinions, often in relation to general improvements.

In survey questions that relate to learning and knowledge the results are positive, and reflect what we have experienced through observation and interviews. The framework to develop skills among the workforce is unquestionably one of the organizations main strengths. The different learning initiatives are many, and often quite extensive.

Special focus must be directed towards the reading circles and learning circles, as representatives from all levels of the company participate in them. The experienced consistency in opinions and common understanding of methods and theories can partially be anchored in these learning initiatives. In addition the 87% of the respondents have participated in the learning circles, which must be considered a good result. From Illeris' (2012) model, Learning in Working Life, it is clear that the outcome of the learning process is at its highest in the area where the fellowship and the individual's work identity meet. Through learning and reading circles employees must first acquire their understanding of the subject on an individual level, before discussions and briefings are held jointly. The reading and learning circles is part of the preparation for implementation of different initiatives. It is an arena to ask questions and receive answers, and it often involves all parts of the organization. Managers and leaders will assure a common understanding of the subject, and possible problems and obstacles will be discussed. With this practice theory is taken apart, translated, and put into the right context. Members of management have stated that their goal is to make the philosophy their own, not only to reduce the resistance for the unknown, but to promote pride and ownership to the philosophy. To seek ownership and change the management system to fit the relevant organization is an important factor, according to (Johnstad et al., 2012). Additionally, it needs to be emphasized in order to meet the Norwegian culture and existent norms.

However, from interviews we experienced that several managers, leaders, and operators had stated that refreshment sessions and increasing frequency of different learning initiatives would be beneficial. Training and reestablishing focus on the 5S method has been requested from a department leader, which has also led to the launch of one A3 within every department, on how to improve within 5S improvement work. A department leader stated the following:

"It is necessary to refresh knowledge on the simple methods within lean, because some people don't understand what 5S consist of anymore".

Furthermore, a member of management stated that:

"It is a very long time since certain operators received their training, I wish we were more frequent".

The fact that several employees have requested training within the same area is an indication that several employees do not remember initial training. This might affect several aspects like meaningfulness and the ability to conduct valuable improvements.

However, these statements also indicate that the framework to conduct the needed training already exists, but the focus of the organization is directed towards other training initiatives. The process of learning and developing knowledge is represented several theories that this thesis builds upon, and must be emphasized for several reasons. The earlier contributions on engagement from psychological studies, point to the cognitive element. Furthermore, The Nordic model's focus on learning, tells us that it must be emphasized in Nordic countries. The Norwegian Working Environment underpins the focus on organizing the workplace and facilitating a process that supports learning on daily basis.

Lean critical thinkers argue that lean might intensify and create a stressful environment at work. This must be considered when facilitating for learning in the organization. From what we have experienced several operators have been known to avoid working on improvements. Results from the survey also indicate that participation in continuous improvement work increases the workload, as much as 45% agree or somewhat agree on this question. In the technical-organizational learning environment, Illeris' (2012) points to the work pace and intensity of tasks, as a factor that can prevent learning. On the contrary employees must also feel challenged. A combination will spark the learning process, as the participator is forced to experiment and utilize problem-solving techniques.

There seems to a broad consensus regarding questions related to what is expected of each employee, and each employee's understanding of co-workers routines. Furthermore, the workforce seems to agree that they understand how their roles affect the organization in a holistic context. Answers within these questions received 87% agreed or somewhat agreed, which can be considered a broad level of agreement. From Hezberg's (1959) two-factor theory it is clear that responsibility and expectations are important factor to intrinsically motivate employees.

During observations we witnessed the use of visual tools in the facility. At Fibo-Trespo walls and boards are filled with information that operators are familiar with. Standards on how to perform every role at any station along the production line are kept up to date. Meaning that operators from other departments might step in to perform a job according to these standards, on occasions where a member of a team is absent.

The sociological agenda places the power to make decisions with the performer of the task. In the lean philosophy, teams are often understood to be self-managed, but Shimizu (2004) points out that only 10% of all improvement activities are led by operators, or carried out by self-managed teams. At Fibo-Trespo the power is to make decisions are placed in between these two standpoints. When working on general improvements operators and team leaders stand free

to make decisions, as long as the costs do not exceed kr.10.000. We believe that a balance is present at Fibo-Trespo, were operators are trusted to make decisions, but often facilitated and guided towards the answer. From questions regarding an employee's perception on improvement work being self-driven, and whether or not they have the authority to conduct improvements, answers showed a high level of agreement. We believe that employees at Fibo-Trespo experience the self-actualization that is major intrinsic motivational factor. Equally important, when improvements and the proposed measures prove significance, employees will experience burst of self-esteem. By letting employees make decisions, they will also feel valuable in a bigger context, as their work will benefit the organization.

Within the lean philosophy the visibility of management is emphasized. At Fibo-Trespo a lot of the communication happens on the shop floor, and through the 24-hour meetings.

Among managers, one position is a dedicated lean coach. The lean coach at Fibo-Trespo has many responsibilities like leading training initiatives, projects, and serves as coach on A3's. The role also involves being the lean expert internally. However, if the lean coach is in need of assistance or advice, an external lean consultant is also present one day each week. From our experience managers and leaders at Fibo-Trespo all have hands on experience, and has been with the organization for a long time. Managers have office time, but prefer working close to operators at the shop floor. When asked if leaders lead by example, the survey results showed a high level of agreement. Arguably, a visual management has become a major part of the organizations way of leading.

The results from the survey, points to questions in relation to The Technical- Organizational Learning Environment and The Nordic Model, as areas with less agreement. More specifically, the questions showing shared opinions are in relation to variation in work and the work pace. Under 60% of the respondents agree or somewhat agree that they experience variation or are able to dictate work pace. When discussing this matter it must be considered that Fibo-Trespo's main focus is running a streamlined production system. Therefore, operators will at many times be bound to operate machines in order for production to run smoothly. The survey results from figure 22 underpin the correlation between being bound to machines and experiencing a lack of variation. However, as much as 65% answered that they are not bound.

