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Lean leadership
Creating a culture for continuous improvement
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ABSTRACT

Continuous improvement has been one of the staples of successful industry for years but the research behind what factors separate a successful continuous improvement from a not successful had not been well defined. Both Lean leadership and the factors surrounding it had been defined but only partially explored and the connection between them has seldom been researched. As such, the aim of the thesis was to investigate the separate effect Lean leadership and contextual factors have on a continuous improvement culture and the impact contextual factors have on Lean leadership. The study was conducted by forming an analysis model based on literature which was divided into two sub-models: Enablers and Lean leadership. A case study was performed gathering data from a case company using triangulation in the form of a document study, participant observation and semi-structured interviews. The data formed a write-up of the case which was then compared to the best practices defined in the analysis model in order to gauge the effects.

The study resulted in an analysis of what effect the fulfillment level of enablers and Lean leadership have on continuous improvement as well as what effect enablers have on Lean leadership. The conclusions of the analysis for enablers were that unfulfilled enablers negatively impact a continuous improvement culture and that management commitment dominates the negative effect if not fulfilled. For Lean leadership it was found that the individual choices of a Lean leader are important and can have an impact on the continuous improvement culture of those below the leader in the hierarchy. Also, unfulfilled enablers has a direct and adverse effect on a Lean leader's ability to foster a continuous improvement culture. The study further contributed to theory by an exact description of the effect of these unfulfilled enablers at the case company as well as providing a generalized model for analyzing a continuous improvement culture.

Keywords: Continuous improvement, Continuous improvement culture, Enablers, Lean leadership, Lean production

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Definition list

CEO = Chief executive officer

CI = Continuous improvement

FPY = First pass yield

FT = Flow technician

GL = Group leader

HK = Hoshin kanri

LPS = Lean production system

KPI = Key performance indicator

OCM = Operational control meeting

PDCA = Plan-Do-Check-Act

PM = Production manager at the case company

PS = Production system

RQ = Research question

SOP = Standard operating procedure

Tact = The time, based on customer demand, between which a product must be finished

TL = Team leader

TM = Team member

TPS = Toyota Production System

TQM = Total quality management

TWI = Training Within Industry

1 INTRODUCTION

The introduction is divided into three sections. The first covers a brief background about Lean. This is followed by a section with the aim and research questions and the scope for the thesis.

1.1 Background

Lean is often referenced to as both Toyota Production System (TPS) and Lean production (Woehl, 2011). Employees play a key role in Lean, in fact the "Main difference between lean and former mass production approaches is the role of employees. The separation of white and blue-collar workers does not exist in lean production" (Dombrowski & Mielke, 2013, p. 569). The true benefit of Lean, insist Soriano-Meier & Forrester (2002), is the overall strengthening of the system. If applied properly, the Lean methods will make any shortcomings in the system appear quickly and the shortcomings will have profound impacts.

Lean inherent much of its concepts from The Toyota Way 2001 (Liker & Hoseus, 2008), which is "The Guiding Principles at Toyota reflect the kind of company that Toyota seeks to be. The Toyota Way 2001 clarifies the values and business methods that all employees should embrace in order to carry out the Guiding Principles at Toyota throughout the company's global activities" (Toyota motor corporation, 2012). The Toyota way 2001 stands on two pillars: continuous improvement (CI) and respect for people (ibid.). Furthermore, Liker & Hoseus (2008, p. 4) state that "The Toyota Way is first and foremost about culture - the way people think and behave is deeply rooted in the company philosophy and its principles." This quote summarizes what Toyota is all about in one short sentence, i.e. that the tools are only the tip of the iceberg and that the culture, the part under the water, is much larger. Culture is the cornerstone of The Toyota Way but many companies tend to neglect this aspect. In general, companies focus on the tools such as A3 sheets, 5S and setup-time reduction, but forget that each of these tools came about for a specific reason (Liker & Convis, 2011). It is therefore not a surprise that Dombrowski & Mielke (2013) mention that many companies seem to believe that they are Lean as long as the implement some of the existing Lean tools. Or that companies seem to forget that the tools and methods have to be adapted to suit each company (Dorota Rymaszewska, 2014).

Having either studied or worked at Toyota for several years, Liker & Convis (2011, Chapter C) "believe that the biggest gap in capabilities in the Lean movement, and the root cause of the failure of many Lean programs, is in leadership." The authors continue with claiming that when Toyota has been less successful, the reason for this has been that some departments have failed to follow the Toyota Way. At Toyota, it is the workers which do the value-added work, and the leaders are there to enable this by "... develop subordinates so that they grow and improve, and remove obstacles and set challenges and goals so that teams at all levels of the organization can contribute to Toyota's continuous improvement and attainment of its long-term goals" (Liker & Convis, 2011, Chapter D.6). Leadership in organizations is a topic that have been studied for half a century so it is not until quite recently focus have been on leadership in Lean production system (LPS) (Seidel, Saurin, Marodin, & Ribeiro, 2017). Further, Woehl (2011, p. 2) mentions

that "Over the last decades, most of lean manufacturing research has focused on the implementation of lean practices".

Lean was first initiated in the manufacturing industry, but has today spread to different sectors, e.g. healthcare (see e.g. Aij & Teunissen, 2017), because of today's competitive environment (Mcpolin, 2014). Despite literature pointing at the high importance of Lean, the success rate of the implementations has been low (Woehl, 2011). Continuous improvement, or Kaizen, is of strategic importance, since evidence prove that companies which with a long-term perspective strive "for true excellence in the products they make and the services they provide outperform companies that are focused only on short-term financial goals" (Liker & Franz, 2011, pp. 6–7). Therefore, it is not a surprise that Imai (1986, p. xxix) mentions that "kaizen is the single most important concept in Japanese management-the key to Japanese competitive success." Further, Bessant & Francis (1999) state that CI is of strategic importance, since it is a benefit based on a group of related behavioral routines which takes time to learn and therefore are hard to copy. This means that applying CI is a competitive factor. Or as Imai (1986, p. 49) explains it, "Japanese managers have found that seeking improvement for improvement's sake, is the surest way to strengthen their companies' overall competitiveness."

1.2 Aim and research questions

Several authors (Dombrowski & Mielke, 2013; Dorota Rymaszewska, 2014; Emiliani, 2008; Liker & Convis, 2011) point out that there are numerous reasons to why Lean implementations fail to succeed and to be sustained. Two main reasons are the inability to create a continuous improvement culture and an unsuccessful leadership, i.e. none Lean leadership. Thus, aim of the thesis is to investigate the separate effect Lean leadership and contextual factors have on a continuous improvement culture and the impact contextual factors have on Lean leadership.

According to Waldman et al. (1998), leadership is not the only thing which can impact a culture. In order to ascertain how the prerequisites of a company affect the continuous improvement culture, the following research question has been stated:

RQ 1: How does the contextual factors impact a continuous improvement culture?

There is an inherent lack of literature on what routines, knowledge, skills and behaviors that constitute a successful leadership or even Lean leadership, both concerning the implementation and sustaining of continuous improvement and Lean implementation overall (Mcpolin, 2014). In order to investigate what effect Lean leadership has on a continuous improvement culture the following research question has been stated:

RQ 2: How does Lean leaders impact a continuous improvement culture?

In order to investigate how the contextual factors of a company affect a Lean leader's ability to promote a continuous improvement culture, the following question has been stated:

RQ 3: How does the contextual factors affect a Lean leader's ability to foster a continuous improvement culture?

1.3 Scope

The scope of the thesis was to deliver a scientific contribution as well as a contribution to the company that stood host for the study. The scientific contribution was made in the form of a scientific study fulfilling the aim of the thesis and the contribution to the company was the recommendations found at the end of this thesis. Within the company, data gathering was limited to the production department and therefore to personnel and interactions within this department. Further, the interviews conducted were centered on the group leader (GL) hieratical level and the hierarchical levels surrounding them, production manager (PM) and team leaders (TL), while observations were conducted at the entire department. All TLs present at the beginning of the study were allowed to partake, however, not all did and therefore lay outside the scope of the thesis. Furthermore, implementation of CI needs to include some sort of method for performing CI (Bessant & Francis, 1999). The examined CI methods applied at the case company were 5S and Kata, and were therefore included in the scope.

2 THEORETICAL FRAMEWORK

The theoretical framework is divided into five sections, which are as follows: continuous improvement culture, enablers for continuous improvement, leadership, Lean leadership model and framework analysis.

2.1 Continuous improvement culture

This section is divided into three parts. The first part gives a brief description about organizational culture. The second part is a description on what CI is and the CI methods included in the scope of the thesis. The third section goes into defining what a CI culture entails.

2.1.1 Organizational culture

Organizational culture is a popular research topic but has proven difficult to research, as the believes that form the foundation of the culture are tacit and therefore difficult to investigate (Sackmann, 1991). Schein (1984, p. 3) defined organizational culture as "the pattern of basic assumptions that a given group has invented, discovered or developed in learning to cope with its problems of external adaptation and internal integration, and that have worked well enough to be considered valid, and, therefore, to be taught to new members as the correct way to perceive, think, and feel in relation to these problems." Schein & Scheiner (2017) mention that the learning that have taken place the earliest in a group becomes the cultural DNA, which means that the established beliefs, values, and desired behaviors are taken for granted, and in essence becomes non-negotiable. They further mention that the cultural DNA is very stable and cannot be changed without changing the composition of the group and that culture thereby give the group some level of structural stability. The strength of a group's culture can be defined in two terms: the homogeneity and stability of the group membership, and the number and depths of problems the group has survived (Schein, 1984). Schein & Scheiner (2017, p. 6) state that "To fully understand a given group's culture, we will need to know what kind of learning has taken place, over what span of time, and under what kinds of leadership."

When a group receives feedback on an action, if this feedback is positive and continues to be positive, those beliefs, values and behaviors that gave rise to the action will be taken for the right way to continue (Schein & Scheiner, 2017). Further, these values and beliefs are then incorporated into the group identity and will be taught to newcomers (ibid.). Schein (1984, p. 10) states that "Culture goes beyond the norms or values of the group" and thereby the values and beliefs that have been taken for granted is the part of the organizational culture.

Schein (1984) divides organizational culture into three levels: Artifacts and creations, Values and Basic assumptions. Artifacts and creations are the level that can be observed, the behaviors of the group. Values is the next level of the model and is the conscientious why of the behaviors, the expressed reason for behavior that people can express. In the deepest level of the model are the basic assumptions which consists of a person's underlying assumption of how things really are and are often unbeknownst to the person in question. When analyzing a culture, Schein & Scheiner (2017) describe that a cultural analysis can be done in the three levels previously described, each analysis garnering a different depth of culture:

- Artifacts have the combined attributes of being visible but are difficult to understand. It includes aspects such as the language used in a group, the style of clothing, myths about an organization and the public lists of values. However, the meaning of these observable artifacts have to the group are not readily understandable. Analyzing artifacts without understanding why they exist may lead to wrong conclusions.
- Espoused values and beliefs is the second level of analysis are the beliefs and moral of a person or group that is conscious and can be described by that individual. However, they tend to be abstract and can even become contradictory.
- Taken-for-Granted underlying basic assumptions are those beliefs and values of culture that have become so generally accepted that there is little variation within the social unit. These beliefs and values are almost inconceivable for the group to change and therefore extremely difficult to affect as it requires the person to change their view.

2.1.2 **Continuous improvement**

Kaizen is a Japanese word which Imai (1986, p. xxix) defines, for a workplace, as an "*ongoing improvement involving everyone* - top management, managers, and workers." This means that every part of a company has to continuously evaluate their process and thereby continuously improve (Liker & Franz, 2011). Or as Bessant, Caffyn, Gilbert, Harding, & Webb (1994) explain it, that CI is a philosophy that can be expressed as "a company-wide process of focused and continuous incremental innovation." The improvements made are a result of that the organization continuously make an effort (Wittenberg, 1994) and thereby are not satisfied after one improvement has been made. Further, when promoting a Kaizen strategy, one should not be concerned with immediate payoff (Imai, 1986).

Kaizen is not only a collection of problem-solving tools and methodologies, but also a philosophy centered on exposing problems in order to move towards an ideal vision of a production system (PS) (Liker & Hoseus, 2008). Liker & Franz (2011) continue that the implementation of Kaizen takes a long time and can not only be implemented by copying the existing tools. They further mention that by continuing to improve and with leaders who has the mindset aiming for excellence, the efforts are turned into a culture. Further, "Implementing Continuous Improvement as a 'quick fix' rather than to achieve culture change will impede day-to-day activities as it will not be integrated into the organisational structure and the full potential benefits of the approach will be missed" (McLean, Antony, & Dahlgaard, 2017, p. 227).

Imai (1986) states that the heart of CI activities lies in the Plan-Do-Check-Act (PDCA) cycle, which is an adaption of the Deming wheel consisting of four activities/phases; plan, do, check and act. He further mentions that it is the process through which new standards are set, revised and replaced. However, before PDCA is applied, current standards need to be stabilized (ibid.). Liker & Franz (2011, p. 20) state that "When an organization embraces PDCA, it starts to grow to become a learning organization. Projects go beyond one-offs and become a continuous stream of learning opportunities on the road to excellence."

Imai (1986) mention that the PDCA-cycle is a process which continuously iterate until the desired result is obtained, and the following explanation of the four phases is based on him. In

the *plan* phase, data is gathered in order to develop and finalize a plan for an improvement, which is implemented in the *do* phase. The implementation is later checked in the *check* phase, in order to see if the result is what desired. If that is the case, an action is being made in the *act* phase, involving that the change is standardized in order to ensure that the improvement is followed and sustained. If the result is not as desired, a new plan is formed in the act phase and the process is started anew. Liker & Franz (2011) mention that the key concept with PDCA is to learn in a deliberate way, i.e. you first identify the problem or gap, then try countermeasures which is checked and finally these learnings leads to appropriate adjustments are made.

5S

5S is one of the multiple tools which a company can employ when implementing Lean (Randhawa & Ahuja, 2017) and can be applied in order to "expose problems that one may not see otherwise" (Liker & Hoseus, 2008, p. 39). Randhawa & Ahuja (2017, p. 50) mention that "5S is simplest and easiest tool in lean manufacturing for the employee to learn for the improvement and elimination of waste from the workplace" and "is a management tool or technique developed by Takshi Osada during 1980s in order to constitute and sustain better quality, productivity, safe environment in an organization." Imai (1997, p. 64) defines the 5S' as:

- "Sort: Separate out all that is unnecessary and eliminate it.
- Straighten: Put essential things in order so that they can be easily accessed.
- Scrub: Clean everything -- tools and workplaces -- removing stains, spots, debris, and eradicating sources of dirt.
- Systematize: Make cleaning and checking routine.
- Standardize: Standardize the previous four steps to make the process one that never ends and can be improved upon."

Kata

Kata, as defined by Rother & Aulinger (2017, p. 3), is "A small structured routine. Learning and then combining these individual practices is a way of developing competency in the overall way or pattern of doing something." The method has been developed by Mike Rother after studying Toyota for several years (Rother, 2010). Further, he describes Kata as the way Toyota teach the behavior patterns that make up the foundation of CI efforts. He further divides the Kata into two separate parts, the *improvement Kata* and the *coaching Kata*.

The improvement Kata is the vehicle that moves a process towards the goal vision of that process by setting and fulfilling a challenge (Rother, 2010). The challenge should act as a theme in order to connect an organization's strategy with execution (Rother, 2017). During the planning phase, a challenge should be set on strategic level and then cascaded down through the organization's level with the challenge broken into target conditions at each level which becomes the challenge of the level below (Rother & Aulinger, 2017). The challenge at each level is broken up into target conditions which are set by the adept and it requires several target conditions in order to reach the challenge (ibid.). Rother (2010) mentions that the target condition is set by analysis of what is required of the process to move towards meeting the challenge and it should be challenging to manage but not impossible to achieve, as to provide

motivation once achieved. He further mentions that it should be actionable, meaning it should be easy to distinguish if it is fulfilled or not, but there should be no clear solution to achieving it. He also recommends that a target condition should take no more than three months to achieve and that novice Kata user should have target conditions that span somewhere around one to four weeks.

Rother (2010) mentions that the process to achieve the target condition is based on the PDCA-cycle with each cycle being a step towards the target condition. However, every step does not necessarily need to involve a countermeasure to the problem, but could be simply to gain more information from the process (ibid.). He further mentions, that as used in the Kata method, the PDCA-cycle is about conducting rapid experiments in order to reach the target condition, rather than developing complex solutions that take longer time. The purpose of the experiments according to the Kata methodology is to as soon as possible identify the next obstacle (ibid.). Once a target condition has been reached, a reflection of the totality of the journey to the target condition should be conducted (ibid.).

The coaching Kata is according to Rother (2010) the way that Toyota teaches the improvement Kata. He mentions that the adept in the coaching Kata is the one who is supposed to figure things out, with the mentor asking questions to discern the thinking of the adept, but trying not to lead the adept in a certain direction. Rother & Aulinger (2017) mention that a learner of the Kata practice should be subject to daily coaching cycles. They further mention that the adept should prepare the details of the last experiment and submit them to the storyboard before the coaching cycle. The coach in Kata is responsible for the solutions but not for making the choices (Rother, 2010). Rother & Aulinger (2017) state that a Kata coach is to provide mostly feedback on the process, teaching the adept a scientific procedure rather than telling the adept what to do. They also add that the coach's coach is responsible for observing coaching cycles and giving feedback on how to become a better at the process. This role can be filled by a person one level above, a peer of the coach or a specialist (ibid.). A mentor should not direct the solutions to a problem but can direct the next step if the mentor deems it necessary, and he/she should allow the mentee to do mistakes, as long as these mistakes will not impact the customer, in order for the mentee to learn (Rother, 2010).