From observations and open interviews it is clear that a system to fulfill the need for variation clearly exist, but the system has no exact procedure or standard, that is known to us. It seems to be a wanted practice that every operator, including team leaders, will rotate on each role during a shift. However, several employees have expressed their concerns with the practice not always being followed, and that employees will override this practice. At each station along the production line, certain roles must be filled, for that station to perform its tasks. The different roles at each station have a variable amount of variation, and some roles will be more monotonous than others. By rotation, every operator spends a certain amount of time at each role, and will eventually run through every role. Some employees may prefer certain roles, and

in the interviews it became clear that within most teams a complete rotation is practiced. However, some employees also stated that a full rotation was not necessarily the practice. In Herzberg's (1959) two-factor theory the job enrichment is a critical factor, and it is from production industry people came to know about mindless and repeatable tasks. Securing rotation, providing a social environment, and establish ownership relation to a subdivision, instead of a locked position becomes essential, to ultimately engage employees. Workers that understand different roles and are able to see the internal customer and supplier relations are more likely to perform.

The mixed answers in ability to dictate work pace from the survey results are also reflected through the data collected in the open interviews. A member of management said:

"We have experience with the tough days here at Fibo, depending on the production levels"

The rate of production will vary a lot, depending on peaks during the year. Managers are able to predict the level of production, but because of the variation from time to time, there is also the challenge of leveling production to create a more stable production rate. Meaning that some periods will leave less time to work on improvements. This also reflects that the only possible resource scarcity we could see, that could prevent improvement work, is time. Several operators has also pointed out that missing one person at the shift during busy times, will change the work routines. Furthermore a department leader sates that:

"Sometimes I see mediocre efforts, but I believe there is a balance between work pace and satisfaction"

During times of high production level, employees might not be at the same level of engagement in their improvement work. If time becomes a resource scarcity, time is not necessarily devoted to work on improvements, meaning that employees must compensate in order to be able to work on improvements, which then can be considered extra labor. From the survey, 45% answered that they agree or somewhat agree that participation in lean improvement work increases the workload, which underpins the previous point. According to Illeris (2012), there is little room for learning if the work demands high pace and intensity.

 Another point made by an operator:

"*Through the competence system we have experienced more variation*"

This statement points in another direction, and indicates that providing variation for the employees and building a more rigid framework for rotation is currently being focused by management. The competence system promotes development of interdisciplinary skills, and system thinking.

General Improvements and the Competence System

The following section seeks to address some of the problems with general improvements, rewards and recognition, and how it affects the competence system.

General improvements are from our experience emphasized in several settings at Fibo-Trespo. It is a metric for overall performance of the workforce, referred to in several settings. Additionally employees depend on general improvements to be able to advance in the competence system. The main problem is that there are no exact guidelines or requirements towards general improvements that employees can relate to. No limitations, is from one standpoint positive, as it lets the workforce look for improvements wherever and however they want to. Several employees state that:

"*I stand free to decide what to improve. If I feel that it is an improvement, then it is*".

We believe that this approach has served the organization well in establishing a culture for improvements. Operators have learned how to look for improvements, how to solve problems, and it has become a way of thinking. From table 21 in the survey, we can see that as much as 70% agree or somewhat agree that they think about improvement work daily. On the contrary, evidence from interviews also suggests that improvements does not always generate the wanted value, or possess the needed meaningfulness to engage all workers. A leader stated that:

"*Some doesn't even care about improvements, it almost seems like they want to sabotage*".

Furthermore, a leader explained that:

"*One person can conduct all improvements on a team, and the whole team will still be rewarded*"

The question remains, if there is lack of understanding among some employees, which makes it challenging to constantly identify new areas to improve. Another possible explanation is that improvements are done to retrieve rewards and recognition, rather than for the gains from the actual improvement. According to Griggs (2010), there is a balance of intrinsic and extrinsic motivation. When performing the task itself feels rewarding, intrinsic motivation is high. Griggs (2010) also argues that extensive rewards and prices can take the focus away from peoples original intentions. From interviews it became clear that operators list improvements on others in order for the team to receive rewards, meaning that some of the operators will conduct improvements mainly to receive the reward. This is a specific indication that the existent framework does not work, and paints a false picture on the actual performance in each team. Furthermore, it means that several operators look for improvements on the wrong basis. Operators will be looking for areas to improve towards the end of the month when rewards are given. This might result in improvements with less value and meaningfulness.

At the start of the lean journey, the general improvements made great impact, and a lot of improvements still do. That aside, a valid point is that if general improvements mainly revolve around 5S, progress will eventually decline. The number of improvements has not declined, but the quality and content of general improvements are at least more variable.

General improvements must be considered one of the most important factors of rewards and recognition. But we have to separate between rewards given to teams that manage to conduct their number of improvements, and rewards given through the competence system. Teams receive dinners, trips, and visits to best practice organizations. These are rewards that does not cost too much, and appeals to several factors in the social cultural learning environment. From these more symbolic rewards the organization can build stronger teams in line with the ways of the TPS. The right balance between intrinsic motivation and extrinsic motivation are with this form of rewards, more likely to be preserved. Although, several incidents suggest otherwise, as people pin improvements on other team members to receive rewards.

The competence system is used to map employees individually, and will therefore also reward individually. Meaning that the amount of general improvements per person plays an important role, and is in fact necessary to advance and achieve a higher pay grade. It is with the current practice possible for employees to pin improvements to others, which might affect their pay grade. However, employees also have to reach a certain amount of improvements to remain on the current pay grade. Rewarding on behalf on individual performance is by itself not emphasized within the lean methodology. However, the competence system is, like The Nordic Model, created through collaboration between two parts. Worker unions will preserve the employee's rights and needs, while management will preserve the organizations values. Through interviews employees stated that they value the competence system, and see it as an opportunity to request both variation and learning. From a theoretical standpoint, the system takes into account, a crucial point within employee engagement. Namely, that the employees are profiled on an individual basis, and it is apparent that not all employees are motivated or satisfied by the same factors.

At Fibo-Trespo, like many other organizations, it is natural for management to focus on developing employees that show special interest and ask for more. In other words, employees that request training and pursue an act of self-actualization are also likely to be the ones that are more engaged. Therefor it is important to consider that by developing the ones that are already engaged, the gap between the less engaged and the more engaged will become more evident. On the contrary, Fibo-Trespo has focused the development of leaders, as in middle management. Leaders are at Fibo-Trespo, the strong link between management and operators. These leaders are regular operators that have shown more interest in learning about lean. In other words, they are the more engaged employees. Strong leaders that are present at the shop floor at all times, has proven to increase engagement among operators.

Evaluation of Methods for Lean Continuous Improvement

Through our analysis of Fibo-Trespo's approach to improvement work, it is possible to compare the different methods for continuous improvements, with a focus on how they might affect employee engagement. A common factor for the three different methods is that they all contain some form of gradual improvement. When comparing these methods it is important to keep in mind that other organizations might have different ways of practicing these methods. Even internally, the approach to A3 might vary among teams.

A general improvement is by itself a gradual improvement, or a small innovative step in the right direction. Several general improvements will set the organization in a better position, assuming they generate value to some extent.

A3 is a more complex problem solving practice, which relies on several gradual improvements, to eventually solve a bigger and more complex problem. A3 relies on several PDCA cycles. Management has stated that A3's often tend to run for long periods of time, and has several times resulted in a loss of focus. Often problems become too extensive to solve, when the team only meet once a week to work on the A3. Furthermore, the members and leader of a team often design an A3, with less involvement from management, meaning that the basis for knowledge resides within the team.

At Fibo-Trespo the Improvement Kata is a problem solving practice, much like A3. In addition, the Improvement Kata takes the organizational strategy into account, and provides a direction for the problem solving practice. In contrast to A3, the Improvement Kata will consist of daily sessions, to keep the pressure and prevent that focus will get lost. Another essential point is that the Improvement Kata is a top-down problem solving practice, whereas A3 is a bottom-up approach. To elaborate, the members of the team will fill out an A3 sheet, because of their proximity to the problem. Furthermore, the team often identifies the problem and will be held responsible for working on the problem. In contrast, the Improvement Kata starts at the top of the organization. Management has identified a vision or overall challenge that operators down at the process level must relate to.

In terms of engaging employees the lean culture seeks to challenge and involve employees in decision making, to create the self-actualization and build confidence. It must be emphasized that the Improvement Kata preserves these values, to a greater extent than general improvements. Our findings suggest that general improvements have in several incidents been related to problems that are easy to deal with. In other words, employees identify the problem, but can also immediately see the solution. If the solution to a problem is obvious, working to solve it generates less intrinsic motivation, which leads to less engagement.

Continuous improvement or gradual improvements can lead to bigger innovation where new knowledge is created. However, it can be argued that these gradual improvements must be directed towards the same problem in order to collectively form an innovation. From this

standpoint, general improvements can only be labeled as an innovation if the improvement is extensive enough. Innovation leads to development of new knowledge, and is more likely to happen, using A3 or Kata as method for continuous improvement.

Through Kata and A3 employees experience learning that takes place through the social process, when coworkers can discuss, reflect, and exchange ideas. However, Kata is different from A3, because of the coach and student relation. Schön (1987) says that the interaction between a more experienced coach and the student will stimulate a reflection-in-action that can lead to learning. Through Kata, coaching sessions will take place on a daily basis.

Eventually Kata is meant to replace A3 as problem solving method. Kata can be considered a more advanced problem solving method that will preserve the values of A3. From our assessment of the organization and the different methods for continuous improvement, we believe that this is definitely a step in the right direction. By aligning improvement work with strategy to a greater extent with the Kata chain, the meaningfulness and value of improvements will increase. Arguably this can lead to higher levels of engagement among employees. However, management must assure that focus is not drawn away from general improvements. We believe that general improvements are a smart and elegant way of placing the power to decide in hands of the operator. It reflects the flat organizational structure, where employees have the opportunity to predispose work and make improvements affecting their own work routine. With low requirements towards improvements, the organization has secured broad involvement from employees. A culture of improvement has anchored and employees have become good problem solvers, which serve as a good basis for implementing more purposeful improvement methods.
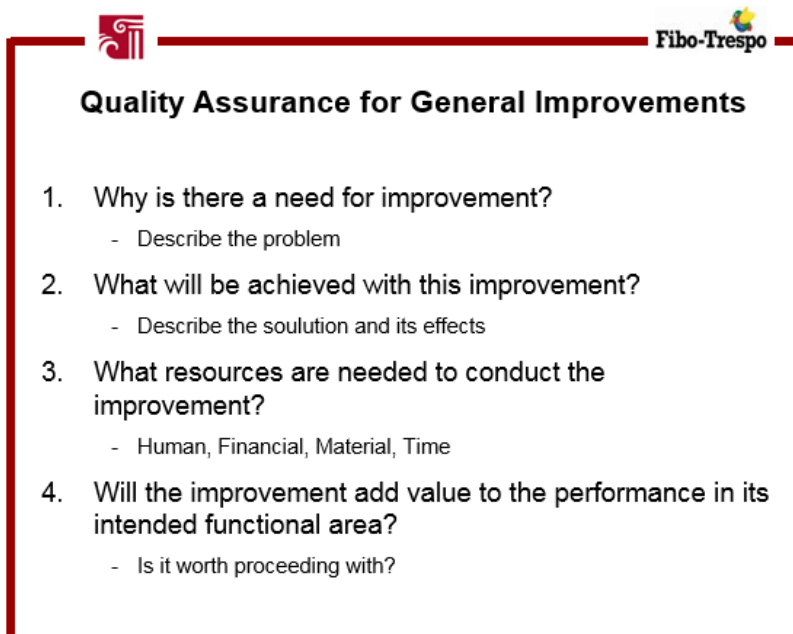
7.2   The Constructs

As mentioned earlier in the thesis, the presented construct consists of a list of recommendations or improvements in order to engage Fibo-Trespo's employees in lean continuous improvement. Based on analysis and inferences from section 7.1, four measures are included in the presented construct. Two of the recommendations suggest concrete measures that we believe will indirectly increase employee engagement in lean continuous improvement, based on theory and case material. The two remaining aspects of the construct are suggestions directed towards Fibo-Trespo's management regarding possible initiatives that can be initiated.

Our proposed solution to the problem regarding general improvements, include a quality assurance practice. This practice consist of a simple card with reflective questions that aims at creating awareness towards general improvements, and secure that all improvements serves the purpose of improving the current situation, thus add value to employees and the performance of the organization. It is important to maintain employees' freedom and authority to conduct general improvements. The quality assurance practice does not take this authority away from the employee, but intend to make employees think about the value and meaning of the

improvements by taking time to reflect upon why the improvement is necessary and how it improves the current situation, as well as what it takes to conduct it. The way the practice works, is that the initiator of any given improvement seeks an accomplice within the team and presents the improvement proposal. The initiator will present the improvement and defend it up against the questions at the card. Meaning that the other employee possess the role of quality controller, and will ask the questions listed at the card. Through reflection they will determine if the improvement is valid, or of such value that it can be considered a general improvement. Upon agreement, the initiator can plot the improvement into the system for general improvements. If the quality controller does not approve, changes can be proposed or the improvement might also be rejected.