Rother & Aulinger (2017) mention that for an organization, the policy deployment goes through three stages of skill and behavior development: Awareness of the pattern of scientific improvement thinking, able to apply scientific improvement thinking as a learner, able to teach scientific improvement thinking as a coach (ibid.). They further state that a middle manager needs to first be taught scientific thinking before teaching it to others.

2.1.3 Continuous improvement culture

The Toyota Way 2001, Toyota's management philosophy, is often illustrated as a house with two pillars, *continuous improvement* and *respect for people*, and a foundation consisting of five elements, Challenge, Kaizen, Genchi genbutsu, Respect and Teamwork, also known as the True North values (Liker & Hoseus, 2008). A way to define the different stages and depths of a Lean culture is to divide the culture into the three levels defined by Schein (1984), which has been done by Liker & Hoseus (2008). In their example, the methods that Toyota use such as Andon

are the artifacts, the spoken reason for them being used are the espoused values. Further they define that for Andon, quality is more important than productivity, and the assumptions guiding them such as that the workers key job is to identify and call attention to problems makes up the basic assumptions. Woehl (2011) also used the levels defined by Schein (1984) to describe the essence of Lean culture. In his literature review of organizational culture, he found "that artifacts, beliefs, and underlying assumptions all need to be synchronized to support a lean culture" (p. 43).

The existing organizational culture at a company can stifle change (Pascale, Millemann, & Gioja, 1997). Hariharan (2006) states that there is risk that the organization is not culturally ready for the change but that the process for changing it is to move forward with the change. This is supported by Shook (2010), who states that starting with a change in behavior leads to a subsequent change in values and behavior which leads on to a change in culture, see Figure 2.1. This means that in order to change a company culture towards a CI culture, one needs to first introduce new tools and behaviors in order to facilitate a change in people's mindset.
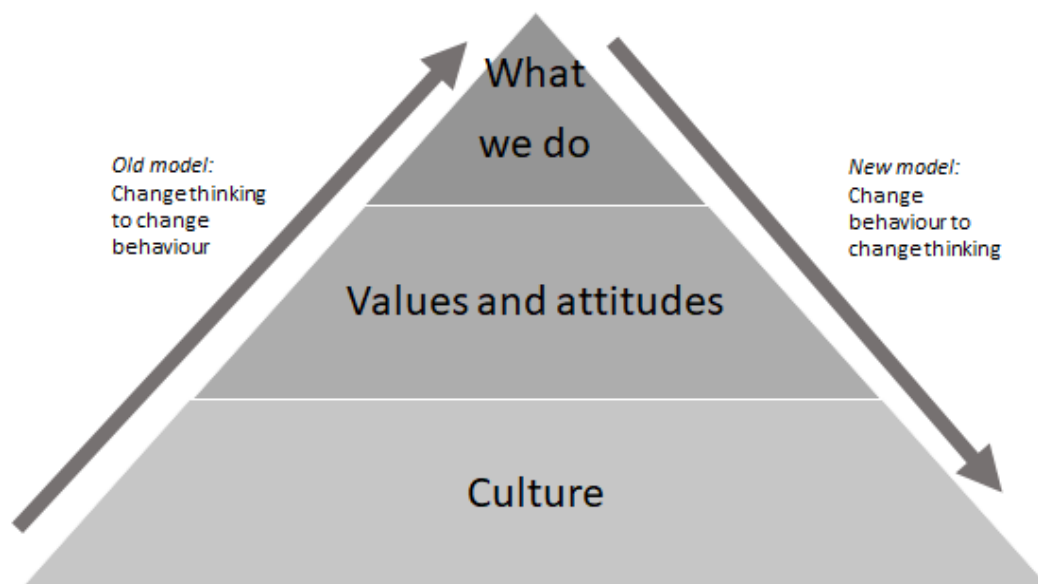
Figure 2.1. Shook's version of culture change adapted from Shook (2010, p. 66)

CI culture is a broad concept enveloping many different cultural identifiers. Miller, Wroblewski, & Villafuerte (2014) have found 10 core beliefs of Kaizen culture which make up the espoused values and beliefs of Schein's (1984) model. The ten core beliefs are: humility, alignment, security, respect, service, process, urgency, connection, consensus and sharing. They mention that the core beliefs can be used as a target in order to reach a CI culture and can be reached with the help of the emerging artifacts and behaviors found in Table 2.1, which contains direct quotes from the authors.

Table 2.1. 10 Kaizen core believes (Miller et al., 2014, Table 3.2)

Kaizen **Core** Beliefs	**Emerging Artifacts and Behaviors**
Humility	"Servant leadership; letting go of paradigms; learning from other organizations; not making excuses; willingness to experiment; reflection"
Alignment	"Passionate commitment to continuous improvement and service excellence; long-term investment in people and community; total engagement in the transformation; *hoshin kanri*"
Security	"Safety first practices; stop and fix; visual controls; 5S; no layoff policy for kaizen; andon system; two-way communication; standards"
Respect	"Development of people; leaders as teachers; job rotation; cross training; total engagement; family atmosphere; fun workplace"
Service	"Customer-aligned organizational structures; pull signal; value stream design; voice of customer"
Process	"Value stream mapping; go see/*genchi genbutsu*; low-cost automation; level workload; process-aligned frontline management; do more with less; standard work for leaders; problem solving process"
Urgency	"Dissatisfaction with status quo; stop and fix; 5 why; *kaizen*; improve constantly"
Connection	"Value stream thinking; cross-functional teams; flow; visual management"
Consensus	"Catch ball; everyone speaks; team-based kaizen activity; daily shift start meetings"
Sharing	"*Yokoten (best practice sharing)*; benchmark tours; customer-supplier collaboration; volunteer kaizen at local non-profits"

2.2 Enablers for continuous improvement

There are different terms that can be used for the prerequisites of CI, among them sustainability factors (Jaca, Viles, Mateo, & Santos, 2012) or critical success factors (Fryer, Antony, & Douglas, 2007) or enablers (Ma, Lin, & Lau, 2017)). This section focuses on five enablers which was identified in literature: management commitment, employee involvement, communication, continuous improvement training and standardization.

Several literature synthesis studies (Kaye & Anderson, 1999; van Aartsengel & Kurtoglu, 2013) focusing on CI barriers and enablers, have shown that leadership is important for a successful implementation. Furthermore, Lean leadership is important in advanced stages of implementation (Knol, Slomp, Schouteten, & Lauche, 2018). Likewise, regarding total quality management (TQM), Silay & Ebrahimpourz (2003) found that organizational leadership was a critical factor for success with TQM in all the countries their research covered. Since Lean

leadership in and of itself is covered by another part of the study, it will not be further elaborated in this section.

2.2.1 Management commitment

One enabler identified to be of importance to CI implementation, is management commitment (Fryer et al., 2007; García, Maldonado, Alvarado, & Rivera, 2014; Jaca et al., 2012; Knol et al., 2018; McLean et al., 2017; Trenkner, 2016). Management commitment is by Fryer et al. (2007) seen as the most important enabler for CI. García et al. (2014) find that management commitment has a positive effect on employee motivation when investigating CI implementation. They further mention that management commitment has a direct impact on education and communication. Byrne & Womack (2013) state that without the Chief executive officer (CEO) leading the Lean transformation from Gemba, e.g. the shop-floor, and fully engaging in the Lean transformation, there is little chance of success. They further state that the CEO should engage in Kaizen events regularly in order to understand the details in order to be able to set goals. "A 'Kaizen event' is a focused and structured improvement project, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated timeframe" (Farris, Van Aken, Doolen, & Worley, 2008, p. 10). Furthermore, if an implementation lacks or relies solely on one person as the driver, the implementation will suffer (McLean et al., 2017). Soltani, Lai, & Gharneh (2005) mention that if the senior managers lack knowledge and understanding of the philosophy, their commitment is low, which, in turn, affects the commitment of the workers. A manager looking at process-oriented measures rather than result oriented measures, will be more supportive and less critical of results, since improvements are expected to come in small steps (Imai, 1986). Oakland (2011) comments that in order to change a company culture, management needs to show their commitment. Waldman et al. (1998) state that the implementation of CI might encounter difficulties if the middle managers and top managers exhibit differences in leadership behavior.

There needs to be allocated time for the improvement activities to take place and therefore there is a potential conflict between short-term productivity and improvement activities (Bessant & Francis, 1999), this means that top management needs to allow this type of time to be present in the production. Proper resources need to be granted to the CI program in terms of both access to personnel with time dedicated to the improvement program as well as financial means to fund training, allow for investments and budget for a reward system (Jaca et al., 2012; Knol et al., 2018; Powell, 1995; Sterman, Repenning, & Kofman, 1997). This is further supported by Dora, Kumar, & Gellynck (2016) who state that lack of time among employees is a barrier to CI. This run in parallel with management commitment as they are the only ones who can issue these resources. Further, Mcpolin (2014) mentions that a change of culture may require an initial lowering of production expectation to allow time for CI experiments. Investments in improvements might be disruptive and result in lower output in the short-term perspective (G. Li & Rajagopalan, 2008). While early results are said to provide a boost commitment to the improvement program, a focus on early results can lead a company to experience stress in the form of excess capacity, downsizing and economic difficulties which might hamper commitment to the program (Sterman et al., 1997).

A reason for that Lean implementation fails, is that companies mostly focus on the short-term goals, while Lean is a long-term investment which needs to be evaluated continuously (Dorota Rymaszewska, 2014; Liker & Convis, 2011). Improvement initiatives does not often produce short-term results and it require intense CEO commitment (Powell, 1995) as the costs of working towards long-term improvement come immediately while the major benefits are delayed and thus might affect the profits negatively short-term (Hahn & Doganaksoy, 2011). Imai (1986) states that a financial decision system, which forces managers to calculate an expected return of investment for each decision made, does not lend itself well to CI. Dorota Rymaszewska (2014, p. 1000) claims that a long-term perspective contributes to the creation of a Lean culture, as well as it requires "a considerable degree of organizational learning skills".

2.2.2 Employee involvement

Employee involvement or employee commitment levels is an important enabler for CI initiatives identified through a literature study performed by McLean et al. (2017). They found three issues to account for when examining employee involvement; time allocation, role conflict and participation levels. Chay, Xu, Tiwari, & Chay (2015, p. 1047) conclude that employee involvement "is one of the most critical elements to make a lean transformation programme a success story."

Hariharan (2006) mentions that team members (TM) may not participate in improvement efforts because they either do not have the time or do not make the time. He further mentions that lack of participation can be the result of a lack of motivation that may come from not knowing what they can gain from the project. A role conflict can arise between improvement efforts and the regular demands of work (McLean et al., 2017; Zbaracki, 1998), especially for operators who still need to produce the daily amount while taking time for improvement work. An implementation can therefore be seen to place unrealistic demands for employee commitment levels (Powell, 1995). Sterman et al. (1997) elaborate that if improvement efforts take too much time from primary responsibility, the lack of support and low morale can cause an improvement initiative to fail.

If employees are overburdened, their commitment to improvement will fail (Sterman et al., 1997), overburdening of people and equipment, muri, leads to waste in a LPS (Dorota Rymaszewska, 2014). Working overtime can be seen as a type of overburdening of operators as it is defined "as an extension of the daily working time or the total working time over the planning period" (Ingels & Maenhout, 2018, p. 143). Overtime can be seen as a management issue as it is them who decides upon the level of human resources. The effects of overtime are decreases in: productivity, motivation, effort (Shepard & Clifton, 2000), quality, performance (H. Li, Love, & Drew, 2000), attention, executive functions (Proctor, White, Robins, Echeverria, & Rocskay, 1996) and increases in: fatigue, depression, confusion (Proctor et al., 1996), absenteeism and employee turnover (Shepard & Clifton, 2000).

Mcpolin (2014, p. 130) identifies job security as a critical aspect of Lean implementation since "there will always be resistance and fear toward the cultural transformation of the organization." Thereby, a CI implementation needs to be followed by a no-layoff guarantee because of CI activities (Byrne & Womack, 2013), since if workers are threatened with layoffs, their

"commitment to improvement will fail" (Sterman et al., 1997, p. 509). Kusén & Ljung (2013) state that Lean leadership enables security. Mcpolin (2014) recommends a leader to several times during a Lean implementation to communicate that it will not result in any layoffs.

Several authors (e.g. Bessant & Francis, 1999; Goodridge, Westhorp, Rotter, Dobson, & Bath, 2015; Jaca et al., 2012) identified measurement and feedback system as an important enabler for the learning process of CI. It is incorporated here as it can be seen as to be strongly linked to employee commitment. A management system for handling ideas and provide adequate feedback and rewards/recognition should be developed in order to reinforce the behavior of CI (Bessant & Francis, 1999; Jaca et al., 2012; Knol et al., 2018). Camp (2015, Chapter 13) mentions that "implemented employee suggestions are a critical part of any continuous improvement system." There needs to exist a system for making suggestions for improvements of products or processes (García et al., 2014). Bessant & Francis (1999) further argue that a token reward for each improvement idea, as well as a larger reward for implemented ideas could be profitable. "Reward is connected to motivation" (Jaca et al., 2012, p. 147). One reason, Elvnäs (2017) mentions, that has a negative effect on an employee's motivation, is if the company constantly make changes. This has also, according to him, a negative effect on an employee's performance and work execution, as well as it leads to more anxiety and dissatisfaction for the workers. He also mentions that a change needs to be done systematically in adequate steps in order for the change to be consistent. García et al. (2014) found that motivation has a positive impact on communication. Alves, Dinis-Carvalho, & Sousa (2012) state that a suggestion system must credit the suggestion and be seen to be taken seriously, or workers are unlikely to share their ideas. Furthermore, Byrne & Womack (2013) suggest that a rapid response to suggestions is important in order for employees to keep offering suggestions. They further suggest that improvement ideas should be implemented as soon as possible, preferably on the spot. Camp (2015) continues with that a suggestion needs to be given adequate feedback, both if it is accepted or not. He further states that the number of implemented suggestions is one important measure for employee trust.

2.2.3 Communication

Communication can be considered an enabler for CI (Fryer et al., 2007; García et al., 2014; Knol et al., 2018). García et al. (2014) found that communication among operators impacts the operators' abilities, skills and motivation in a CI implementation positively. They further state that one aspect of successful communication for CI is the existence of meetings allowing for the expressions of ideas and opinions. Also, a lack of communications surrounding the outcomes of Lean initiatives seem to have an adverse effect on the initiatives (Bhasin, 2013). Conversely, publications of the successful improvements from early implementation of CI can lead to positive discussions about CI that increases commitment (Sterman et al., 1997). Knol et al. (2018, p. 3) found that communication, as defined by "Ideas, information and knowledge are exchanged honestly, clearly and transparently, both orally and in writing, in all organisational directions", is one of the three most important factors for initial implementation of Lean. Horizontal communication allows for coordination of improvement activities across functions while vertical communication allows for the spreading of learning throughout the organization (Jaca et al., 2012). Beer (2003) identified closed vertical communication as a

barrier to strategy implementation of CI because it reduced the organization's quality of learning.

García et al. (2014) identified that there needs to be communications between senior management, managers and their areas. Further, Dora et al. (2016) state that lack of communication, both in-between management and operators and between functional areas, can hamper the implementation of Lean. When employees understand each other's objective, as well as coordinates and collaborates between functions, they are better at overcoming problems and functions are less likely to cause issues for one another (Galeazzo, Furlan, & Vinelli, 2017). A lack of integration between CI with already established organizational practices on both manager and employee level is a barrier for CI (Zbaracki, 1998). Galeazzo et al. (2017) found that strategic alignment in the form of clear strategic objectives at all functional levels and across all functions, is an important factor for CI implementation. Byrne & Womack (2013) argue that support functions such as maintenance and tool making should give priority to the CI. Good coordination among functions within the company, as well as supportive mentors, is needed in order to facilitate a Lean transformation (Flumerfelt, Alves, Leão, & Wade, 2016). Imai (1986) mentions that to be able to maintain and improve quality in a production process, communication must work well between people at every production stage. He suggests that one way of achieving this communication, is to always think of the next process as a customer and thus hold the same requirements as to any external customer.

One aspect of problem-solving is to bring problems to the surface (Liker & Hoseus, 2008) and a free flow of information allows ideas to be found (Irani, Beskese, & Love, 2004). Liker & Hoseus (2008, p. xxvii) mention that "Without the tools at the process level problems will not be visible, making it less likely people will develop their abilities to think and solve problems." One way of bringing problems to the surface is via an Andon system where operators are able to stop the line and call for help whenever they detect a problem (Shook, 2010). A problem is defined as a gap between the standard of the process and the actual condition (Liker & Franz, 2011). Liker & Convis (2011) suggest that it should be easy to see if there is a gap in production compared to the current standards. Further, Byrne & Womack (2013) suggest that how well the production is doing compared to tact time should be visible at each cell in the production. A measurement system should be put in place, both to measure performance of CI initiatives and to measure performance gaps in order to provide information for directing CI efforts (Bessant & Francis, 1999). Goodridge et al. (2015) found that measurements are important not just to define a problem and make it visible but also as evidence of successes of improvements.