In figure 24, an English version of the quality assurance card is presented. The original Norwegian version can be found in Appendix 10.3. In turn, we believe that this card could increase employees' engagement towards lean continuous improvement because they will learn to see the value of the improvements and the meaningfulness of their work. According to Illeris (2012), meaningful work is one of the keys to facilitate an organizational technical learning environment.

Quality Assurance for General Improvements

1. Why is there a need for improvement?
   - Describe the problem

2. What will be achieved with this improvement?
   - Describe the soulution and its effects

3. What resources are needed to conduct the improvement?
   - Human, Financial, Material, Time

4. Will the improvement add value to the performance in its intended functional area?
   - Is it worth proceeding with?

Figure 24: Quality Assurance Card for General Improvements

Our second recommendation in the construct is a change in the competence system at Fibo-Trespo. As discussed, employees depend upon a certain number of general improvements in the current competence system. With the current framework each level of competence contains a demand for general improvements, along with several other factors. Because there is nothing that defines the general improvements, our suggestion is to remove number of improvements from each level in the competence system. As pointed out in section 7.1, general improvements

can sometimes be dishonest in terms of who conducts them. Providing pay raise on such uncertain measures can create a falsified picture of the competence among the employees. It is important to remember that there are several other good measures in the competence system, and people that have reached higher level of competence, are most likely qualified. However, altering the organization's basis for assessing employees, by removing an uncertain and to some extent falsified indicator of employee performance, can help ensure that general improvements are conducted on the right premises, and not because of personal or financial gain. We are not saying that financial rewards are the reason why all employees at Fibo-Trespo conduct improvements, but our interview findings indicate that some employees think more about the rewards than the improvements themselves. We believe that this recommendation, in addition to the previous one, will increase the value of the improvements and at the same time it can help increase intrinsic motivation, as employees see the meaning of conducting improvements rather than the reward associated with it (Griggs, 2010). Thus, increase employee engagement towards lean continuous improvement.

Further, we would recommend that Fibo-Trespo's teams should develop their own proper standard for rotation during their shifts. The survey showed that Fibo-Trespo's employees was least satisfied with the workloads, variation in work tasks, and ability to dictate work pace, which according to Herzberg (1959) and his categorization of motivation in the work place is a part of the hygiene factors. High pace monotonous work is not optimal for engaging employees as it takes away their opportunities for self-realization and self-development. However, the ability to affect work routines are preserved by the Working Environment Act in Norway.

Through findings, we discovered that there was variance between teams when it comes to rotation. Some teams have good practices for rotation, while others do not. Our survey also shows a clear connection between those who are bound to operate machines and those who disagreed or somewhat disagreed that dictation of work pace and variation in work was satisfactory. A proper rotation standard for every team can provide more variation in work tasks, as well as better opportunity to dictate work pace. More specifically, our suggestion is that team members get together in fellowship to develop the rotation standard themselves. Through discussion, they can agree upon a rotation standard that satisfies the members of the team as good as possible. Variation in work tasks and less monotonous work can increase the employees' dedication and engagement towards lean continuous improvement as it influences the ability to learn at work (Illeris, 2012).

Finally, we would recommend repetition of certain learning initiatives, as it is important to not forget the initial lean methods and keep the momentum going. Even though the organization has come a long way in changing the culture and have moved forward by implementing A3 and now Kata, it is important to not lose focus on the basic elements of 5S, Standardization, Operator controlled maintenance, and SMED. It is all about anchoring the culture of improvement and constantly trying to engage people in the process of lean continuous improvement. From interviews, we see that some of the employees at Fibo-Trespo think it is

time to refresh these elements. The survey also shows that some employees (13%) have not participated in learning circles. If management arranges one or several seminars, where the initial lean methods and tools are being relearned and refreshed, employees can feel more comfortable and confident in their improvement work. Illeris (2012) states that facilitating a learning environment at work can increase employees' ability to involve themselves.

A summary of the construct is presented in table 9.

CONSTRUCTS		
Measures	**Content**	**Results**
Quality assurance practice for general improvements.	A card that includes reflective questions to assure quality in general improvements. Utilized in a dialog between initiator and an accomplice.	Secure a level of value and meaningfulness in all general improvements. Avoid and prevent unnecessary and dishonest improvement initiatives.
Changing the competence system.	Removing numerical quotas for general improvements in each level of the competence system.	Altering the organization's basis for assessing employees, by removing a false indicator of employee performance. Ensures that general improvements are conducted on the right premises.
A recommendation to develop a proper standard for rotation within teams.	In fellowship, each team develops a rotation practice that reflects agreement among the members.	Secure that every team utilizes a rotation practice that ensures variation in work.
A recommendation to refresh knowledge within initial lean methods and tools.	Management arranges a seminar where employees have the opportunity to refresh their knowledge within initial lean tools and methods such as Operator controlled maintenance 5S Standardization SMED	Increases employees' ability to conduct more valuable and meaningful improvements, by increasing the understanding and knowledge within these methods.

Table 9: The Constructs

Our construct is divided into four recommendations towards increased employee engagement in lean continuous improvement at Fibo-Trespo.

7.3   *Evaluation of the Construct*

As the structure and feasibility of the construct are discussed in the previous chapter, the evaluation seeks determine if the solution actually works or not. At first, we discuss the functioning and relevance of the construct as well as its theoretical contribution to the field

based on our initial study. Further, we present a critical discussion of the construct in order to evaluate its validity. Optimally, we would get the construct tested, but due to limited time and resources, this was not an option. Finally, we utilize the evaluation criteria presented by March and Smith (1995), to evaluate our constructs and research, which include completeness, simplicity, elegance, understandability, ease of use, operationality, efficiency, and generality.

The construct is context specific, meaning that the construct is designed specifically for Fibo-Trespo. The contribution to theory is therefore somewhat limited in terms of generalization. Our construct draws upon elements from lean theory, learning, motivation, and the Nordic model to provide new knowledge to the organization. Our construct does not include a specific model that directly increases employee engagement towards lean continuous improvement, rather a list of recommendations to the organization, including initiatives that base on theory and case data that indirectly can increase engagement. Thus, we provide theoretical contribution in terms of concretizing theoretical elements into survey questions and providing a model for measuring employees' engagement towards lean continuous improvement.

A critical discussion evaluates both negative and positive sides of the constructs. Since our constructs are divided into four different elements, a discussion is provided for each one of them. The quality assurance card is supposed to mitigate problems discussed earlier in this chapter. First, the idea of designing a card came from the elements of Kata, which is known to many of the employees at Fibo-Trespo. Thus, makes it less complicated to implement. At the same time, the card is simple in terms of use and it will only take a couple of minutes to go through the questions and reflect upon the value of the improvement. However, it can be somewhat extensive because it includes the involvement of two employees to get through the quality assurance process. Among our four recommendations, the quality assurance card provides completeness as it is designed as a concrete solution to a problem. In practice, Fibo-Trespo only needs to print the card and start the process of practicing the routine. We also believe that employees will find the card understandable, as the questions on the card is of a simple nature. However, the question regarding if the improvement will add value to its intended functional area can sometimes be hard to answer. This is one of the reasons we decided that two employees should be involved in the process. In the quality assurance phase employees are likely to withdraw knowledge from Kata coaching sessions. Meaning that the employee responsible for assuring quality will take the role of a mentor, and the owner of the improvement must be student. We also believe that the proposed measure is easy to use and it does not require many resources to implement. Since the card requires changes to the existing procedure for conducting improvements, we were skeptical to how it would be received by the employees. Therefore, simplicity was a main goal when developing the card, as its purpose, in turn, is to increase employees' engagement towards lean continuous improvement. There is no guarantee that the initiative will work as intended, but based on theory and data collection, we have reason to believe that it will.

Our recommendation to remove general improvements as a measure and incentive in the competence system with regard to problems discussed earlier is a very simple initiative. It is not certain that every employee will understand the reason behind removing these criteria, especially those who usually conducts many improvements, and they may find this unfair. It is important that the organization explains the reason why they have decided to remove general improvements to all employees, that the quality and value of the improvements are more important than the amount. In turn, we believe that this can help the organization engage its employees because the intention is to shift the focus on general improvements from reward to meaningfulness, which is grounded in theory. The competence system is specifically designed for Fibo-Trespo and their procedures and processes. Thus, generality is limited. Implementation of this recommendation on the other hand, is simple because it involves a minor change, with low complexity. The efficiency of implementing this initiative is uncertain, but based on our sources of evidence and theory, we believe that it will increase the chances of engaging employees in a long term perspective as well as prevent low engagement as a result of focusing on the wrong aspects.

Our third recommendation consists of developing a rotation standard or routine within Fibo-Trespo's teams. This recommendation is not specific, due to the different work tasks that exist within the different teams. This is the reason why we suggest that the members of the teams develop this standard by themselves. Thus, the recommendation lacks completeness. We know that some teams have rotation practices, without any written standards or such. By implementing a self-developed standard, the employees will get more variation and better opportunities to dictate their own work pace, which in turn can increase employee engagement towards lean continuous improvement. The recommendation aligns with the other ones in terms of simplicity and ease of use. We believe that Fibo-Trespo will understand the reason behind this recommendation because of its intention of letting employees influence their own work practice. A self-developed rotation standard will also have some elements of generality as it can be applied elsewhere as well.

Our recommendation to refresh employees' knowledge within the initial lean methods and tools is based on data from our informants and interviews. Initiating such an activity can be an extensive process, as it requires many resources and a great effort by the organization to arrange learning seminars. However, we see this as a prevention-initiative that will claim an immediate effort, but prove useful over time in terms of keeping the momentum up and not forgetting the initial lean initiatives as well as anchoring the lean culture.

Evaluation Criteria

The relevance of our study and presented construct bases on findings from the exploratory phase of our research, as we found that there were potential to increase employee engagement towards lean continuous improvement. Even though our survey shows mostly positive results regarding employee's engagement towards improvement work, some areas were less positive, upon which

we have emphasized in the design of the construct. On this foundation, we believe that our construct can mitigate some of the problem areas and actually contribute to the organization's performance and serve its purpose.

The completeness of our research circles around questioning if the proposed construct solves the initial problem. The main challenge in assessing completeness is that the research process terminates when the constructs are designed, leaving no time to test the solutions. There may also be limitations regarding our capacity to assess all necessary information and determine what information is needed and what is not. Subjectivity among informants and in our sources of evidence in general can also affect the completeness of the report. However, recognized research methods have been utilized in order to maintain the professionalism and completeness of the research.

The theoretical term employee engagement is one of the main hurdles in order to simplify our research. Through complex theoretical concretization, we have tried to increase understandability and simplicity of our research. However, we find all the information provided in the report necessary in order to allow the reader to see how inferences and conclusions are drawn, which in turn, can decrease simplicity. The research itself has been conducted in Norwegian, including meetings, interviews, survey and supervision. Our report on the other hand, is written in English, which creates challenges when it comes to translating terms and phrases. However, we do not see this as a problem or as weakening in terms of the content of our research, but it can affect the understandability and simplicity for readers that find English difficult. Academically, we believe that it increases the generality of the report, as it reaches out to a bigger research community.

The structure of the report includes numerical chapters and sections, which makes it easy for the reader to maneuver and navigate through the presented research. We also provide an executive summary for those who just want quick insight in our research. Thus, the structure of the report increases the ease of use. As discussed earlier, our constructs are developed based on Fibo-Trespo's existing procedures and methods of working. Thus we believe that operationality is obtained. However, we can only say this with some level of certainty, because our constructs has yet to be tested. The same can be said regarding efficiency as an evaluation of such depends on Fibo-Trespo to implement our constructs. If it eventually comes to this, efficiency can be evaluated by studying employees' engagement towards lean continuous improvement sometime after implementation.

The way that our research ties theoretical aspects together can be generalized to other production companies in the same context, as a way of facilitating an arena for engaging employees. However, the survey itself is constructed specifically for Fibo-Trespo and alterations needs to be made in order for other organizations to utilize it. The fact that our research is heavily content specific is the main hurdle for assessing generality and can be a potential shortcoming for our constructs.

81

8. CONCLUSION

Fibo-Trespo has launched several initiatives in their journey to run a "leaner" production, and increase their competitiveness. Employees at Fibo-Trespo have experienced a lot of changes since 2007, and our research seeks to determine if changes has anchored in the organization. Through inspections, interviews, and an engagement survey, we sought to determine what level of engagement that resides within the workforce, towards lean continuous improvement. We had reason to believe that levels of engagement would vary among employees, and that we could determine several focus areas that could increase engagement, from our concretization of relevant theory. The results from the survey were undeniably very positive, and prove the organizations success in engaging people.

Lean theory lacks material regarding how organizational learning takes place. Therefore, we have emphasized learning theory in our thesis. We believe that one of the reasons for Fibo-Trespo's success is their learning and training initiatives. The level of lean knowledge that resides within the workforce can be considered high. Furthermore, learning and training are important factors according to the Nordic model.