2.2.4 Continuous improvement training

Several authors (García et al., 2014; Jaca et al., 2012; Knol et al., 2018; McLean et al., 2017; Shook, 2010; Trenkner, 2016; Van Aken, Farris, Glover, & Letens, 2010) state that training and education of CI is of high importance in order to initiate a CI culture and methodology. Further, in a case study by Lodgaard, Ingvaldsen, Aschehoug, & Gamme (2016), all interviewees mentioned a lack of knowledge and knowledge sharing as a barrier for CI. Also, García et al. (2014) found that education has a positive impact on communication in CI implementation. McLean et al. (2017) found that a lack, or incapability, of training to deliver the needed

knowledge is a factor for unsuccessful Lean implementation. They further found that even when adequate training is provided, initiatives can still fail if there is no further support afterwards. Knol et al. (2018) state that a lack of resources and support has been found to be destructive for the implementation of Lean practices. Byrne & Womack (2013) suggest that a support operation should be created to support the Lean implementation, whose responsibility would be to support and run CI events and provide training in Lean techniques. Camp (2015) states that it is important to have a full-time employee working with Lean. Jaca et al. (2012) mention that to provide assistance for CI activities, some sort of organization in charge of Lean activities should be established.

Training (in TQM) can often be too theoretical (Zbaracki, 1998). A long time between training and result can lead to frustration, but this can be partially prevented if training is done on real improvement projects (Snee, 2010). Practical assistance should be provided to employees in order to secure that both knowledge and experience necessary to implement the policy is taught to the organization (Oakland, 2011). Implementation of CI should include both basic training in problem-finding and problem-solving processes as well as training in basic CI tools and techniques (Bessant & Francis, 1999). Managers should receive training in teamwork and problem-solving methods (García et al., 2014). Byrne & Womack (2013) argue that a CI implementation should begin with a series of full time Kaizen events that last for about a week. Kaizen events can be considered as a good teaching tool for initiating a CI culture and promoting problem-solving knowledge within the company (Liker & Franz, 2011). Considering the extent of training, employee turnover at operational level can be detrimental to Lean CI development, as the new employees lack the training required, while at higher levels turnover of managers, whether they move within the company, to new positions, or outside, can be detrimental as it leaves no one to sustain their efforts (Zbaracki, 1998).

Imai (1986) states that people must be trained in using problem-solving tools. However, a certain discrepancy seems to exist regarding the initial extent of training, with Mcpolin (2014) suggesting that initial training should encompass all employees and McLean et al. (2017) suggesting the mile-deep inch-wide approach of starting education with a small team. Liker & Franz (2011) recommend that a Lean implementation begins with a pilot area where knowledge of the CI methodologies are taught in depth before spreading it to the rest of the company. They further recommend that the PDCA-cycle is followed strictly during this initial phase and that a teacher guides the process. During the development of a CI process (CIP), only a few processes should be selected at a time according to available resources (Jaca et al., 2012; McLean et al., 2017). Going in depth with the initial area will further support spreading of Lean at a later stage as it allows for the training of internal teachers that can teach their co-workers (Rother, 2010). Byrne & Womack (2013) further support this view, stating that a company should initially create a model line in order to create deep understanding of Lean within this area. Risks are that if one is too ambitious and make too large changes too fast, the organization is not able to accommodate to them and the changes may not take hold (Hackman & Wageman, 1995).

2.2.5 Standardization

Standardization has been identified by Ma et al. (2017) as a prerequisite for CI culture. Further, there would not have been any improvements if the work would not have been standardized, thereby, the core aspect of CI is to maintain and improve standards (Imai, 1986). Standardized work is based on three elements: Tact time, precise work sequence performed by worker within tact time, and the standard inventory required to keep the process operating smoothly (ibid.). Emiliani (2008) mentions that standardized work leads to several benefits, such as reduction in variability, improved quality and flexibility as well as stability and clear expectations. He further mentions that standards should not be seen as a strait jacket that inhibit worker creativity, rather creative ideas should be encouraged and incorporated into the standard in a controlled way. Liker & Hoseus (2008, p. 163) mention that "the standardized work must be owned by the team and seen as a tool to record and teach the newest ideas." A system for auditing the standard work of TMs need to be put in place for auditing standardized work or the leaders are apt to stop auditing when they feel that the TMs know it all (Liker & Meier, 2007).

Liker & Franz (2011) state that it is critical at the process level to have a standardized work which expose process abnormalities, as without standardized work and job instruction training, the TMs lack the skills to point out problems as they occur and thus the possibility to investigate them live vanishes. This view is supported by Wittenberg (1994, p. 12), who states that "Standardization is an essential feature of kaizen. The drill is to establish a standard, maintain it, then improve on it." Furthermore, Byrne & Womack (2013) denote standardized work as extremely important for improvement work as, without a standard to compare to, it is difficult to know if an improvement has happened. Imai (1986, p. 6) continues with that "If people are unable to follow the standard, management must either provide training or review and revise the standard so that people can follow it." Emiliani (2008) further notes that the benefits of standardized work is that it creates a reference point for CI. This reference point is then shifted at each improvement by changing the standard, or as (Imai, 1986) explains it, once a problem has been solved, that solution must be standardized to prevent reoccurrence, see Figure 2.2. Standardized work also increases the visibility of abnormalities, and can act as a platform for individual and organizational learning (Emiliani, 2008).
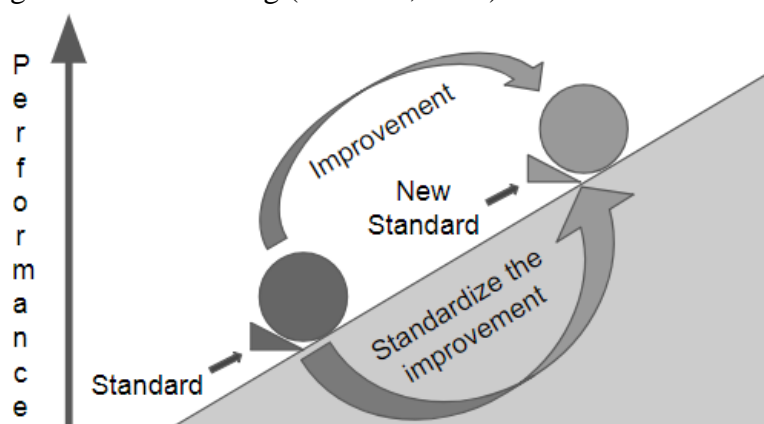
Figure 2.2. An improvement becomes the new standard adapted from Rother (2010, p. 12)

Imai (Imai, 1986, pp. 75–76) states that standards have the following six characteristics: "1. Individual authorization and responsibility; 2. Transmittal of individual experience to the next

generation of workers; 3. Transmittal of individual experience and know-how to the organization; 4. Accumulation of experience (particularly with failures) within the organization; 5. Deployment of know-how from one workshop to another; 6. Discipline."

2.3 Leadership

This section is divided into two parts. The first part gives a brief description about what leadership is, while the second part briefly explain Lean leadership. The second part also include the difference between a group leader and a team leader.

2.3.1 Leadership general

The subject of leadership has been studied for many decades (Yukl, 2013), which has resulted in many different definitions. Each definition depends on the focus the researchers have chosen for their study, and as a result there is not an agreed common definition for a leader nor a manager (ibid.). Elvnäs (2017) mentions that for several centuries, the main task of a leader has been to inform and instruct others but the last twenty years the focus has shifted towards that a leader should focus on co-workers instead of oneself. He suggests that this can be done by asking questions, listening and giving feedback, i.e. a leader's main task should now be to coach and give feedback.

For Kusén & Ljung (2013, p. 69), "leadership is about creating a culture and a structure so people can feel meaningful, competent and appreciated." Further, Northouse (1997) claims that there are themes which are central to concept of leadership: leadership is a process; leadership involves influence; leadership occurs within a group context; and leadership involves goal attainment. Another definition is used by van Aartsengel & Kurtoglu (2013, p. 32) leadership is "the art of influencing people and to gain their 'genuine commitment' to accomplish common organizational goals". Another definition is the one Elvnäs (2017) uses in his book *Effektfull*: leadership "implicates interaction with co-workers, since it is through interaction with co-workers that you can wield influence". His book is based on the findings from his research about leadership, which has been performed in different environments. Influence is a recurring word which Elvnäs (2017, p. 27) points out and which he defines as "something that makes us do what we do, leads and steer us in our actions in different situations." Further, he points out that a leader whom does not influence others is not a leader, since "to lead is to influence" (p. 15). Process is another recurring word by him, which he defines as "something which systematically occur continuing and recurrent" (p. 27). With these two words, influence and process, he states that leadership is about recurrently and systematically influence others. This is complicated by that it is not only the leader that influence a person's working life, also the colleagues and the person's own work procedure have an influence (Elvnäs, 2017). He mentions that these three influencing things has been identified by an American psychology and behavior researcher named Aubrey Daniels. Both influence and process were two words mentioned by Northouse (1997) when explaining leadership.

2.3.2 Lean leadership

The leadership used at Toyota Motor Corporation is known as Lean leadership (Liker & Convis, 2011). One definition for Lean leadership is the one by Dombrowski & Mielke (2013, p. 570),

who define Lean leadership as "a methodical system for the sustainable implementation and continuous improvement of LPS. It describes the cooperation of employees and leaders in their mutual striving for perfection. This includes the customer focus of all processes as well as the long-term development of employees and leaders."

Several authors (Achanga, Shehab, Roy, & Nelder, 2006; Dombrowski & Mielke, 2013; Poksinska, Swartling, & Drotz, 2013) claim that Lean leadership is important. Dombrowski & Mielke, (2013) claim that Lean leadership is a prerequisite in order to engage and involve the employees in their daily improvement activities while both Achanga et al. (2006) and Poksinska et al. (2013) claim that Lean leadership is a prerequisites for a successful and sustainable Lean implementation/initiative. Further, Liker (2004) claims that in order to have a successful Lean implementation, it requires a long-term commitment by the leaders.

Group leader and team leader

Liker & Meier (2006) state that GLs and TLs have three main responsibilities: support for operations, promotion of the system and leading change. Each leader is in charge of a team of employees. The ideal span of control for a leader for a group is, according to Toyota 5-7 persons but that 6-8 are frequently occurring (Liker & Hoseus, 2008). Leadership at production level requires small teams of around five people or the leader will not be able to devote enough attention to each employee (Trenkner, 2016). Liker & Meier (2006) mention that both types of leaders should, among others, support CI activities, but while GLs should process TM' improvement suggestions and work on CI activities, TLs should train TMs. Liker & Meier (2007) state that a GL, or a skilled TL, should teach work instruction according to the Training within industry (TWI) methodology to employees. They further mention that the GL has the responsibility to develop a training plan for job training and the TL should assist training, and recommends not using full time trainers to TMs.

Marksberry (2010) mentions that at Toyota there is a balance between the GL leading the TL and encouraging the TL to express opinions of how the work should be performed. According to his findings, the TL makes suggestions to the GL but the main focus is on supporting the GL. Furthermore, he mentions that GLs and TLs held an interdependence that suggests that a TL has to be able to perform many of the same functions as that of a GL, which confirm what Liker & Meier (2006) mention regarding that the TL should train for the GL role.

"The group leader is the first-line supervisor, the first formal management level. This person leads the daily work that brings the tools and methods of lean to life" (Liker & Franz, 2011, p. 90). A GL's work is centered on managerial tasks of daily management, responding to issues, revising standards and overseeing CI activities (Inamizu, Fukuzawa, Fujimoto, Shintaku, & Suzuki, 2014). Further, a GL's work among others, include to gather failure information, make quality improvements and make process observations (standard development and adherence) (ibid.). Liker & Convis (2011) state that the GL is the primary driver of daily Kaizen as their insight into the teams provides them with the ability to identify the problem.

A TL's work includes taking care of line stoppages and malfunctions, support and perform CI in production (Liker & Franz, 2011). Inamizu et al. (2014) agree and continue that TLs should also handle managerial tasks and be a relief worker who steps in on-line when a line worker is

missing. Marksberry (2010) states that TLs should provide assistance when it comes to issues of minimizing production variations, decisions of inventory management as well as provide emergency assistance to maintain the production flow. Furthermore, he mentions that a TL needs to have technical skill in the production flow that person is leading and be a good teacher. The TL should know every job in his/her area and can therefore teach them (Liker & Meier, 2007).

At Toyota, a TL divide their time between working on the line full time certain days and as TL full time the other days (Liker & Convis, 2011). Responsibilities of TLs include answering Andon calls, problem-solving, checking quality and conformance to standards as well as working on Kaizen projects for the group (ibid.). Marksberry (2010, p. 408) mentions that there is a lack of detail and the exact practices that make up a Lean TL, but at Toyota, the TLs have the responsibility "to teach and develop team members, maintain and improve team member relationships, provide emergency assistance and fill in when needed." He further mentions that a TL is also responsible for the teaching and upholding of quality in the production process. Further, he found that a TL at Toyota put roughly the same balance of time between the following four categories; plan, prepare, and organize; check, observe and monitor; act on abnormal activities and problem-solving; and lead and report.

Inamizu et al. (2014) characterize over-lean as a mode of Lean where emphasis is shifted from offline activity (real cause analysis, revising standards through CI and developing multi-skilled workers) to online activity (standard work and dealing with defects). They mention that this state arises when increases in production cannot be met by recruitment, skill development and CI activities. As a result, it sacrifices the long-term development of both process and personnel for an increase in capacity and should therefore be limited to absorbing short-term fluctuations on market rather than actual increases to demand (ibid.). Furthermore, they state that you can determine the current mode by observing the behavior of the GL to see how much time he/she spends on online activities. In an over-lean system, a TL frequently has to work in the production, meaning that the GLs have to cover their responsibilities by responding to the issues that the TLs usually should perform (ibid.). To avoid this to occur, Inamizu et al. (2014, p. 195) suggest that "When the workers' skills are constant, it is necessary to increase the number of workers in order to increase the line speed and not to increase the working hours."

2.4 Lean leadership model

Dombrowski & Mielke (2013) have made a conceptual model, based on a literature study within Lean leadership, which consists of five fundamental principles of a Lean leader: improvement culture, self-development, qualification of employees, Gemba and Hoshin kanri. The model is not industry specific (Aij & Teunissen, 2017) and the "principles should support lean leaders in their daily efforts for continuous improvement" (Trenkner, 2016, p. 135). The model bears similarity to Liker & Convis's (2011) leadership model, which includes four stages/characteristics which is, by them, seen as most important of Toyota leadership. These stages are related to the True North values, which are the five elements of the The Toyota Way 2001 house. The principles have been identified as important in order to succeed and sustain a Lean implementation. This section is thereby divided into five parts, one for each principle.

2.4.1 **Improvement culture**

Two key values for an improvement culture, also known as Lean culture, are striving to perfection and that failure is a possibility to improve (Dombrowski & Mielke, 2013). Long-term thinking is here considered to be an important aspect (ibid.) and is important since developing CI capability is "an evolutionary learning process, with a gradual accumulation and integration of key behaviours over time" (Bessant & Francis, 1999, p. 1107). A Lean leader should "Set the direction and build organizational capability to solve problems at the root cause" (Byrne & Womack, 2013, p. 107). van Aartsengel & Kurtoglu (2013, p. 26) state that without the right leadership, none of the other factors for achieving CI will matter because "you will not be able to create the right culture, you will not be able to plan and manage strategically, you will not be able to improve the enterprise performance, you will not be able to improve internal processes, and you will not get the right results." The role of the Lean leader is to influence the attitudes and behaviors of the employees towards development of the production (Halling & Renström, 2014). Further, a leader is someone who can "infuse the business with purpose and values, help determine the character of the enterprise, and ensure its long-term survival" (van Aartsengel & Kurtoglu, 2013, pp. 31–32). Leaders should never work on short-term objectives on the cost of abandoning long-term objectives (Trenkner, 2016).

One way of changing culture is to provide positive feedback as it will be interpreted as the right way to continue and thus will be incorporated into the group identity (Schein & Scheiner, 2017). Dombrowski & Mielke (2013, p. 571) mention that shop floor workers probably have most knowledge about a process weaknesses and failures, "they need support from the management in order to maintain improvement activities at all levels and all processes." Thereby, they continue, "Lean leaders have to pick up the employee's ideas and help to apply them in practice" (p. 571). Applying ideas can be seen as a positive feedback on improvement suggestions and should thus according to Schein & Scheiner's (2017) argument change the culture of the group. As rapid response to suggestions and that improvement ideas are implemented as soon as possible, is important for employee participation (Byrne & Womack, 2013) and the participation of individuals in improvement efforts pushes the method into the company (Zbaracki, 1998), a leaders role can also be to provide this feedback and to implement employee suggestions. This is also supported by Liker & Meier (2006) who state that part of GLs' responsibilities is to process TMs improvement suggestions. The GLs and TLs, together with their operators, need to feel ownership of the process (Liker & Convis, 2011). Leaders of CI has the responsibility to muster the resources within their authority to support Lean activities (Goodridge et al., 2015). Employees should be seen as a key factor in order for a Lean implementation to be sustained, and should therefore not be forgotten in the implementation process (Dombrowski & Mielke, 2013). Especially considering that a basis for CI is that all improvement work, should start with a need and this need can only be found by those who work with the production (Alves et al., 2012).

Trust leads to risk taking (Li, Nahm, Wyland, Ke, & Yan, 2015). Further, positive values of trust in managers' abilities will make workers more willing to participate in improvement activities (ibid.). Trust leads to that the employees feel motivated and noticed (Elvnäs, 2017). In order to support a trusting environment, a Lean leader should avoid putting blame on persons

for mistakes or errors (Goodridge et al., 2015), since it results in low levels of trust which in turn result in a lower employee initiative (Knol et al., 2018). Dora et al. (2016) found that a lack of respect for fellow workers and blame game had a negative effect on organizational culture. Dombrowski & Mielke (2013) mention that it has to be the process which should be in focus and not the person causing the failure. Furthermore, they mention that failures are a good thing, since it elucidates a problem with the process where actions are needed to prevent recurrence. Progress within CI depends on that everyone within an organization must admit any failings or mistakes made at their job otherwise progress is impossible (Imai, 1986). Therefore, Lean leaders should seek input from every member in a team in order to create a culture where all members feel free to raise issue and provide ideas (Goodridge et al., 2015). Imai (1986) states that the number of worker suggestions should be an important criteria for reviewing the performance of a supervisor. Knol et al. (2018) identified that learning focus, where employees are allowed to make mistakes and learn from them, is one of the three most important factors for initial Lean implementation.