High levels of engagement were somewhat expected from the survey results, but the data presented in the thesis show several interesting trends. Our research is also based on qualitative data collected through open interviews, observations, and second hand sources. In aggregation these data form a strong basis for allowing the researchers to make the recommendations and practical solutions that was presented through the constructs. Our findings, in relations to variation and work pace provide grounds to ensure that a good practice of rotations and interdisciplinary learning initiatives, are promoted and focused. Additionally, data showed that meaningfulness and value of lean continuous improvement were variable and needed to be addressed. Leading us to further investigate the organizations competence system, and how employees are rewarded and recognized for good work. The solution resulted in several practical changes and a quality assurance system for general improvements. The construct also offers a recommendation towards refreshment upon the initial lean methods, as data suggested that knowledge within these methods could be improved. The solutions proposed in the construct, are all grounded in theoretical aspects that affect employees' engagement. We are confident that the proposed construct can contribute to increasing engagement levels.

Employee engagement is arguably a complex term, and when measuring engagement, it is important to consider the context. In Nordic countries we meet organizations with flat structures, broad involvement, and empowered employees. Additionally, the pressure to specialize and promote innovation in order to remain competitive internationally is arguably higher in a high cost country like Norway. Furthermore, employees' rights and needs are preserved and protected by the Working Environment Act. As our knowledge of engagement increased during our study of the relevant literature, we realized that a lot of elements that will

increase engagement are highly present at Fibo-Trespo, as a result of being located in Norway. Being able to learn and develop at work almost goes without saying in the Norwegian society. However, levels of engagement can always increase, and we are certain that the organization still have a long road ahead in terms of continuous improvement and engaging their employees. In lean organizations the relentless focus of removing non-value adding activities will form a more fragile production system. By making problems surface, lean organizations rely on the knowledge and strength of the workforce to tackle problems. Engaged employees will give their best performance in their roles at work. Higher engagement levels can lead to increased business results and lower turnover rates.

The developed construct is based on data collected in the case, and is by intention specified for Fibo-Trespo. However, we believe that other organization can retrieve relevant knowledge from this report. The method for measuring engagement can be transferred and used in other organizations, but adaptions and adjustments must be made to fit the relevant case. Furthermore the case description presents Fibo-Trespo's approach to continuous improvement, which other organizations can benefit from. The construct has been verified and Fibo-Trespo's management has taken great interest in our study. Furthermore, we present an evaluation of the construct, but unfortunately we will not be able to include the implementation and use of the measures in this study.

8.1   Future research

Our research phase has to some extent revolved around the development of the presented construct. Through the study we have been given the opportunity to dig deeper in engagement literature and lean continuous improvement, leading to several suggestions for future research:

- When we first approached Fibo-Trespo they initially suggested that our research would revolve around their newest lean initiative, Kata. However, since this project is just at the starting phase, our study would have limited data to draw conclusions upon. In his book, Toyota KATA, Mike Rother presents: "*The systematic pursuit of desired conditions by utilizing human capabilities in a concentrated way"*. We would suggest a study that shows the results of implementing this method. Our study can only present Kata as a way of working on continuous improvement, from a more theoretical perspective. Arguably it contains a lot more.
- Measuring engagement among employees must, as mentioned, be considered complex. Developing a survey that could be used across other organization, making it possible to compare results, and to determine where organization fail or succeed in engaging the workforce would be interesting. As an example a survey designed for Norwegian companies in the production industry, would allow us to compare different management frameworks, and their impact on engagement.
- Looking further into Fibo-Trespo's approach regarding learning and training, to determine what separates them from others, could be an interesting case study. In 2014

the organization won the competence price. The purpose would be to determine the reason for their success.

9. BIBLIOGRAPHY

Amundsen, I., Kalsaas, B. T., & Jon P. Knudsen, T. S. (2014). Lean og den norske modellen - møte eller konflikt? In H. C. Garmann, G. Johnsen, & I. Amundsen, *Forskning møter praksis: perspektiver på arbeidsliv og innovasjon i kunnskapssamfunnet* (pp. 27-43). Kristiansand: Portal.

Arbeidsdepartementet. (2013, February 18). *Globalassets.* Retrieved February 27, 2015, from Regjeringen: https://www.regjeringen.no/globalassets/upload/ad/publikasjoner/rapporter/2013/tbu_ kortversjon_2013_endelig.pdf

Bagozzi, R. P., Youjae, Y., & Phillips, L. W. (1991). Assessing Construct Validity in Organizational Research. *Administrative Science Quarterly; Sep 1991; 36, 3; ABI/INFORM Global*, pp. 421-458.

Bottrup, P. (2001). *Læringsrum i arbejdslivet : et kritisk blik på den lærende organisation.* Copenhagen: Forlaget Sociologi.

Brown, L. V. (2007). *Psychology of Motivation.* Portland: Nova Science Publishers.

Cohen, L., Manion, L., & Morrison, K. (2002). *Research Methods in Education.* London: Routledge Farmer.

Det Kongelige Nærings- og Handelsdepartement. (2008). *St.meld. nr. 7 2008-2009 Et nyskapende og bærekraftig Norge.* Oslo: 07 Gruppen AS.

Directorate of Labor Inspection. (2013, April 01). *Binfil.* Retrieved Mars 05, 2015, from Arbeidstilsynet.no: http://www.arbeidstilsynet.no/binfil/download2.php?tid=92156

Dreier, O. (1999). Personal Trajectories of Participation across Contexts of Social Practice. *Outlines*, 5-32.

Evans, J. R., & Lindsay, W. M. (2011). *Managing for Quality and Performance Excellence, 9th edition.* Mason, OH: South-Western Cengage Learning.

Friel, D. (2005). Transferring a lean concept from Germany to the United States: The impact of labor laws and training systems. *Academy of Management Executive, 19*(2), 50-58.

Gallie, D. (2003). The Quality of Workinf Life: Is Scandinavia Different? *European Sociological Review*, 61-79.

Ghauri, P., & Grønhaug, K. (2005). *Research Methods, in business studies.* Essex: Pearson Education Limited.

Griggs, R. A. (2010). *Psychology: A Concise Introduction.* New York: Worth Publishers.

Gustavsen, B. (2011). The Nordic Model of Work Organization. *Journal of the Knowledge Economy Volume 2, 4th Issue*, 463-480.

Harter, J. K., Schmidt, F. L., Killham, E. A., & Asplund, J. W. (2013, February 01). *The Relationship Between Engagement at work And Organisational Outcomes.* Washington, D.C: Gallup, Inc. Retrieved from http://www.gallup.com/services/177047/q12-meta-analysis.aspx

Hayes, T. L., Harter, J. K., & Schmidt, F. L. (2002). Business-Unit-Level Relationship Between Employee Satisfaction, Employee Engagement, and Business Outcomes: A Meta-Analysis. *Journal of Applied Psychology, 87*(2), 268-279.

Herzberg, F., Mausner, B., & Snyderman, B. B. (1959). *The Motivation to Work.* New York: Wiley.

Holmström, J., Ketokivi, K., & Hameri, A.-P. (2009). Bridging practice and theory: A design science approach. . *Decision Sciences, 40(1*, 65-87.

Illeris, K. (2012). *Læring.* Oslo: Gyldendal Norsk Forlag AS.

Illeris, K. (2012). *Læring i Arbejdslivet.* Fredriksberg: Roskilde Universitetsforlag.

Jacobsen, D. I. (2005). *Hvordan gjennomføre undersøkelser?* Kristiansand: Norwegian Academic Press.

Johnstad, T., Giæver, T., Holtskog, H., & Strand, T. (2012). *Lean på Norsk.* Vallset: Opplandske Bokforlag.

Jørgensen, C. H., & Warring , N. (2002). *Læring på Arbejdspladsen: den lærende i centrum.* Copenhagen: Roskilde Universitetsforlag.

Kahn, W. A. (1990). Psychological Conditions of Personal Engagement and Disengagement at Work. *The Academy of Management Journal, 33*(4), 692-724.

Kalsaas, B. T. (2012). *3B Birkeland : en bedrift i prosessindustrien, erfaringer fra arbeidet med å innføre lean basert forbedringsarbeid.* University of Agder. Grimstad: University of Agder.

Kalsaas, B. T. (2012). The Last Planner System Style of Planning: Its Basis in Learning Theory. *Journal of Engineering, Project, and Production Management 2(2)*, 88-100.

Kasanen, E., Lukka, K., & Siitonen, A. (1993). The constructive approach in management accounting. *Journal of Management Accounting Research (5)*, 243-264.

Keegan, P. (2014, 12). *The 5 New Rules of Employee Engagement*. Retrieved from Inc.: http://www.inc.com/magazine/201412/paul-keegan/the-new-rules-of-engagement.html

Kruse, K. (2012, 6 22). *What Is Employee Engagement*. Retrieved from Forbes: http://www.forbes.com/sites/kevinkruse/2012/06/22/employee-engagement-what-and-why/

Kvale, S., & Brinkmann, S. (2009). *Det kvalitative forskningsintervju.* Gyldendal akademisk forlag.

Lave, J., & Wenger, E. (2003). *Situeret læring - og andre tekster.* Copenhagen: Reitzel.

Levin, M., & Klev, R. (2002). *Forandring som praksis.* Trondheim: Fagbokforlaget.

Liker, J. K. (2004). *The Toyota Way.* New York: the McGraw-Hill companies.

Lukka, K. (2003). The constructive research approach. Case study research in logistics. *Publications of the Turku School of Economics and Business Administration, Series*, 83-101.

MacDuffie, J. P. (1995). Worker's Roles in Lean Production. In S. Babson, *Lean Work* (pp. 54-69). Detroit: Wayne State Univesity Press.

March, S. T., & Smith, G. F. (1995). Design and natural science research on information technology. *Decision Support Systems 15*, 251-266.

Maslow, A. H. (1943, July). A Theory of Human Motivation. *Psychological Review vol 50*, pp. 370-396.

May, D. R., Gilson, R. L., & Harter, L. M. (2004). The psychological conditions of meaningfulness, safety and availabilty and the engagement of the human spirit at work. *Journal of Ocupational and Organizational Psychology*, 11-37.

Moen, R., & Norman, C. (2006). *pkpinc.com.* Retrieved February 5, 2015, from Profound Knowledge Products, inc: http://pkpinc.com/files/NA01MoenNormanFullpaper.pdf

Oyegoke, A. (2011). The constructive research approach in project management research. *International Journal of Managing Projects in Business, Vol. 4 Iss 4*, 573-595.

Rath, T., & Conchie, B. (2008). *Strenght-Based Leadership: Great Leaders, Teams, and Why People Follow.* Michigan: Gallup Press.

Reite, M. H., & Nodeland, R. (2015, March 29). *økonomi*. Retrieved April 07, 2015, from Fædrelandsvennen: http://www.fvn.no/okonomi/--En-av-de-beste-industriproduksjonene-i-landet-2787132.html

Rice, C., Marlow, F., & Masarech, M. A. (2012). *The Engagement Equation: Leadership Strategies for an Inspired Workforce*. New Jersey: John Wiley & Sons, Inc .

Rosenthal, M. (2010, June 28). *2010/06/28*. Retrieved from The Lean Thinker: http://theleanthinker.com/2010/06/28/toyota-kata-the-how-of-engaged-leadership/

Rosenthal, M. (2014, August 13). *2014/08/13*. Retrieved from The Lean Thinker: theleanthinker.com/2014/08/13/where-toyota-kata-doesnt-work/

Rother, M. (2009). *Toyota KATA*. New York: McGraw-Hill.

Saks, A. M., & Gruman, J. A. (2014). What do we really know about Employee Engagement. *Human Resource Development Quarterly, 25*(2), 155-182.

Salanova, M., Agut, S., & Peiró, J. M. (2005). Linking Organizational Resources and Work Engagement to Employee Performance and Customer Loyalty: The Meditation of Service. *Journal of Applied Psychology, 90*(6), 1217-1227.

Schaufeli, W. B., Bakker, A. B., & Salanova, M. (2006). The measurement of work engagement of with a short questionnaire: A cross-national study. Educational and Psychological Measurement. *Educational and Psychological Measurement, 66*(4), 701-716.

Schaufeli, W. B., Taris, T. W., & Van Rhenen, W. (2008). Workaholism, Burnout, and Work Engagement: Three of a Kind or Three Different Kinds of Employee Well-being? *Applied Psychology: An International Review 57 (2)*, pp. 173-203.

Schön, D. (1987). *Educating the reflective practitioner*. San Fransisco: Jossey-Bass.

Shimizu, K. (2004). *Transforming Kaizen at Toyota*. Okayama Univeristy.