Industry professionals seem to think that to teach Lean, it is important to apply Lean methods and coaching within the persons work setting (Flumerfelt et al., 2016) but that the tools in themselves are not what signifies a Lean operation, but it is the mindset of using tools to reach a Lean philosophy (Spear & Bowen, 1999). The "change in behavior and mindset of employees and leaders", is by Dombrowski & Mielke (2013, p. 569), considered to be the biggest challenge when implementing Lean. They further mention that the easiest part is the implementation of methods and tools, but for it to be successful, the leaders are required to have a deep understanding of Lean. A significant risk of Lean implementation is that the managers become overburdened with additional duties (Bhasin, 2013) this might lead to lower level managers not viewing CI as essential and thus not participating (McLean et al., 2017). Leaders that have access to sufficient "autonomy, information, support, access to resources and access to professional development" are more likely to be able to implement Lean (Goodridge et al., 2015, p. 12) and thereby create an improvement culture.

2.4.2 Self-development

Two key values for self-development are: Lean leaders are role models and new leadership skills are necessary (Dombrowski & Mielke, 2013). This principle covers the development of the leader. Trenkner (2016, p. 129) claims that "The role of a lean leader is to be open to personal development necessary to take care of one's leadership skills".

Liker & Meier (2006) mention that at Toyota, the majority of the leaders have started on the floor before being promoted to a higher position, thereby it usually takes many years for an employee to be promoted, which result in a great knowledge about the organization. According to them "Toyota does not view the manager's job as simply accomplishing tasks and having good people skills" (Chapter, 1.3.9). This is confirmed by Trenkner (2016, p. 133), whom claim that "charisma is not a feature Toyota searches for in its leaders" and that "Toyota prefers modest, responsible people willing to work in a team and open to learning. Competent leaders who demonstrate their skills at work all the time are highly appreciated." According to Goodridge et al. (2015), Lean leaders are supposed to act as models for the behavior i.e. lead

by example. Mann (2010) states that to learn Lean through Gemba walks which requires the student to be patience and to tolerate frustration as the learning takes time. He continues that the student needs to make corrections as necessary to learn the mindset and that it must be developed over time through personal experience. Further, he mentions that the desired outcome of sensei-student Gemba walks is that the student for him/herself learn to see where Lean management principles can be applied, this knowledge gained can later be used to teach others.

Emiliani (2008) states that leaders often say that their work cannot be subject to standardization because it is subject to a great deal of variation, however this variation can often be tracked to be the result of inconsistent decision making from the leader. This means that a lack of standard for leadership can be both inefficient and costly. Elvnäs (2017) mentions that clarity creates security for the co-workers and makes it easier for the leader to perform his/her work. Emiliani (2008, p. 25) mentions that standardized work can bring many of the same benefits for leadership as it does for workers and can be comprised of a "definition of leadership, an expression of business principles, and identification of a skill set for executives", which can provide a framework for leadership at the company. He further mentions that this framework for standardized leadership could contain three aspects: a definition of leadership that takes into account both internal and external customers, a description of principles that leaders are to follow in their work and a standard skill set in aspects that keep the business process operating smoothly. This standard should then be corrected in the same way as any standard, using CI. Standard work for leaders help in translating the abstract concept into concrete expectation of how a leader is supposed to lead (Mann, 2010). As part of Emiliani's (2008, p. 34) definition of a standardized leader, he states that a leader should have "Beliefs, behaviors, and competencies that demonstrate respect for people, motivate people, improve business conditions, minimize or eliminate organizational politics, ensure effective utilization of resources, and eliminate confusion and rework."

2.4.3 Qualification of employees

Two key values for qualification of employees, to coach and develop others, are long-term development of employees and continuous learning (Dombrowski & Mielke, 2013). This principle covers the development of a subordinate of the leader. Improving people in a Lean perspective is the most important aspect of a business (Wittenberg, 1994). Trenkner (2016, p. 129) claims that "The role of a lean leader is to [...] inspire and support one's subordinates so that they develop". An important aspect for a Lean leader is the process of coaching others as "the continuous development of processes must go along with a continuous development of people" (Dombrowski & Mielke, 2013, p. 571). This view is supported by Goodridge et al. (2015), who mention that Lean leaders should work mostly as coaches or mentors. The employees at the shop-floor are the ones that perform the value-adding work (Liker & Convis, 2011; Liker & Hoseus, 2008) and a leader should serve these employees, which is known as the concept *servant leadership* (Liker & Hoseus, 2008). A servant leader has to be humble and earn the respect of the workers (Trenkner, 2016) as "it is first when the leader do something for the co-workers that they in their turn will do something for the leader" (Elvnäs, 2017, pp. 39–40).

Elvnäs (2017) mentions that the best leaders are those who like to help others reach a higher degree of independence and make them grow within their tasks. According to Byrne & Womack (2013, p. 107) a Lean leader should "Show respect and support for all your associates." *Sensei* is the Japanese word for teacher and it is how an employee, apprentice learn how to perform a work by a superior who is one or two level above in the hierarchy (Liker & Convis, 2011). For operators, these levels are made up by TLs and GLs who should coach and act together with the operators, own and improve the process (ibid.). Furthermore, Dombrowski & Mielke (2013) mention that the coaching should be taken place every day. The person responsible for the daily coaching at Toyota is the direct manager (Liker & Franz, 2011). The employee needs to be constantly challenged and will learn through solving problems (Dombrowski & Mielke, 2013), and this is what respect for people means at Toyota (Liker & Franz, 2011). Further, the middle management must be able to explain its concepts and communicate commitment (Oakland, 2011).

Marksberry (2010) mentions that role prescriptions provide standards on how a role should play out in an organization and gives a mean to manage the expectations a particular role has. He continues that role prescriptions can be divided into obligations and rights, with obligations being the expected behavior of the person and rights being the behaviors others are expected to direct towards the role holder. Further, Liker & Hoseus (2008, p. 139) mention that at Toyota, an employee is first to learn one role before he/she can learn the role one level up and this is possible "by having clear roles and responsibilities for each job level". They further mention that the requirements for an employee to assume a role, e.g. the skills and experience, are identified and visualized in a matrix chart, which is used for the coach and employee to see the process and decide what needs to be done in order for the employee to assume the role.

García et al. (2014) state that workers need to be trained to work in different processes. Job rotation deepen knowledge and experiences of the operator (Macpherson, Lockhart, Kavan, & Iaquinto, 2015). Job rotation means that all TMs are familiar with the processes performed in the team, which is a strength when it comes to problem-solving (Liker & Hoseus, 2008). Monden (2012) states that Lean teams must develop multi-skilled workers through job rotation that can determine the root cause of deviations. He further states that "since each worker participates in every process within the shop, he feels responsible for all goals of the shop, such as safety, quality, cost, and also production quantity" (Chapter 8.3). Liker & Hoseus (2008, pp. 179–180) have acknowledged that employees which only perform one task in the team "have no interest in discussing improvements of other jobs on the team since they do not personally perform them" and thereby state that "with job rotation there is a high level of interest in discussing all aspects of the jobs in the team." Beyond that job rotation is positive from a problem-solving perspective, it is also positive from an ergonomic point of view, since demanding work tasks are shared between the TMs when applying job rotation (Liker & Hoseus, 2008; Monden, 2012).

Dombrowski & Mielke (2013) mention that the coaching should be taken place at the shop floor, not simply through courses and training. Further, a Lean leader's coaching is not about solving the problem but rather about the process of developing people in the problem-solving methodology and thereby the teaching of the individual is more important than the improvement

itself (Rother, 2010). "Leaders should set high standards and challenge their employees to stretch and think beyond their first or second idea, not accepting mediocrity. At the same time, leaders need to show trust and patience with their employees even if success does not come in the short term" (Mcpolin, 2014, p. 50). Managers should coach and not fix (Spear, 2004) and a Lean leader needs to move from a 'hero mentality', primarily working as problem-solvers, to become a coach and build learning teams (Kaplan, Patterson, Ching, & Blackmore, 2014). A Lean leader should support employees in the problem-solving process, not help employees solve problems (Trenkner, 2016). It is important for the leader to not correct every detail, since this can hamper the motivation and involvement of a co-worker (Elvnäs, 2017) and a servant leader needs to learn to hold back solutions and focus on developing other (Liker & Convis, 2011). Toyota emphasizes that it is important to let an adept struggle with their problem for a longer period of time, rather than for the coach to solve the problem for him/her (Liker & Franz, 2011). However, guidance in the process of problem-solving is important, as mentioned by Elvnäs (2017, p. 153), "humans want it to be clear what they are expected to do. When they then do that, they want someone who cares and when they are done, they want some assurance regarding if what they did was good or bad and understand why." One such structure can be Toyota Kata, which can be seen as a formal structure for teaching improvements (Dombrowski & Mielke, 2013). Further, Liker & Ballé (2013, p. 19) state that Lean leaders need to teach their employees four things: "First, they should teach work standards, which means making explicit the critical difference between what we know for sure (confirmed by repeated experiment) and what we do not. [...] Second, they teach how to see and report abnormalities. [...] Third, they should teach kaizen, or participating in team problem-solving projects and learning to solve problems with specialists from other functions. [...] Finally, managers must teach their employees how to make suggestions and carry them out themselves."

2.4.4 Gemba

Two key values for Gemba are: shop-floor management and decisions based on first-hand knowledge (Dombrowski & Mielke, 2013). *Gemba* is a Japanese word and means workplace, i.e. the place where value is added, and "should be the site of all improvements and the source of all information (Imai, 1997, p. 14). According to Byrne & Womack (2013, p. 107) a Lean leader should "Support the important processes through daily gemba walks and frequent reviews of the key performance indicators (KPI)." A reason to Toyota's success is their "deep appreciation for the value of deep knowledge of the actual situation" which has been possible due to genchi genbutsu, which means go and see to deeply understand (Liker & Franz, 2011, p. 62). By genchi genbutsu, Elvnäs (2017) mentions that the leader will understand the work tasks that are performed by the co-workers and the problems that arise for them. He further mentions that "Leaders who is well aware of co-workers work procedure and reality, also easier obtain a confidence from the co-workers to be their leader and has easier to make decisions for the organization" (p. 110).

Kaplan et al. (2014) mention that leaders being visible on the shop-floor contributes to the culture. Further, Goodridge et al. (2015) stress the need for a leader to be visible in the production since it send the workers a signal that their work has priority over other demands on the leader's time. A manager gain credibility and respect by performing a Gemba walk, which

consists of taking the time to comprehend the work of the employee (Gesinger, 2106). "Lean leaders should go to the shop floor frequently in order to truly understand the processes and to make the right decisions" (Dombrowski & Mielke, 2013, p. 571). Furthermore, Elvnäs (2017) mention that by regularly paying attention, following-up and evaluating the performed work, are the easiest ways to motivate someone. Time needs to be set aside to visit the Gemba each day, where a leaders recognizes an employee's work and is able to answer questions (Aij & Teunissen, 2017). Elvnäs (2017) mentions that an employee's performance is positively affected if the leader give the employee feedback on his/her performed work. In order to give adequate feedback, he further mentions, that the leader should collect information about a person's performance and his/her way to perform a task. The recommended method, by him, to do this, is among others, to be more present in the work the co-workers perform, which is possible through Gemba.

A Lean leader's decision should be based on facts confirmed personally from Gemba (Trenkner, 2016). At Toyota, each TL should review at least one employee daily to see if they work according to standard, the same applies to GLs and the person one step above the GL, but weekly (Liker & Meier, 2007).

2.4.5 Hoshin kanri

The key value for Hoshin kanri (HK) is: aligned goals on all levels (Dombrowski & Mielke, 2013). HK is also known as policy deployment and "is the process of setting goals and targets and, most important, the concrete plans for reaching those targets" (Liker & Convis, 2011, Chapter 5). HK is important for direction of CI development, as it allows a business strategy to be broken down into clear targets that can be measured (Bessant & Francis, 1999). According to Jaca et al. (2012), several authors have identified that the improvement program and its objectives needs to be linked to the strategic objectives of the company. Leaders should make sure that employee development is integrated into company objectives (Trenkner, 2016). According to Liker & Hoseus (2008, p. 429), HK "connects leadership's vision, values, and philosophies (the Toyota Way) to the daily activity on the floor (developing people in problem solving to reach business goals)." It is applied in order for each employee to feel that they are involved and know that they can contribute to the progress of the company (Liker & Convis, 2011). A leader should inform and make sure that the subordinate is aware of what needs to be done regarding how to proceed, the deadline and by whom it will be performed by since this has a positive effect on both the performance and motivation of a co-worker (Elvnäs, 2017).

"Hoshin kanri focuses the CIP activities of each team on a long-term goal to make sure that improvement activities do not have opposite directions" (Dombrowski & Mielke, 2013, p. 572). Trenkner (2016, p. 129) claims that "The role of a lean leader is to be and formulate challenges and objectives so that teams at each level of the organization have their contribution to the continuous improvement and the achievement of long-term objectives." Further, according to Byrne & Womack (2013, p. 107), a Lean leader should "Identify breakthrough opportunities and set stretch goals to achieve them", where, according to Trenkner (2016), precise objectives should be used as intermediates of long-term goals. Stretch goals set by the overall strategy for the CI should be difficult to achieve (Byrne & Womack, 2013). Elvnäs (2017) mentions that

with clear goals set for the organization, it is easier for the co-workers to know what they should do and how the co-workers individual performance affect the organization. For instance, each KPI should have a single person who is responsible for performance against the metric (Camp, 2015). Furthermore, those measures can be broken down into more specific measurements that make them up the further down the hierarchy one gets (ibid.). Elvnäs (2017, p. 102) mentions that it is crucial for a business to break down the organization's goal for the co-workers in order to enhance their motivation, participation and involvement, since "Clarity in goal and aim constitute a deep ground for humans motivation and is crucial for how much they are willing to endeavor."

2.5 Framework analysis

A framework analysis was conducted and resulted in the model visualized in Figure 2.3. The model is divided into two sub-models which will be used to evaluate the fulfillment of enablers and Lean leadership principles. The models are further divided into five categories, each representing an area to be analyzed. The enablers are used to investigate how well the company fulfill the system level requirements for CI and is divided into management commitment, employee involvement, communication, CI training and standardization. The Lean leadership principles are used to investigate how well the Lean leaders at the case company fulfill the requirements for CI and consists of the areas of improvement culture, self-development, qualification of employees, Gemba and Hoshin kanri. Each arrow represents a research question (RQ) and the analysis of the sub-models will be used to answer these questions. The first RQ will be answered by analyzing the fulfillment of each enabler and then see its effect on the CI culture. The second RQ will be answered by analyzing the fulfillment of each behavior model at GL level. The third RQ will be answered by investigating how the lack of fulfillment of enablers affect the behavior model of Lean leaders.
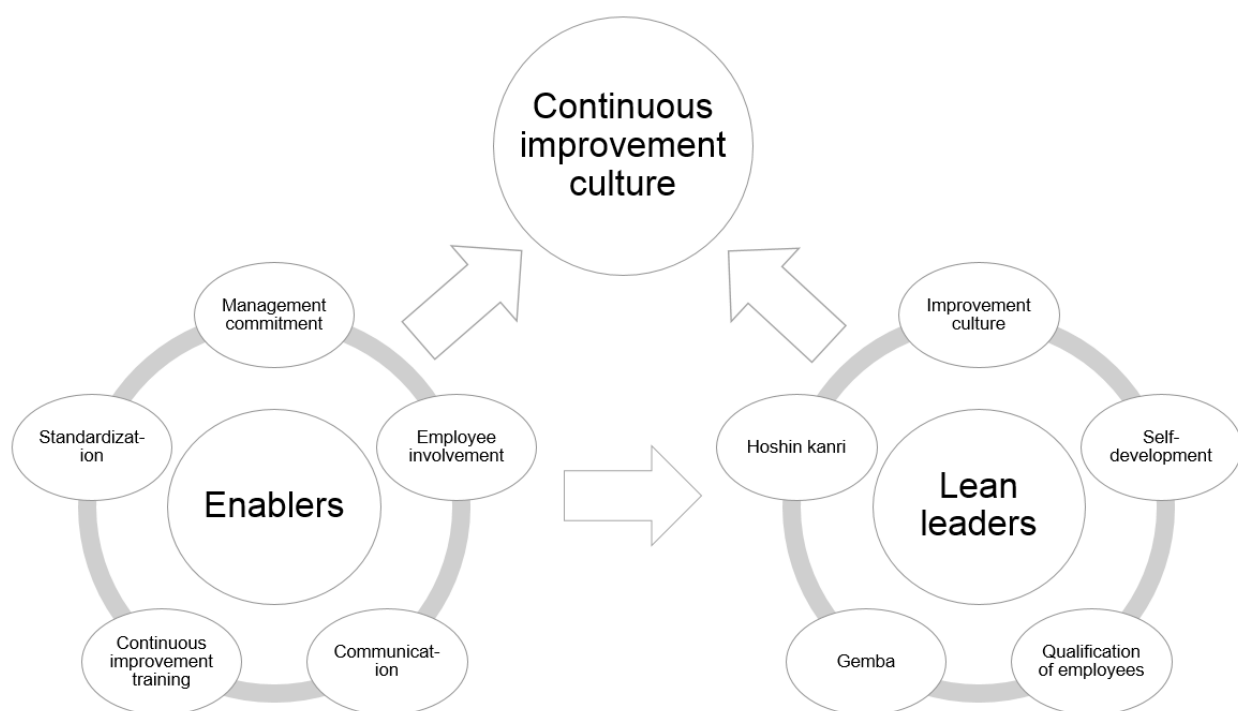

Figure 2.3. Analysis model

3 METHODOLOGY

The research was performed as a case study and therefore the first section regards the characteristics of a case study. This is followed by a section about the conducted literature study as well as a section about the three data gathering methods applied. The fourth section regards how the data has been analyzed, while the fifth regards the validation of the data. The sixth regards the ethical considerations while the seventh, and last, regards the sustainability aspects.