Shook, J. (2008). *Managing to Learn*. Massachusetts: Lean Enterprise Institution, Inc.

Southworth, T. (2012). Gemba Walks. *Printing Lean*, 38-39.

Thorndike, E. (1920). A constant error in psychological ratings. *Journal of Applied Psychology 4 (1)*, pp. 25–29.

Van de Ven, A. H., Polly, D. E., Garud, R., & Venkataraman, S. (2008). *The Innovation Journey*. New York: Oxford University Press.

Wig, B. B. (2014). *Lean ledele for lærende organisajsoner*. Oslo: Gyldendal Arbeidsliv.

William, M. H., Schneider, B., Barbera, K. M., & Young, S. A. (2009). *Employee Engagement: Tools for Analysis, Practice, and Competetive Advantage*. Oxford: Wiley-Blackwell.

Womack, J. P., & Jones, D. T. (1996). *Lean Thinking.* New York: Simon & Schuster Inc.

Womack, J. P., Jones, D. T., Roos, D., & Carpenter, D. S. (1990). *The Machine that Changed the World.* New York: Free Press, a Division of Simon and Schuster, Inc.

Xu, J., & Thomas, H. C. (2011). How can leaders achieve high employee engagement? *Leadership & Organizational Development Journal , 32*(4), 399-416.

Yin, R. K. (2014). *Case Study Research, design and methods.* Thousand Oaks, CA: Sage Publications, Inc.

10. APPENDIX

Appendix 10.1: Interview guide

Appendix 10.2: Survey

Appendix 10.3: Quality Assurance Card (Norwegian)

10.1 Interview guide

Purpose of the Interview:

The purpose of this interview is to identify Fibo Trespo's ways of conducting lean continuous improvement work and employees' engagement within.

- Mapping the methods and procedures for lean continuous improvement work.
- Identify Employees' engagement towards lean continuous improvement.

Interview Structure:

The interviews are low/semi-structured, which means that the interviewee enquire information based on an interview guide that covers specific topics (Kvale & Brinkmann, 2009). The interviewer follows the guide, but can let the respondent talk freely about topical paths that stray from the guide if he or she feels this is appropriate.

Topics:

- General information about the interviewee
- Continuous lean improvement work
    - General improvements
    - A3
    - KATA
- Employee Engagement
    - Learning
    - Motivation

10.2 Survey

UNIVERSITETET I AGDER

Fibo-Trespo

Velkommen til denne spørreundersøkelsen som er basert på samarbeidet mellom Fibo-Trespo og Universitetet i Agder om Lean forbedringsarbeid. Formålet er å kartlegge involvering og engasjement blant ansatte i forbedringsarbeid.

Undersøkelsen tar omtrent 10 minutter å gjennomføre.

Undersøkelsen sikrer deltakerens anonymitet.

Bakgrunnsinformasjon

Hvor lenge har du arbeidet i bedriften?
(1) ❑ Mindre enn 3 år
(2) ❑ 4-10 år
(3) ❑ 11-20 år
(4) ❑ Mer enn 20 år

Hvor gammel er du?
(1) ❑ 20 år eller yngre
(2) ❑ 21-40 år
(3) ❑ 41-60 år
(4) ❑ 60+ år

Er du bundet til å betjene maskiner i jobben (for eksempel overvåke liming eller fres slik at du i mindre grad enn ved en del andre jobber kan regulere eget arbeidstempo og er mindre fleksibel)?
(1) ❑ I stor grad
(2) ❑ I noen grad
(3) ❑ Ikke bundet til å betjene maskiner

93

Har du deltatt i Læringssirkel?
(1) ❑ Ja
(2) ❑ Nei
Har du gjennomført Kata trening?
(1) ❑ Ja
(2) ❑ Nei

Har du deltatt i gjennomføring av en A3 problemløsning?
(1) ❑ Ja
(2) ❑ Nei

UNIVERSITY OF AGDER

	Uenig	Delvis uenig	Verken enig/eller uenig	Delvis enig	Enig
Mine arbeidsoppgaver og instrukser er klare og definerte.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg har tilstrekkelig autoritet til å gjennomføre forbedringer	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg vet hva som forventes av mitt arbeid.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Forbedringsarbeidet er selvstyrt	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Bedriften lytter til ansattes forslag og tiltak.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	Uenig	Delvis uenig	Verken enig/eller uenig	Delvis enig	Enig
Mitt forbedringsarbeid bidrar til verdiskapning for bedriften.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg trives i felleskap med mine medarbeidere.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg vil anbefale bedriften som arbeidsplass til andre.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Ledelsen viser vei og leder ved å sette eksempler.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑
Jeg vet hvor jeg skal henvende meg om jeg ønsker råd i forbedringsarbeid.	(1) ❑	(2) ❑	(3) ❑	(4) ❑	(5) ❑

	Uenig	Delvis uenig	Verken enig/eller uenig	Delvis enig	Enig
Arbeidet gir meg en følelse av å lære på arbeidsplassen.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg har god innsikt i jobben min og forståelse av betydningen for helheten.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg har tilstrekkelig kunnskap og tyngde til å utføre alle mine arbeidsoppgaver.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Bedriften legger til rette for opplæring og kompetansebygging.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg har god forståelse av andres oppgaver og bedriftens virkemåte.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐

	Uenig	Delvis uenig	Verken enig/eller uenig	Delvis enig	Enig
Jeg har stor variasjon i arbeidet.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Arbeidsbelastningen på jobben er akseptabel	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Deltakelse i forbedringsarbeid gir økt belastning	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg har god påvirkning på valg av arbeidstempo på jobben	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg har god mulighet til å forbedre egen arbeidspraksis	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Jeg tenker aktivt på forbedringsarbeid i mitt daglige arbeid.	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐
Forbedringsarbeidet gir økt effektivitet for bedriften	(1) ☐	(2) ☐	(3) ☐	(4) ☐	(5) ☐

Tusen takk for at du tok deg tid til å svare på undersøkelsen!

10.3 Quality Assurance Card (Norwegian)

Fibo-Trespo

Kvalitetssikring av generelle forbedringer

1. Hvorfor er det behov for en forbedring?
   - Gjør rede for problemet

2. Hva vil oppnås med forbedringen?
   - Gjør rede for potensiell gevinst

3. Hvilke ressurser trengs for å gjennomføre forbedringen?
   - Menneskelige, Økonomiske, Materielle, Tid

4. Vil forbedringen skape verdi for ytelsen i det tiltenkte funksjonsområdet?
   - Er den verdt å gå videre med?