3.1 Case study characteristics

The study was exploratory, investigating what can occur, and the area of investigation was not a controlled environment as well as that the research needed to be conducted observing live events. This corresponds to Yin's (2014, p. 2) recommendation that a "case study research would be the preferred method […] when (1) the main research questions are 'how' or 'why' questions; (2) a researcher has little or no control over behavioral events; and (3) the focus of study is a contemporary (as opposed to entirely historical) phenomenon", case study research (CSR) was chosen as the study method.

"A case study is an empirical inquiry that investigates a contemporary phenomenon (the 'case') in depth and within its real-world context, especially when the boundaries between phenomenon and context may not be clearly evident" (Yin, 2014, p. 16). Further, Eisenhardt (1989, p. 534) states that "The case study is a research strategy which focuses on understanding the dynamics present within single settings." In a case study, non-random sampling is used and the case is chosen because it is of interest (Ridder, 2017). The case company chosen was a medium sized manufacturing electronic devices and was located in the Gothenburg area in Sweden. The company was of interest, since they had an ongoing Lean implementation and their entire business was conducted under the same roof, which seemed suitable for a CSR. Eisenhardt (Eisenhardt, 1989, p. 537) continues with that "the goal of theoretical sampling is to choose cases which are likely to replicate or extend the emergent theory." One reason for this study was to extend emergent theory, particularly in the interaction between enablers and Lean leaders, as well as the exact effect of unfulfilled aspects of the two sub-models of the analysis model. Woodside (2010, p. 9) mentions that "the objective of CSR is not to generalize findings to a population but to probe theory (i.e., one or more explicit mental models related to the processes being examined [...])." As the exact effect of the sub-models could not be explained by the theoretical framework, it was considered suitable to use a case study.

Woodside (2010) mentions that one benefit of the case study methodology is that it can facilitate a deep understanding of the actors, interactions, sentiments and behavior within a certain process. Further, Eisenhardt (1989) mentions that one of the advantages of CSR is the possibility to make adjustments during data collection, to, for instance, add cases and subjects to explore themes that emerge during the study. She further mentions that overlapping data can help discover these themes. This type of adjustment can also be applied to tools in theory building research, allowing researchers to change interview questions in order to probe themes and take advantage of opportunities (ibid.), which was applied in this study. The collection of

operational data, i.e. data arising from spontaneous conversation, observations of activities and texts written by the subjects, is one of the core strengths of CSR (Woodside, 2010).

3.2 Literature study

The framework in this thesis is the result of an extensive literature study and has been conducted in order to gain a sufficient understanding about the chosen topic. The research covers the following topics: continuous improvement, continuous improvement culture, leadership, Kata, Lean leadership, Lean Production and qualitative research as well as the combinations of the various phrases. The study has been performed by using primarily the search engines: Summon and Google Scholar. In addition, the reference lists of each article has been checked to see if they could give more valuable information. To store the sources and make a joint library, the reference management tool Mendeley was used.

The creation of the framework has been an ongoing process during the study. In the beginning, literature was collected in order to conduct the interviews. Thereafter, the framework has been adapted with respect to the obtained information from the interviews and observations, which corresponds Eisenhardt's (1989) description to how a case study is conducted.

The literature study resulted in an analysis model to analyze the subjects of enablers and Lean leadership and their effect on CI culture. The factors chosen to be included in the enablers model were based on different sources to identify enablers and a selection was made from the scope of the thesis, discounting those factors that would not apply to a production department. The Lean leadership model was based on Dombrowski & Mielke's (2013) model using the same five principles but amplified and enlarged using Lean leadership literature in order to enhance the possibility to evaluate them.

3.3 Data gathering

Two sources of information particular to a case study approach are direct observations of the events to be studied and interviews with the persons involved in the events (Yin, 2014, p. 12). Furthermore, Eisenhardt (1989) and Ridder (2017) mention that data gathering in CSR is usually focused around, but not limited to, interviews, archives and participant observation. These three sources of information was also the ones chosen for the thesis. This data gathered corresponds to empirical data, which means that it is collected in a real system where the interaction between humans and tasks or products are investigated (Osvalder, Rose, & Karlsson, 2010). Qualitative data is classified as data which answers questions regarding what, who, how, when and where as well as different aspects are investigated (ibid.), which means that the collected data for this case can be classified as qualitative.

3.3.1 Interviews

To get a deep understanding regarding the relationship between GLs, TLs and PM, as well as the other departments at the company, semi-structured interviews were conducted with most of the employees at these three hierarchical levels in the production department. The interviewees have in the interviews described their view of different contexts, e.g. how they felt and thought about certain matters, which corresponds to subjective data (Osvalder et al., 2010).

A semi-structured interview is a mix of structured and unstructured interview (Osvalder et al., 2010). It was in this case study decided to use the structure of a semi-structured interview since it makes it possible for the interviewer/s to ask follow-up questions (ibid.) or as DiCicco-Bloom & Crabtree (2006) explain it, that semi-structured interviews often have a set of open ended questions and allows for other questions to emerge during the interview which can elicit a deeper understanding of the subject. The length of this type of interview is usually longer and the number of interviewees are less than for a structured interview (Osvalder et al., 2010). DiCicco-Bloom & Crabtree (2006) further mention that spontaneous follow-up questions should be stated in an non-directive way as to not lead the interviewee on.

The interviews were conducted during a period of four weeks in the middle of the period of the study, which corresponds to 20 weeks. They were conducted in Swedish, which was later translated into English. In total eleven employees were interviewed, these were the PM, the three GLs and seven TLs. Of the TLs, two had proceeded to other positions within the company, but were in this study asked questions about their role as TL. They were also asked additional questions e.g. regarding their transition to their current position. There are different reasons to why not all TLs were represented in this study, however all TLs were allowed the chance to participate, meaning that selection did not occur.

The interviews were held by two researchers, where one to a high extent asked the questions whereas the other took notes and in some cases asked follow-up questions. The interviews were held with one interviewee at the time. Interviewing one individual at the time, i.e. individual in-depth interview, makes it possible to investigate social and personal matters in a deep way compared to group interviews where a larger range of experiences are presented but can prevent deep reflections (DiCicco-Bloom & Crabtree, 2006). Further, with in-depth interviews it is important for an interviewer to quickly establish a positive relationship with the interviewee and elicit feelings of trust and respect (ibid.) and therefore some initial questions regarding previous positions and education was asked in order to get to know the interviewee.

As a complement to the notes taken during each interview, the interviews were also sound recorded. This was done only with the asked permission of the interviewees. All interviewees agreed to be recorded and they were told that the recordings will only be accessible for the researchers and will be deleted at the end of the project.

The length of the interviews varied between the different positions. The TL-interviews lasted between 50-80 minutes whereof a majority of the interviews with GL and PM had to be broken down into several interviews. The reason for the length of the latter interviews was that their interviews were covering a larger spectrum of questions as well as they did not have enough time to dedicate for one long interview. In total the researchers have spent approximately 18 hours on performing the interviews. Adding the preparation before each interview, which corresponds to approximately 15 minutes, the amount of time spent, without the time spent on the interview guide, corresponds to approximately 22 hours per researcher. This allowed for a more complete picture to be formed, as the researchers allowed themselves to be completely emerged in the company culture and thus able to observe different actions for a significant time.

Since the interviews with some of the TLs were limited to one hour, to lessen the impact on the company, some questions were marked as questions that could be skipped in case the interview were taking longer than anticipated. At all time, it was also possible to ask the PM, GL and other personnel, questions if clarification was needed, e.g. a specific situation.

An interview guide was made with questions specific for the PM, GLs and TLs. The interview guides were in Swedish and their original structure can be found in Appendix A-C. The interview guides include the information given to the interviewee at start of the interview. The questions were based on background information about the company, the literature study and observations made early in the project. In the beginning of an interview it is important to get the interviewee talking and the first question of an interview should be both broad, open-ended, tied to the subject and non-threatening (DiCicco-Bloom & Crabtree, 2006). Therefore, the first interview held with an interviewee started with some background questions, which is something that was also recommended by Osvalder et al. (2010).

3.3.2 Observations

Observation is a method used to e.g. see if there is a difference or similarity to what a person claim they do and what they actually do (Osvalder et al., 2010). In this research, the conducted observations have been a complement to the interviews. The observations have not focused on how many times a person did a certain thing and thereby the result is more leaning towards qualitative than quantitative.

Unstructured observations of behavior have been made, which the researchers define as observations made without a pre-structured list of behaviors and actions to look out for and could entail anything from how the workplace is organized to specific interactions with employees. Eisenhardt (1989) states that field notes are important to create an overlap of data that enhances theory building. She further discusses that one should note whatever impressions that occur, rather than sifting because it is difficult to know what will have value in the future. Therefore, in the beginning of the research, the observations were made unsystematic and not systematic (Osvalder et al., 2010) since everything, that could be of interest was noted.

Marksberry (2010) mentions that observations need to be made on a wide variety of persons and contexts in order to be accurate. This was the case of this study, since observations were made over a wide period of time and settings, e.g. participating in different meetings, walking among the production groups, and by throughout the study being positioned in the production. This means that the researchers have more or less been active during the project, which corresponds to, according to Osvalder et al. (2010), a participant observation and has the advantage respectively disadvantage of being more credible respectively requiring a lot of time, compared to if been expert. They also mention that the persons who are studied, may, at least initially, be more aware of their behavior. Unstructured interviews can be part of participant observation where the observer ask the questions while participating in events (DiCicco-Bloom & Crabtree, 2006). The observations were made directly, since it was the researchers who were present and documented the information of interest, instead of indirectly which would have been the case if the researchers would have not present and instead used a tool e.g. video camera, to document the observations (Osvalder et al., 2010).

The researchers did also, too a high extent, participate at the daily meetings and group meetings with some/the specific groups at the production department as well as other meetings of relevance, which result in that the conducted observations can also be seen as participant observations (Osvalder et al., 2010). A complete list of meetings participated in can be found in *4.1.3 Meetings*. The researchers have spent approximately 55 hours each attending meetings, which have led to an increased understanding. Active participation in the case study group has the possibility to enhance the understanding of the world of the participants (Dahlke, Hall, & Phinney, 2015), therefore these types of observations resulted in a more complete picture of the company. When possible, Woodside (2010) states that a researcher should ask participants questions about what is happening, what is triggering the event, what the meaning of the event is and what is going to happen next as a consequence of the event. This has been made throughout the project, in order for the researchers to better understand what is happening.

3.3.3 Written documentation

Written documentation can be organization's internal documents, e.g. instructions and incidents reports (Osvalder et al., 2010). A document study was performed where written documentation from the case company was collected. The study of organizational documents can provide an alternative to observation for job analysis (Marksberry, 2010). However, organizational documents rely on people being aware of the expectations and conforming to the description, they are also subject to biases both when reading and compiling meaning that the message communicated might not be the message intended (ibid.). Internal documents in the form of both role descriptions, company exposition, educational documents and presentations were investigated which were retrieved from the company's operations manual.

3.4 Analysis

One way of starting to analyze data in a case study, is to perform a so-called write-up of the case which is pure descriptions of the case studied with a high degree of detail but without drawing conclusions (Eisenhardt, 1989). This comprises the current state of the study. To form the current state write-up, the three different sources of information were compared and all information pertaining to a certain topic was gathered alongside one another to illustrate either convergence or divergence. The interviews together with observations were used as a basis and document study's followed investigating interesting areas. To note, there has not been made a difference in the current state if the TL is a previous TL or a current, unless it has not been stated in the text.

The analysis was conducted by utilizing the analysis model and entering the data from the write-up. The enablers were applied to system level. A comparison was made between actual practices at the case company and the practices recommended by the literature, where discrepancies and similarities were examined. The effects of these similarities and discrepancies on CI culture were further extrapolated by using both literature and the write-up. This analysis is comprised of the current state analysis of the report and those discrepancies found that had a negative effect on CI culture was used as a foundation for the recommendations to the case company. The enablers model was applied to the system level of the company, looking at what can be

changed in the practices and system for the entire production department. The leadership model was applied to the GLs of the company and their effect on TLs and TMs.

3.5 Validation

Methods, to collect data, are applied in order to make it easier for a researcher to conduct their study but they are also applied in order to assure the quality of the study (Osvalder et al., 2010), then validation is an important concept. Validation regards to what extent the collected and assessed data corresponds to the reality and for which situation and target group the collected data is valid (ibid.). In this case, the target group has been the production department where the data has been collected from a bottom-up perspective.

Triangulation can be referred to as using several approaches to investigate research questions in order to enhance the confidence and findings of a study (Bryman, 2003). "Triangulation [...] has been viewed as a qualitative research strategy to test validity through the convergence of information from different sources" (Carter, Bryant-Lukosius, DiCenso, Blythe, & Neville, 2014, p. 545). When conducting studies involving human behavior, it is important to use different methods when collecting the data (Osvalder et al., 2010). Senge (1990) states that the mental model of a person interviewed during a case study often disagree with direct observations as made by a researcher (as cited by Woodside, 2010). In addition, either observations or interviews taken alone have a high likelihood of missing important details and lack depth of understanding. He also states that participants in a case study are often certain that their mental models are correct both on what has occurred and why it has occurred. Therefore, three types of data collection methods have been used: interviews, observations and written documentation. This corresponds to methodological triangulation (Bryman, 2003), where different sources of information is used to form a more complete picture. Triangulation in case studies often includes direct observations by researchers within the environment to be studied, questions asked to participants as well as study of written documents occurring in the subject area (Woodside, 2010). Since all these methods have been applied, it increases the validation of the study. Furthermore, Yin (2014) mentions that the construct validity of a case study can be enhanced by allowing key informants to review a draft of the report. Therefore, the thesis has been read by the company supervisor, before handing in the report.

This study has been performed by two researchers, which also can be referred to as investigators. Eisenhardt (1989) mentions two advantages to why multiple investigators are of value: firstly, multiple investigators enhance the creative potential and secondly, they provide either convergent or conflicting findings which either strengthens the argument or prevents a single researcher from calling case closed prematurely. The two researchers have throughout the study discussed the findings, both convergent and conflicting, which has led to a strengthening of the study.

3.6 Ethical considerations

Since the study involved employees at the case company and their daily interactions, it was important to regard the ethical issues the research may lead to. For example, DiCicco-Bloom & Crabtree (2006) mention that an issue with interviews is to make sure that specific data cannot

be traced to a particular individual as it can hurt their position in a system from persons whose interest are in conflict with the individual. Therefore, in the beginning of each interview, the interviewees were told that they were to be anonymous in the report. But since only a few persons were to be interviewed, and the interviewees were divided into three different groups, it might be possible to discern opinions of specific persons with enough pre-knowledge of the participants. For instance, the GLs were only three persons and it might therefore be easy to identify their individual contributions for any person with knowledge about the company hierarchy. Therefore, an agreement has also been made where the interviewees have acknowledged and agreed to the risk of identification of their opinions. These conditions have also been explained at the beginning of each interview. The researchers have also, to an as large extent as possible, hidden the identifiers of certain individuals in order to protect these peoples' identity.

Another aspect is the presence of the researchers at the production department, since this might not be comfortable for all workers. One way taken to mitigate the problem, was to inform the concerned personnel. Therefore, the personnel at the production department were informed by the PM, at the monthly production information meeting. The researchers also participated in most of the groups' meetings, where they were able to present themselves and explain the purpose of their presence. This hopefully made the personnel comfortable with the presence of the researchers.

The researchers have in certain cases hidden information about the number of members of each group who stated something in the current state description, this was made in order to protect the privacy of the interviewees. This might have had an impact on the validity of the study. However, the numbers have not been either exaggerated or understated, and therefore information is not misleading, merely not fully forthcoming and should not have a significant impact on the result.

3.7 Sustainability

Out of the three sustainability factors, i.e. economic, environment and social, this thesis mostly cover the social aspects, since focus was on the relationship between the employees and the leadership at the company. A healthier and more efficient climate at the company would most likely improve the economic gain for the company and in turn society, but the magnitude of this improvement can only be determined in retrospect. It was not the aim of the study to investigate this impact, rather the focus was on the psychosocial aspects of the interaction between different layers of leadership and therefore the economic aspect was left out. The effects of the environmental effects with an improved leadership at the company was either vague or non-existent. Therefore, the ecological aspect was not considered.

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4 CURRENT STATE

The current state is divided into four sections, which are as followed: company description, continuous improvement culture, enablers for continuous improvement and Lean leadership model. At some sections, there will be repetitions from a previous part, the reason for this is that the findings are related and thus the same information can apply to two different areas.

4.1 Company description

This section is divided into four parts. The first part is the company structure, where the focus is on one of the company's sub-department, the production department. The second part is a description about the company's Lean journey. Thereafter follows a description of the meetings involving the group leaders. The last part is about the company's applied CI methods.

4.1.1 Company structure

The study took place at a medium sized electronic device company located in the Gothenburg area in Sweden. The company had four KPIs, here stated in the order of priority: security, quality, delivery reliability and productivity. Further, they measured internal deliverability between processes which for many processes were around 50% while the delivery reliability to the customer was above 90%. The company had five departments: production and quality, product development, IT, sales and relations and economy, see Figure 4.1. The company had a total staff in the vicinity of 150 whereof around 100 were part of the production and quality department. This department was divided into four sub-departments: production, planning and purchasing, production development, and quality. The largest sub-department was production which had around 80 blue collar workers. There was one responsible manager for each of the sub-departments and these had equal authority, and this group of managers is referred to as production and quality management group. The managers consisted of: a production manager (henceforth referred to as PM), a quality manager, a purchasing and planning manager and a production development manager.
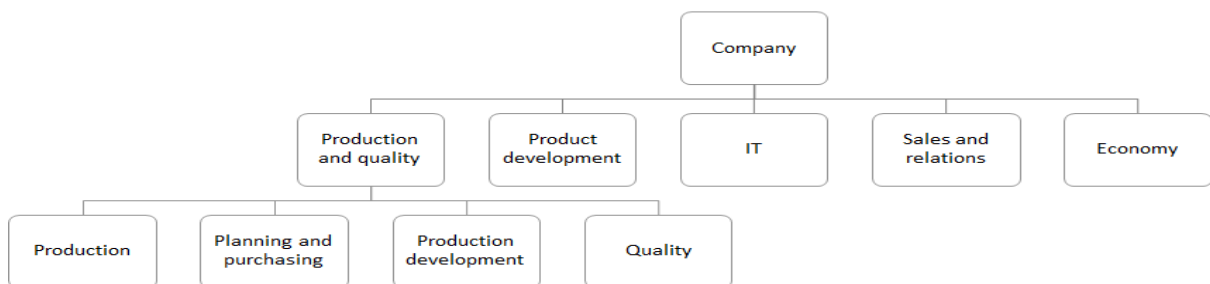
Figure 4.1. Structure of the company's departments

The production department was divided into four hierarchical layers, where the top layer consisted of the PM. The entire structure of the production department is visualized in Figure 4.2 at the end of this part. The PM had worked at the company for almost two decades, with various roles related to the production department, e.g. operator and product-coordinator, and had held the role as production manager for ten years. Before being employed at the company, he/she had worked for some years at other employers.

The next layer consisted of three production leaders, henceforth referred to as GLs, with authority over three different areas of the production. The GLs worked regular office hours with their office time being between 8:30 and 16 with one hour flexible time. The GLs' direct boss was the PM. Each GL had between 1-4 production groups, each with a TL leading the group. As the first layer of management, the GLs held staff appraisal meetings with each employee in the group/s that belonged to them. The GLs were positioned together in what can be considered a relatively central position of the production area, within less than a minute walking distance from the production groups. Further, their office was not enclosed or sectioned off from the remained of the production area.

The third layer of the hierarchy consisted of TLs who had the responsibility for making a daily initial placement of work tasks for the personnel in their group and reporting any missing personnel to the GL. Further the TLs were to communicate any issues reported in the groups to their GL. There were nine TLs, each responsible for a group of two to ten TMs, which is the fourth and final layer in the hierarchy. Six of the groups worked daytime, whereof three had flexible working hours and the other three had set working hours. The groups with set working hours had pitched times, which consisted of 90 minutes pitches of production where throughput was measured. The last three groups worked in shifts, where one group was divided into two shifts. These three groups worked on a highly automated line. Out of the other six groups, one was responsible for the inbound warehouse and another the outbound warehouse, while the other four performed manual work on the parts delivered from the other three groups. The TLs worked the same times as their TMs, except for the group that was divided into two shifts, where the TL worked day-time and was thereby partly present during both shifts. The TLs reported directly to the GL responsible for their group.

Included in the production department, there were a group of flow technicians (FT). During the study, the responsibility for this group shifted from the PM to a TL. This TL was not working as a FT, instead his/her role could be seen more as that of a GL. The FTs had the responsibility to do maintenance on machines as well as perform emergency repairs.
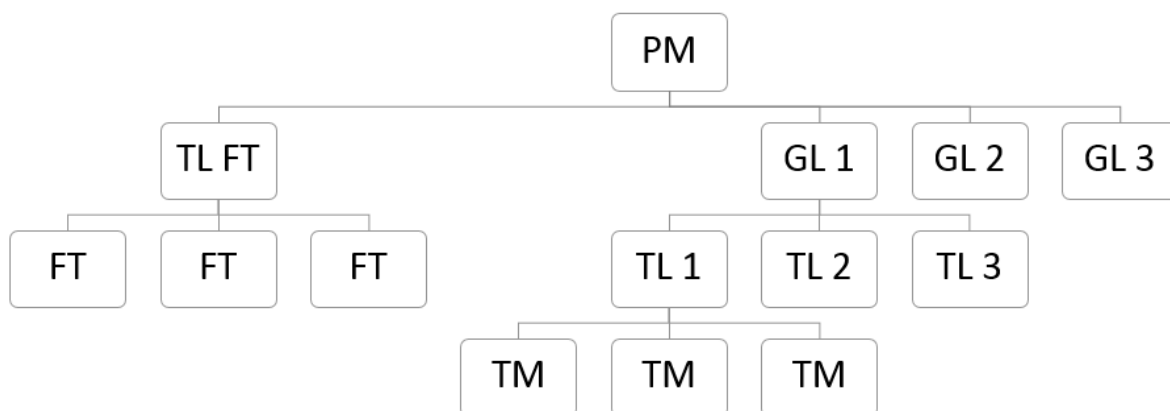

Figure 4.2. Structure of the production department

4.1.2 Lean journey

The company started their Lean journey 2002, when a managing director was hired who brought Lean methods to the organization. The following years methods such as 5S, standardization,

Kaizen and Kanban were implemented. The reason for working to implement Lean was stated as driven by working towards a one-piece flow. Since 2015 they have worked with the challenge-based Kata system between PM and GLs as well as between GLs and TLs. At the beginning of the study, the PM deemed that they had reached the GL level with the Lean implementation, meaning that they had fully grasped the methods and ideas, while certain TLs might had absorbed a small amount of the Lean principles and thought patterns. Furthermore, the PM stated that the company had come far on their Lean journey, but that there was still a long way to go. They had created a system and rules, but he/she would have liked them to work more with CI and make sure that everyone in the organization learned.

The production department had years prior to the start of this study gone from having a very flat organization with managers with up to 30 direct reporting employees to an organization where GLs and TLs existed which should have somewhere in between 3-10 employees each reporting to them. This was, by the PM, stated as a result of working to adopt Lean philosophies as a manager with that span of control, i.e. number of directly reporting employees, does not have the time to implement Lean. The changes to the organization were also stated to be unfinished as the GLs still bore a brunt of the responsibility that was to be handled by TLs.

4.1.3 Meetings

The company had several recurring meetings involving the GLs and these are presented below with a description of e.g. how often they occurred, whom were present and what they handled. In addition to these meetings, there were also other meetings, e.g. staff appraisal meetings, salary meetings and emergency meetings.

Morning meeting

At 8:45 each day the production department had a quarter of an hour meeting, henceforth called morning meeting, where representatives from each function in the production and quality department participated. This meeting was an avenue to discuss that had cropped up in production. The meetings followed a strict order of speakers and were organized so that any larger issues would be discussed after the meeting with only the people needed. Anything discussed was to be recorded on a whiteboard for future reference, however as far as could be seen, this was done infrequently and certain members of the meeting never recorded their statements.

Meeting between TL and TM

Daily group meetings were conducted in the production groups where the TL took attendance and made a preliminary decision on where the TMs would start their work day as well as an avenue for TMs to bring issues to the knowledge of the TL. For most groups the meeting took place before the morning meeting so that the GLs could bring any issues or staff shortages onwards. In the exceptions where the meeting took place later the GL took attendance before the morning meeting.

Meeting between GL and TL

To some extent, there were daily meetings between the GL and his/her TL or TLs. Two of these were held before the morning meeting, while one was held between the changes of shift. The

meetings were held in order for the TL to bring up problems that had occurred, e.g. absence of personnel or material as well as give the TLs information when needed. The length of these meetings were generally around 5-10 minutes. Between some GLs and TL/TLs there were no decided meeting time, since they started at different times, instead the TL contacted the GL if needed.

Operational control meeting

Once a week the PM and the GLs had an operational control meeting (OCM). The meeting went according to protocol which had a number of fixed points such as information from the weekly meeting of the production and quality management group, co-workers in need of action, joint activities, as well as other areas of discussion. The PM led the meeting and had decided beforehand which points to bring up. The length of these meetings were between 1-2 hours. The format was to be changed at the end of the study, where among others ideas and issues brought up during group meetings were to be discussed during this meeting.

Production and quality management group meeting

Once a week the production and quality management group had a meeting. The meeting consisted of topics to be discussed which was submitted by each of the managers and followed a loose structure with the PM as the meeting conductor. In accordance with the change in OCM meetings this meeting was to bring up those issues that could not be handled in the OCM environment, however this had not been implemented at the end of the study.

Group meeting

Once a month the GLs had a group meeting with each of his/her production groups, one at a time. The agenda for this meeting changed at the end of the study, where more focus would be on improvements, with the problems raised being placed on a board for all personnel to see. The improvement suggestions were then to be discussed during OCM. The meeting would also cover an update about the group's progress regarding the KPIs. The length of these meetings were between 30-60 minutes. The previous agenda also included raising problems and improvement suggestions, but not in the same structured manner as the new agenda.

Production information

Once a month the PM had a meeting with all employees belonging to the production and quality department. During this meeting, he/she presented information about, among other, economy, new products, changes in the production, new or changes with the personnel. The length of these meetings were generally 30 minutes.

4.1.4 Applied continuous improvement methods

This part contains information about the two CI methods applied by the company: Kata and 5S.

Kata

The CI method employed at the company was, according to the PM and the company's internal documents, organized around the Kata philosophy, as detailed by Mike Rother (2010). The method was first attempted in 2015 with a Kata for one of the GLs with the PM as the coach.

According to the PM and GL, the result was a success. This lead to that Kata was introduced to the rest of the company and that an initial training module for the then current TLs was completed under the oversight of the PM. Between 2015 and 2017 a number of Katas took place, with different adepts subjected to the challenge. Kata challenges derived from both PM to GL and from GL to TL. However, at the time of the study only a few Katas were officially ongoing and among those only two had regular activity. These two Katas belonged to two of the GLs and had, as observed by the researchers, an average follow-up frequency in the vicinity of 8-9 days. These Katas were started long before the case study was conducted.

All three GLs were familiar with the Kata approach. They had all had previous Katas as well as one ongoing. The first active Kata dealt with a set-up reduction and the second dealt with an increase in average throughput. The following information about these two Katas are based on observations made by the researchers. There were regular follow-up meetings conducted for both Katas. At these meetings the experiment had often been completed in some kind of manner, however sometimes things had gotten in the way, forcing the same experiment to be rescheduled for the next meeting. Some experiments mainly consisted of gaining more information about the current obstacle or process. Sometimes the validity of the experiments was questioned as the GLs were uncertain if the TMs had worked according to the current standard.

The two previous TLs interviewed had had several Katas, where several of these were viewed as successful. Further, three out of the five current TLs interviewed had at some point had a Kata. Of those, one had finished a Kata and begun another which was never completed, while the other TLs had not finished their Katas. The unfinished as well as finished Katas could be confirmed by written documentation. Some of the TLs mentioned that there to some extent had been scheduled times to perform Kata experiments, were some had had more time than others. Some expressed that they had not had enough time to work with the Kata when it was ongoing which lead to that the experiments were not performed and that the follow-up meetings were therefore postponed. The time restriction seemed to, according to some interviewees, be due to there were seldom personnel to cover for them, which one of them said that he/she had raised to the GL without getting any improvement. However, one interviewee mentioned that the Kata had aided the work processes. Also, one TL mentioned that he/she did not think a Kata should take years to complete.

Now it is time for Kata, let it go fast

To the researchers' awareness, none of the TMs had been an adept of a Kata and had only been involved in their TLs Kata to a small extent. One of the TLs mentioned that he/she did not involve the TMs and thereby also did not think they knew what the TL was doing. Another mentioned that challenged was solved with all TMs included. A third said that he/she discussed ideas with his/her TMs, but the TL made clear that the extent of the TMs involvement depended on the subject.

5S

5S was employed at the company. This method was first introduced in the production department and was a later introduced to the other departments. One interviewee mentioned

that he/she had seen a big difference in cleanliness and order from before and after they introduced the method. One GL mentioned that 5S was a way for the personnel to make small changes without the permission of the GL, which one of the TLs also mentioned.

In the production, each production group, FTs, as well as a group containing the production support staff and production management, had a designated time each week where they were supposed to perform 5S. At the groups' boards, there were a cleaning schedule with tasks that should be performed. The cleaning was divided into weekly, monthly and semi-annually but also some things that should be performed daily, e.g. to control that all materials and tools were positioned where they were supposed to. The weekly tasks had one or more person responsible for it.

Examination of the 5S charts posted in the production area, revealed that there was little activity in either groups' 5S improvements. In the interval of the study, the group that had suggested most improvements had eight improvements, whereof four seemed to have been implemented or solved. Some of the groups had not made any suggestions. The GLs stated at several occasions that 5S was not performed in the expected manner. The shine and straighten aspect of the company model of 5S was taking place but the researchers saw no signs of follow-up meetings were improvements should have been discussed.

5S has mostly stuck on one S, and that's shine. The others are not prioritized, but at the same time they might be the most important parts.

Most of the TLs agreed that focus on the 5S had been on cleaning, picking up and sorting tools as well as marking assigned positions for the tools. While one of them mentioned that the 5S-paper was mostly focused on cleaning and not about improvements, another mentioned that there are prerequisites to write improvements but that they were missing guidance. As a reason to why only the cleaning aspect was performed, one TL mentioned that the cleaning part is easy to schedule while improvements is not as concrete.

It's no improvement work really, more what it should always look like. The bench should be clean at the end of the day. But instead it is only performed on [...].

For some groups 10-15 minutes were spent on 5S, thereafter they have to go back their original tasks, the stated reason for this was the high pressure to deliver the orders which also made one group postpone or entirely skip 5S at a few occasions. Several TLs also mentioned that there was lack of time to perform improvements, such as for instance marking up work areas on the floor, and that the time allotted for 5S had shrunk since the implementation. One TL mentioned that his/her team came with improvement suggestions maybe once a month. For the two groups which operated at the same line, there was one hour overlap each week, where 5S was supposed to be performed. However, this time was utilized for different purposes such as the monthly production information and group meetings, as well as other less frequent meetings which resulted in their 5S being canceled or partly canceled several instances during the study.

4.2 Continuous improvement culture

During the study, the researchers observed several inconsistencies with the PS. Examples included wrong components mounted onto products that resulted in major rework, handling

issues resulting in damage, working around product tests because the tests were not providing the correct result, tests where the product needed to be placed a bit skewed in order to be passed. Follow-up questions on these instances revealed that the major issues, such as the wrong components mounted onto products, resulted in a deviation report and working around the testing equipment but smaller issues, such as placing the products skewed in the test were taught to the members in order for all to know how to work the test. Malfunctioning tests were one common disturbance mentioned by one of the GLs. The deviation reports were owned by the product coordinators and, according to the organizational documents, it was they who owned the responsibility to perform a follow-up on these deviations. The deviations were weighted and then assigned a product coordinator as a mentor who was responsible for handling their further process, either to a countermeasure or to closure without measure. However, according to the PM, deviation reports are only made on serial issues. It came to the researchers' notice that the current system to handle deviations did not work probably and a new system were, during the study, under construction.

During the group meetings, the researchers witnessed several instances where the groups complained on faulty equipment that disrupted their work. For example, hand computers that contained picking orders that restarted, leading to extra work for the operator as he/she had to reconfirm every single pick that had already been made. Or magnetic bits that were no longer sufficiently magnetic, which caused screws to drop onto cards. Another issue brought up during a group meeting was that one group asked what was an alright first pass yield (FPY) for the testing equipment. FPY is defined as the quota of products that did not have quality issues that pass through the test on the first attempt. This was discussed because the group in question expressed frustration at testing equipment that did not work properly and that they experienced that it blocked the flow of products. One GL mentioned that the testing equipment was basically allowed to run until it broke down completely before being fixed. A reason to why they had many small problems, was according to one of the GLs, that the company had more than doubled its workforce this century. He/she continued that they had to rethink the PS and pushes the problems forward and it would take a while until these are gone.

The company maintained a service department for handling customer returns which repaired products. Also, the researchers observed that there was almost continuously one or more persons reworking products that came out of the process both within groups but also in separate locations. The company also had several racks of faulty products in the production area which had no activity ongoing. One TL further reported that their group reworked products each morning while waiting for new products to arrive.

One TL mentioned that a recurring disturbance was due to wrong planning and purchasing, i.e. that the planners had planned a start of production but all needed components had not yet been delivered but the order still remained in the system, meaning that the production personnel attempted to start them. Shortage of components were mentioned by one TL as a large disturbance which impacted all groups, and one GL mentioned this issue as a common disturbance. Another GL mentioned that a common disturbance was that incorrect inventory and that it had been ongoing for a long time.

4.3 Enablers for continuous improvement

This section is divided according to the five enablers identified in the framework, i.e. management commitment, employee involvement, communication, CI training and standardization.

4.3.1 Management commitment

The management commitment is in this thesis considered to be the top management at the company, i.e. the managers at the same level as and above the PM. This means that the manager referred to PM in this thesis, is also regarded as part of the top management.

Six TLs said that the managers outside of the production department had little insight in the work of the production but one thought they had, since they seemed to work with a lot of projects that affected the production. One TL expressed that the top management seemed to believe that everything was going very well as long as the orders are sent to customer. A majority of the TLs mentioned that they barely saw the top managers in the production and that they appear only when there was a customer visit, or, as two TLs mentioned, when there was a serious issue with the PS. One TL said that the CEO was there maybe twice a year. This could be confirmed by the researchers who, during the significant time spent in production, noticed the CEO as present in the production once and that was to facilitate a guided tour for a visitor. Another instance was overheard where one production member forced the CEO down to the warehouse in order to show the disarray caused by significant stock and limited space. Out of the four managers within the production and quality department, the researchers witnessed the PM in production at least once every day. The other three managers presence varied but they were at most seen a few times a week by the researchers.

The only scheduled interaction that top management had with production personnel, aside from the PM, was a general information held by the CEO to the entire company. This occurred four times a year. This also included the remaining managers outside of the production and quality department. However these were not further investigated and might have had interaction that the researchers did not notice. A majority of the TLs and the GLs mentioned that they would like the managers for the other departments to be more present in the production, since they would get a better understanding how the production performs and what issues are present in production. Especially since, as one TL expressed, they were the ones taking the large decisions. One TL also mentioned that the motivation of the workers were affected by this, since if they are not present, it feels like they do not care.

Close to the beginning of the study, the PM had announced at a production information that he/she would work from a desk located in the production area one or more times per week. This occurred a few times during the study. However, the researchers occupied the intended desk during the period of the study. The GLs were positive to this change since it made it faster to take decisions and it seemed to have a positive effect on the rest of the personnel in the production.

The PM was mentioned, by both him-/herself as well as all GLs, as the one who was spearheading the Lean implementation at the company. This was also something the researchers

witnessed in their observations. The PM stated that working with improvements should be a priority and was at multiple times during OCMs and conversation with GLs, seen to mention issues and methods related to Lean. Further the PM stated that he/she wanted to implement Lean in the production department and was seen to spend significant parts of his/her time working to implement Lean methods. For self-development, the PM has attended several courses, focused on Lean. He/she was also active in different Lean forums. The PM described the Lean transformation as a journey which take significant time as it is difficult to change people. Further, he/she stated that certain Kata challenges had been set not because he/she expected large results but in order for the adept to learn the process. For the future, the PM stated that he/she wanted to include the operators in the improvement work. The PM stated that the implementation needs to go top-down, with each layer understanding the process before reaching the next layer.

During the times the researchers attended the morning meetings, the GLs continuously reported either missing production personnel or missing parts to start some productions in the groups. The amount of operators absent varied and the stated reasons were for instance sickness, short notice leave, long noticed leave and parental leave. There were varied reasons stated for why they were missing parts, e.g. the material had not yet been delivered to the company, incorrect inventory levels, previous group in the chain were not yet finished and malfunctioning machines. As a consequence, two TLs mentioned that they had to chase components and products when they did not arrive on time. Whereof one said that it was a recurring disturbance which lead to a stressful situation and that as a consequence errors could occur. If things were not delivered to their group on time, one TL mentioned that they had to continue asking which caused stress for the asked group.

Issues concerning lack of personnel were often discussed after the morning meeting with the PM, GLs and planners remaining in the room, prioritizing which products were to be worked on and which processes or parts of processes that were to be shut down in order to free up personnel for the prioritized stations. This prioritization also applied to so called "tacted products" which were supposed to be running continuously to fill customer demand. The prioritization lead to lending of operators between the groups, sometimes leading to operators ending up in groups where they had little to no experience. The time spent on this prioritization varied, but is estimated by the researchers to have been in the vicinity of 10-15 minutes per day in that setting. As such, the researchers observed that a significant part of overhead time was spent on solving resource issues to cover the deadlines for various orders. At times, the GLs were forced to enter production both to solve problems as they arose, such as wrongly packed orders, and in order to support general production. This was supported during interviews where all GLs reported a significant amount of time spent on solving resource issues which by one of them was seen as a common disturbance in the PS.

When asked directly if they had enough members in their production groups, the TLs' answers diverged. Some TLs had not felt a direct shortage of labor either in their group or other groups. Though, they mentioned that it depended from time to time, and that it sometimes would be hard to perform the work they were supposed to if several persons were missing from different groups, since there was no person to lend from other group. The lending of personnel between

the groups was something one of the interviewees mentioned as a problem, since it lead to that the groups which lent members fell behind even further in order to help other groups. A majority of the TLs stated that they lacked workers both in their and other groups, however one TL and one GL stated that if the work would have been more planned and controlled, the amount of employees would have been sufficient. One TL mentioned that they did not have enough people to fill all their positions. Another said that the groups are very lean and that they are continuously on the edge of not having enough personnel. The effect of this on the group, according to the TL, was an increase in tiredness and sickness and that TMs did not want to work overtime, as well as a feeling of not being heard and that the managers did not seem to care. Another TL mentioned that there were no time for improvement work due to they were the exact amount of personnel needed for their process. One of the GLs mentioned that the biggest hinder to develop CI was that there was a lack of personnel in the supportive functions.

Feels bad when they do not appoint new personnel [when people quit], because there is still as much that needs to come out men with [...] less.

The PM stated that he/she had based decisions on production numbers and had therefore not hired new employees when some workers had left, which he/she stated might have been an erroneous decision. Furthermore, the PM mentioned that he/she wanted to plan the amount of employees from the need of the process but for that to work, they need the planning to be correct and that the decision making within the production and quality department needs to be coherent. However, two GLs thought that in the present situation, there should have been more employees. This was also seen by, the researchers, who observed that a significant amount of overtime was worked in the production, both in form of extended work days and weekend work. This was made on a voluntary basis with the GLs asking the workers for volunteers for the weekend. The overtime was stated to be needed in order to make the deliveries. It was also important for the company to follow the regulations regarding e.g. weekly rest and the maximum amount of overtime a person is allowed to work during a year. However, the PM said that, decrease of focus and productivity as well as increase of sick leave, only occur when overtime has been ordered.

As result of there not had been enough production personnel, one TL mentioned that some groups had to use temporary extra workers which worked infrequently and thus might not remember the procedure between times. Two others mentioned that they did not always receive the same person, resulting in that the person did not know the work tasks and thus had to be trained. As a consequence, one TL mentioned that quality will suffer and time had to be spent to teach the processes. Several groups also stated during group meetings that they wanted the same people to return to the group when extra manpower was needed, as they otherwise had to spend much time training them resulting that the benefit thus decreased. In certain groups, this was seen to lead to frustration.

No document covering the individual production members' expertise existed at the company. Rather, the GLs were seen to sometimes need to ask their TLs who knew what process when lending people around in the production. At certain times, the TLs seemed able to answer these questions but not always. The researchers also observed several instances where there were only one person able to perform an operation and when that person was absent, work could not

continue. At times, there were people who had moved on in the organization who could cover for the absence. A similar issue was discussed during group meetings of several different groups, where they raised that they wanted more work rotation but that it was hindered because the operators lacked knowledge of more than a few processes. In addition, several groups stated that personnel being temporarily placed into the group hindered work rotation because they only had time to train them in one station. One of the TLs mentioned that he/she was aiming for the TMs to be able to perform all processes in the group and also said that not all TMs wanted this. The TL further mentioned that there should be some sort of salary system which should reward employees who were able to perform more tasks, especially since it would benefit the company.

It was noticeable several times by the researchers and also visible in some of the interviews or chats with employees, that improvement works were the first thing sacrificed when there was a lot to do. One TL mentioned that his/her group earlier had had 30 minutes each morning to perform improvement works, but that this time no longer existed. Both TLs and GLs stated that they did not have the time to perform improvements, whereof one GL expressed that the biggest issue to develop improvement work was that there was no time allocated to it and that a solution would be to make it a habit to plan time for it. This view was not shared by the PM, whom several times said that improvements does not have to be large and thereby do not require a lot of time.

The GLs expressed several times, both in interviews and at OCMs that their improvement suggestions were not prioritized by the persons above them. E.g. their suggestions were seen by others as low priority, while the GLs stated that they can be fixed fast and save much time for their workers. Further, some GLs expressed that it was disappointing that they seldom received a reply from certain persons in the organization. The researchers observed several attempts of two GLs to contact the CEO about a certain issue but at the end of the study it had not yielded any result. One GL mentioned that at certain times he/she had made cost calculations as part of improvement suggestions and that these suggestions had been accepted by the top management once the benefit could be shown. One GL mentioned that unfortunately the decision makers only seemed to see the economy and not the time-aspect or that it would result in less frustration for the production personnel. This can be confirmed by the researchers whom attended the general information meeting the CEO held during the study, where the focus was on economy and economic trends. Further, one GL mentioned that it seemed like the company were not willing to pay for the required support as the costs of fixing the problem was visible but the costs of not fixing the problem was hidden even if it was larger.

One TL mentioned that the top management expected that CI efforts lead to large increases in productivity rather than gains in for instance work environment. The TL further mentioned that it felt like top management expected CI to just take place but did not have a plan for it. This can be confirmed by the PM and one GL, who mentioned that the top management had little insight in the daily CI work. The PM also mentioned that there was no resistance from the top management group to CI, but that there should have been more support from the other departments to the two main functions, product development and production, as other departments are support functions. However one GL, mentioned that the CEO initially resisted

Kata and might still not support it. 5S was mentioned by some of the interviewees as having been received positively by the rest of the company which assumed the practice from the positive example on the lower floor.

During the period of the study, the researchers observed that the PS was falling further and further behind schedule, visible by a daily updated note detailing how many days compared to plan the first process, through which all products had to pass, was ahead or behind. At the start of the study this process was ahead of the safety limit decided for the process in order to not affect the following processes' ability to deliver, while at the end fell further and further behind. Towards the end of the study the subject of missing products from this process was often brought up and discussed during the morning meetings as a reason for not being able to work on a particular product. Towards the end of the study, the first production process was forced to go up to a third shift which according to a GL diluted the experience and knowledge of the groups working there. It also scheduled all personnel with experience at the process to a team resulting in trouble in case of absences.

4.3.2 **Employee involvement**

The PM stated that there had been no layoffs due to the implementation of Lean, however, not all resignations were followed by a new hiring. At the attended production information meetings, the PM brought up the subject regarding Industry 4.0. At these times, he/she explained that the company needed to adapt to the competition in order to survive and thereby digitalize and automate the production processes. But he/she expressed that it would not result in a decrease of employees but that a change in work tasks was likely. This was also something, the PM mentioned in the interview. Discussions about industry 4.0 have been held at the group meetings, where the GLs answered questions and in case they could not answer them, they redirected them to the PM who brought it up at the next production information.

Observations have been made where GLs got suggestions for improvements from a worker and took over the issue to their area of responsibility. The TM did not seem to receive some feedback on the proposed issue and were not allowed to further investigate it. At one of these occasions, the GL accepted the suggestion, however, the GL immediately made a counter argument in order to curb expectations on accepting the proposal with cost. Furthermore, it was noted both from some of the interviews and observations, that spontaneous improvement suggestions was not documented.

During the group meetings, the groups came with suggestions. The amount of suggestions varied but was by the researchers estimated to be between five and ten, which on average, since the amount of employees in each group varied, puts the number of employee suggestions at one per person and month

The GLs and one TL mentioned that they are very good to start projects but not so good to finish them or follow through. Or as one of the GLs mentioned, when talking about the PDCA-cycle, that he/she was good at planning and doing but not so good at checking and acting. One of the TLs mentioned that when having given a suggestion prompted by his/her GL, which had summarily been accepted by the same, the suggestion had still not happened several months since the acceptance. The TL said that he/she would have liked more ongoing information

regarding the process, since he/she did not know if the implementation was planned or not or if it were to be actualized. Last time he/she asked, there were no new information to receive. Another TL gave an example of a situation where he/she still had not received any updates about a suggestion.

[There are] A lot [of information and suggestions] which fall between the chairs.

One TL expressed that you lose interest if no change is made, since they did not seemed to take the issues seriously, e.g. request of more personnel or give a suggestion. As a consequence, the TL thought the motivation in the group was impacted negatively. To make a change, the TL mentioned that the GLs need to follow through on commitments and if they could not perform it immediately, a deadline should be decided, as this would show the personnel that the GLs do what they say.

During several group meetings which the researchers attended, the operators expressed that they thought the pressure was too high. Signs of frustration and annoyance was clear to the researchers. Some expressed that they did not feel it fair that they felt the pressure to work overtime in order to meet deliveries while other employees did not work overtime to the same extent. Further, one TL mentioned in the interview that there were a lot of stress in the group, and for that reason, some of the employees did not want to be there. The amount of workers, according to one TL, had a negative effect on the operators' ability to perform improvements, since they did not had time for those things.

4.3.3 **Communication**

Three TLs and one GL mentioned that there seemed to be a gap between the production department and the other departments. The gap was explained, by the GL as a lack of respect which might come to decrease in the future, since several of the upper-floor positions had been filled by people with an in-house production background. The TLs mentioned that it felt as if the company was divided into two parts, upper-floor and lower-floor, whereof one of the TLs mentioned that they did not have many common activities. During the time of the study, there were one common activity that encompassed the entire company. Only a few TMs and TLs participated. The reason for this was stated, by some of the participating employees, as that the time for the event was not suitable for most of the groups.

The researchers observed several instances when improvement work seemed to have difficulty recruiting other company functions to support in improvement work. Either the ones asking for the help did not receive any answer, the department did not have time or it would be done when time was available. This included different functions such as the flow technicians and the quality department.

It feels like we sometimes believe that everything will function when the system is in place, but we have no support functions which can aid the implementation until everything is done.

It was by the researchers noticeable that there were a lot of rather heated discussions between certain functions, which was also confirmed by one of the GLs. This was especially noticeable, at the morning meetings, one week when the PM was absent. The matter was brought up later at an OCM where the GLs discussed that the lack of common direction between the production

department and the planning department was not acceptable and impacted the company in an adverse way. Also, one GL mentioned that while they wanted the same thing, i.e for the products to be delivered on time, the two sub-departments had different directives from their managers and that the departments lacked a common direction. Also to note was that, within the production and quality department, the managers were all equal in authority and during their weekly meeting no higher authority partook in the meeting. The PM said that the production department previously was highly divided and that the different groups did not talk with each other which was no longer the case.

The different working hours between some of the groups as well as between some of the groups and GLs, was a subject that was brought up several times during the study. As a consequence, one interviewee mentioned that some groups at certain times lacked material or that some groups did not get the support needed the first hour of the day from their GL. The problem was brought up at several group meetings and was discussed during an OCM. One TL mentioned that because of these different times, it felt as if they were working at different companies.

Not all TLs felt that the meeting between GL and TL was fruitful enough, since information was easier to get by approaching the concerned persons directly rather than going through the GL. Two TLs mentioned having more contact with the planners and product-coordinators than with his/her GL, since they were the ones which had the most knowledge about what he/she needed to know.

The PM stated that they were not as good at informing the production personnel about changes as they wanted. One attempt at making the process better had been attempted, where the information was spread in connection to experiments where the group was first informed, then the experiment was conducted and was followed by an evaluation that the group was privy to. Further, the PM stated that they informed the local union ahead of a larger change, who were allowed to impact the decisions. Furthermore, he/she stated that there could be suspicion towards changes and that it sometime could be advantageous to inform in connection to the experiment.

A problem, one TL mentioned, was that when information reached the production personnel it was usually too late and too difficult to grasp. He/she further mentioned that they were not asked for advice regarding new machines. One TL mentioned that the information shared with the production personnel varied depending on the size of the change. For large changes, they usually received an introduction to the essentials of what is going to happen, but not how the changes would be made or what each step would entail.

It is a lot of purchasing but not a lot of education.

As far as could be observed by the researchers, there was no system for recording and communicating successful improvement projects. The early Katas had been recorded with a picture of the Kata board and a short descriptive text in the management system, however this had not been updated for over a year. 5S notes were filled out and once it was filled out, it was summarily thrown away. Certain TLs that had had successful improvement work, e.g. Kata, spoke of it positively but when the researchers searched for signs of the effect in documentation it was not possible to identify which improvements were successes and not, nor what the effects

were, without having heard the stories beforehand. Successful improvement work was not communicated through the company, an issue that was discussed during an OCM as something that should be done in order to enhance motivation. Further, the PM mentioned that the focus of Kata is on improvements and not documentations.

The researchers witnessed many instances where during group meetings, the TMs and TL raised ideas for improvements. These were often to be taken onwards for the GL through the organization because the bounds lay outside of their area of responsibility and decision, such as purchasing equipment. However, the researchers observed several instances where at the next meeting, a month in the future, the GL could only give the information that the issue had been passed on to a particular function and that this function had not been able to handle it so far. Furthermore, the PM stated that it is important that there is a system in place for the TMs and TLs to report mistakes and issues, because if there is no system in place, the point where which TMs and TLs will ask for help will vary. Also, the improvement activities mentioned in the GLs' role description were 5S and standards. While for the TLs and TMs no improvements were directly visible in their role descriptions.

During the study, the researchers noticed discussions of implementing a pitch based system, within production department two, where the continuous outcome of each pitch was to be displayed to the workers. The system was to be setup so that the groups could see either how many products they were ahead/behind schedule or how much time in minutes they were ahead/behind. However, as far as the researchers could discover, this system was never implemented during the study, but was accessible for the GLs and PM. When examining the planned pitch system, the researchers saw a high variance in throughput in some processes. Most of the time, the groups were not above the decide throughput for the pitch. One reason stated for the high variance was that sometimes the test equipment did not want to function as it should.

Towards the end of the study, an Andon system was implemented in three groups. The system was setup so that if a problem occurred that the TL together with flow technicians could not solve within ten minutes, a notice was sent to the responsible GL who was supposed to report to the site within five minutes. If the GL was not available, different people with similar authority was set as backup based on experience.

During the period of the study, a new CI handling system was being introduced where a whiteboard served as an initial ranking systems for improvements. Improvements were to be able to come from six sources: Andon system, deviation reports, group meetings, ongoing activities, operation projects and production management. The whiteboard was for issues and suggestions that could not be handled by the production department alone. The improvement ideas were ranked according to difficulty and benefit on a two axis scale and from this, projects were chosen. Up to twelve projects were to be conducted at a time where progress was to be detailed on another whiteboard according to PDCA cycles with each cycle showing progress. However, this new method was introduced towards the end of the study and was not fully implemented at the end of it.

4.3.4 **Continuous improvement training**

At the time of the study, there existed no formalized or structured training program for teaching CI, Kata, 5S, standards or Lean. The PM stated that they previously had held workshops in order to teach methods of CI but that these had been too theoretical and therefore not well suited to teach practical aspects. Therefore they were attempting to make the learning in the form of experiments within the workplace instead as it would be more applicable.

A majority of the interviewees mentioned that there had been a full-day TL workshop about one year prior to the study. However, out of the current TLs, only a few had participated in this event, since the others had moved on to other positions within the company or quit. During the study, a new full-day TL workshop was held, where the TLs did not perform their ordinary duties. The main theme of the workshop was standardization. Subsequent education included a lecture on SOPs and their role within the company as well as the TLs participating in making their own SOPs for building a Lego design along with two "testing equipments", which had a 30 second cycle time. Standards were taught to come not from above but from below, the initial SOPs detailing how they presently worked and that these were then to be corrected and improved by the teams. It seemed like the TLs exhibited an increased level of commitment to standards, since they expressed eagerness to work with standards. Furthermore, one TL mentioned that his/her GL had taught the group regarding SOPs.

One of the GLs mentioned that when Kata was introduced, the then current TLs were trained in Kata. This was confirmed by some of the TLs, where two said he/she got the methodology explained by the GL and another stated that the PM had gone through Kata one time with all the, then current, TLs. Some of the TLs expressed that they wanted to have a greater understanding for the Kata procedure and the reason for it being done. It also seemed like the TMs had no knowledge about Kata, which one TL expressed. During one of the group meeting, a majority of the TMs expressed that they would like more information about the GL's current Kata which was conducted in their group. Further, one of the TLs mentioned that a good coach in Kata is a coach which makes sure that the adept understands and makes sure the work is done.

It was mentioned, both in some of the interviews and at other times, that it would be good if the first Kata would be easier, in order to learn the process. Further, one mentioned that he/she did not think it would matter if the Kata was easy or difficult, as long as the project take place and that they get time to perform it and for it to be possible they need more people.

Regarding training of 5S, only one TL stated that there might have been an introduction with the PM a long time ago. Two TLs mentioned that 5S was initiated before they started at the company. However, one TL mentioned that there may have been a short briefing with each group with the PM and the concerned GL at the occasions when a decision had been made to work more with 5S.

> *[5S] is a lot about that the persons making the improvements see that it is useful for them,*
> *that it is not just an invention which has been pushed down from above.*

For 5S to have a higher impact, one TL mentioned that each employee needs to see the value of the method, that it is the small everyday things that leads to an improvement. To do so, it is

not enough to inform, each person needs to see the benefits for their work situation with their own eyes. Furthermore, the TL also mentioned that the operators need to feel that their suggestions get attention.

The TLs knowledge about Lean varied. The PM held a Lean course available for all employees. It took place outside working hours and two of the current TLs attended. Since it was held outside working hours, one TL did not attend. One TL also mentioned that some information has been shared at the production information. A majority of the TLs seemed to agree that it was good that the company worked towards Lean, but it had its flaws. Another TL mentioned that focusing on saving seconds when the equipment did not work, would only lead to stress, especially if you do not get the information that the end benefit will be that one works at a comfortable pace. A third believed they would never get anywhere, since the persons responsible for the change did not show the way. The TL further expressed that he/she understood that these persons also had a lot to do, but in order to introduce a new system, they had to prioritize this.

If Lean or Kata are the best way for us to work, then we have to work more with it, they have to train us more. They have to show the way. They have to guide us how to do [it], then they should skip some of their meetings or other things which are not as important.

4.3.5 **Standardization**

Two types of documents that existed within the case were product instructions and standard operating procedure (SOP). The product instructions were implemented on each product at the company and was a document originally created when the product was introduced. It was owned by the product coordinator at the company and contained instructions for e.g. how to mount components onto the board. The instructions varied in layout and detail. The PM expressed that a problem with the instructions was that if an operator made a fault and the product was returned from the customer, "the operator obtained the blame", which resulted in a greater gap between blue and white collar workers. Instead he/she would like to initialize TWI, but first the process should be designed in order to avoid errors and second there needs to be test which assure that wrong products were not sent. The PM described that first and foremost the control plan needs to be followed which, among others, contained demands from customers, products and authorities.

The PM stated that they had more or less detailed standards to follow. For this reason, the company had one employee working more or less solely on making SOPs for each process. The initial SOP for each process was based on how one worker in the group performed the specific process. These were, according to the PM, supposed to function as a base for the groups but that the operators were to own the standards together with the TL and GL for that group and improve and change it ongoing. The GLs and TLs were further to have responsibility for having people follow the standards and to make changes to it. To the researchers' awareness, one of the groups, had been introduced to the SOPs as part of their GL's Kata. But according to one interviewee, other groups also used SOPs. Furthermore, one TL mentioned that the instructions had been surpassed by SOPs and that the SOPs were the primary document dictating how to work. Other processes were stated by a TL to have only guidelines for how to work.

One TL mentioned that they never documented improvements made, instead they showed each other and all agreed to follow the new way. The TL claimed that the reason for no documentation was made were that it is not worth it, since it is something you learn by practice and easy to show another, but also that it would have resulted in a lot of paperwork to record every detail. Though, the TL said they probably should had documented it, since it would have aided when there was a new member, but on the other hand, the new member could instead make their own notes. Another TL mentioned that it was not possible to have a standard for all of their processes, since what should be prioritized depends on the exact situation and there are too many conditions to make a standard for each.

The TL workshop held during the study was previously described, where it was stated that some parts focusing on standards. The reason for the SOP exercise, as stated by the PM, was to elucidate that even a relatively simple product can have quite complex SOPs and that SOPs can be done at different levels of detail. The PM further discussed that the SOPs were not supposed to be coming from the top, rather to be decided by the group together with their GL. To note, this workshop was performed after the interviews were held and might have impacted the knowledge of the TLs.

A majority of the TLs mentioned that either the instructions or SOPs, whichever were applicable for the process, were not being followed by every TM. When prompted why, two reasons emerged: the persons of the group worked in the way they preferred or the instructions were outdated. One TL mentioned that after have told the TMs to follow the instructions or standards more than two times, it got embarrassing to keep on demanding. Another expressed that the GLs seemed to believe that they can work according to the tact times, but that not everyone can work that fast. One interviewee mentioned that they have talked that if it is written in the instructions that you should do something, then there is a reason for it.

One GL mentioned during a Kata experiment that he/she was not certain that the experiment had been performed according to the boundaries set for the experiment and that the people of the group might have deviated from the SOP by helping one another out. Another GL mentioned that he/she lacked knowledge of how the process he/she was improving actually worked and as part of the Kata procedure he/she had to create a SOP for part of the process in order to understand it.

When asked if they are able to change their standards the TLs' answers diverged. One stated that you could change the standard but that you had to talk to the product coordinator. Several TLs stated that they could change a way of working by talking to their GLs. One TL mentioned that it was preferable to gather several changes rather than talking to the GL for every little thing. One TL emphasized that it is important to understand that the current standard are to be followed until a better standard has been found, and it is therefore important to report in case a change should be made.. Especially since, his/her GL expected them to work as decided.

During several group meetings, TMs and TL spoke up about different ways of performing certain operations as tips for their co-workers. At these time the GL present praised them for raising it and asked that they would share it with the group. However, no record of the tips were recorded by anyone present. One instance observed was when rather intricate instructions of

how to handle the products was shared in the group. This was met with verbal agreement in the group to handle the product in this way but the change in behavior was not recorded in any way.

4.4 Lean leadership model

This section is divided according to the Lean leadership model applied, and is therefore divided into five parts. The first part, improvement culture, focuses on how the GLs contribute to the improvement culture. The second part, self-development, concern the development of the GLs while the third part, employee involvement, concern how the GLs contribute to the development of the TLs. The fourth part, Gemba, cover how much the GLs are present in the daily work of the TLs and what the TLs would like to have more off. The last part, Hoshin kanri, cover information regarding the GLs and TLs view of what is important.

4.4.1 Improvement culture

As previously been mentioned, there were officially started Kata for TL, however, there were no activity in these Katas. The reason for the lack was stated to be that new TLs needed to become settled in their position first and that there was a high demand in the production.

It has been noticeable both from the interviews and observations, that the TLs and TMs would like their GL to participate when they performed 5S. One TL mentioned that there was a lack of assistance when it came to 5S. He/she felt that the GLs should be present during the meetings or there would be no progress with the improvement aspect of the 5S. The lack of participation was also mentioned by one GLs who stated that they would need to participate during the scheduled 5S times in order to get the process going. However as far as the researchers could observe, this did not take place.

The GLs often referred to themselves as great fixers when it came to the PS. However, most of the smaller issues were not followed up afterwards. An example of this, witnessed by the researchers, was when two revisions of a product had been mixed up, this resulted in a major amount of rework. The GLs participated in this rework, but afterwards the researchers could witness no follow-up activity on avoiding that the issue happened again. In fact the GLs stated that mistakes would always happen.

Some TLs mentioned that they could go to their GL in case they had a suggestion. One said that his/her GL often asked for the group's opinion. One also said that his/her GL is open to improvements and support them. The support was also something another TL mentioned. However, one TL mentioned that he/she did not remember if the GL gave feedback when an improvement had been done, but he/she noticed that it had been made. One GL also mentioned that he/she thought that the operators felt comfortable to make suggestions.

One of the TLs mentioned that his/her group worked with improvements whenever they had time. These improvements regarded new ways to perform a process faster. Another mentioned that they usually discussed the possible improvements during the group's daily meeting and from there took a decision regarding who should proceed with improvement. Another mentioned that he/she first talked with the group about the improvement, and thereafter talked with the GL whom either accepted the suggestion or rejected it with an explanation.

Three TLs mentioned that they were allowed to make some changes without permission, e.g. position of things on the table, but not others, e.g. move a table. What changes were allowed was taught by the TL's GL. Another said that much of their processes had standards and could therefore not be changed. Another mentioned that on request from the GL, the improvements in the group were documented and reported to the GL.

The researchers witnessed several instances where a TM approached a GL and came with a suggestion for improvements to various systems. At these approaches, the GLs assumed the responsibility for the idea for themselves, saying they would investigate it. However, the researches could witness no note taking by the GLs at these occasions.

Several groups stated during group meetings that they wanted to have more work rotation but that the tough schedule and manpower shortage did not allow them the time to train themselves on each other's task, instead needing to keep their most well trained workers at each station in order to be able to meet production schedule.

All GLs stated that it is important to meet someone reporting a mistake in a positive and thankful manner. Two GLs believed that the TMs reported issues while the other hoped that they did but was not certain. Two of the GLs mentioned that they always tried to tell their teams that everyone make mistakes and in case it happens, they should always inform. One TL mentioned that it was never a problem to report a mistake. The TLs did not mention any bad responses to mistakes by the GLs. Rather, one said that accidents happens and another that you learn from your mistakes. Two of the TLs mentioned that they thought some TMs tried to hide when they made a mistake, while another mentioned they did not. To avoid that TMs hide mistakes, one TL mentioned that they maybe should receive more education or to have a reward system.

> *If you bring up something wrong, you are a hero and if you don't it's misconduct.*

Depending on the situation, e.g. the cause of failure and type of product, the TLs acted differently when a problem occurred. E.g. one contacted the concerned product-coordinator in order to know what action to take. Another mentioned that if it is a prototype the problem had concerned, he/she would contact both his/her GL and product-coordinator. Two mentioned that if the product were to be discarded, he/she would write a deviation report and hand it over to the GL.

One GL mentioned that he/she often brought up mistakes that had been made in the group without pointing out the person who did it. One TL also mentioned that if a TM made a mistake, he/she would talk with the TM and then mention it at the team's internal meeting on the afternoon, without pointing out the person who did it. Another TL mentioned that he/she tried to always ask the TM what have happened and as long as nobody got hurt or the person made it with purpose, it is not a problem.

4.4.2 Self-development

The GLs had worked at the company for several years before entering the role as GL. Their previous tasks varied, but all had been operators and one had also been a planner. The GLs had held the role for at least two years. The GLs had had various work before starting at the company, some longer than others. The GLs had had different amount of education as

pertaining to their role. They had all received some sort of leadership education. In addition, they had participated in Kata courses and Lean courses. Two of the GLs had had external Lean training performed at a Lean academy, where the education had consisted of both theoretical tests, a project made at another company as well as projects conducted internally.

The position as GL, according to the PM, involves being co-process-owner with responsibility of their groups' processes and how they are performed. Further, the PM said that the next development responsibility of the GL was to ensure that the groups worked according to standardized work. They should also be responsible for the structure of improvement work, making sure that changes in the process are done in a scientific manner with only one variable changed at a time. The PM also stated that the primary responsibility always is to make the deliveries. The GL also had management responsibilities which included employee related issues.

The PM stated that while the GLs did not meet the target image of how he/she wanted them to operate in the future, they did meet the target he/she had set for this point in the journey. One GL mentioned that he/she wanted to improve on the improvement process as well as gain an increased understanding for certain processes. Working with Kata has given him/her a greater, technical, understanding about the processes and thereby the operators' work. Another mentioned that he/she fulfilled the role description well but wanted to be a better coach. The PM said that he/she saw the Kata methodology as an aid in order for the PM and the GLs to create discussions and coaching. One GL felt that the PM was good at challenging them in their weak areas in order to force them to develop. One GL mentioned that even if he/she was fulfilling the role description, he/she wanted more coaching on the Kata procedure, especially in how to teach it to others who might not have an innate appreciation of the process. Another mentioned that he/she wanted to get more TLs involved in the improvement work so that they could be allowed to develop but that he/she fulfilled the daily responsibilities well. According to the GLs' role description, the only mentioned improvement activities were 5S and standardization. Further, there were no signs that the GLs' time was mostly not scheduled.

4.4.3 Qualification of employees

The case company had an introduction for newly hired production members where they went through an Electro Static Discharge (ESD) course and was oriented in the company's production organization exposition. The introduction was the unofficial responsibility of one of the GLs. The new TM was then assigned a sponsor in the assigned group, to instruct them in how to perform the work tasks. There did not seem to be a common view of whose responsibility it was to be the sponsor for a new employee. Some TLs mentioned that they sometimes taught new employees, but in some cases let other TMs do this as a result of either a lack of time or lack of sufficient knowledge of the process. One mentioned that teaching increased his/her understanding. In the future it was stated by the PM, they aim to follow the TWI methodology. One GL said this had been done before and a lot of personnel thought it was good, but a person needs to be moved out of the production which was not possible in the current situation. One of the TLs also mentioned TWI, there were plans for it to be implemented but that nothing happened.

The PM stated that there had been more employee turnover, at the operational level, than usual lately. Further, several of the TLs were relatively new at their post during the study. The company had had TLs shifting in between groups, left their position for another role within the company, e.g. performing more administrative tasks, or being on long-term leave. Three new TLs emerged during the period of the study, one having been TL for another group for less than a year before moving to his/her current group. TLs lengths employed at the company varied between 1,5 to 10,5 years. The TL position was introduced a couple of years ago and out of the interviewed TLs, some had had the role since start.

The PM mentioned that they did not have a system for how a TL should be introduced and receive support in their role, instead it was a self-reliant system with a lot of communication with their GL. As a consequence, the TLs unfortunately received support reactively, which is not how it should be. To assist the TLs reactively was also mentioned by one GL. The communication was something one GL mentioned that he/she had with his/her TLs, since there was no organized support.

At the time of the study, the current TLs had received little to no training in what was expected of them as TL. Though, there had been a TL-day around one year ago with the then current TL and during the end of this study, there were a new TL-day with the current TL. At the first TL-day, according to one of the TLs, the TLs had requested a common course in one of the company's business programs, which still had not happened. The PM expressed that this day could developed a lot. One GL said that the education for the TLs could be improved.

One TL had requested a clear description of his/her role, but not received one. Before entering the role as TL, all worked as operators. Some TLs had at first been a temporary TL at either their current group or another group before becoming TL at their current group. In some cases, there had been an overlap for a period of time with the new TL and a previous TL for the process. This time had been used as an introduction for the new TL. In one case, a TM in the group had to teach the TL the production processes as the TL had no previous experience in the group, this also applied to another TL, when the overlap was over.

> *In practice none [introduction for the TLs] to be honest, they have received their role description and been able to observe the other TLs or the previous TL.*

One GL mentioned that he/she would like to have a TL who can take over for the GL in case he/she is absent, or that they can solve their own problems. Another GL mentioned that he/she wanted his/her TLs to self-develop precisely as him/her and become more self-sufficient. The third mentioned that the group should be self-sufficient and the TL therefore needs to lead the group.

> *That is the goal, for them [the TLs] to feel that they themselves can take responsibility and grow in their role. I don't want to be there to point too much and for them to feel that they have to see me as soon as something occur. I want to create a culture where they know their level, when they should come [see me], etc.*

In order to become comfortable in the role as TL, one TL mentioned that the feeling of trust received from both the group and the GL made him/her confident while another mentioned that it aided that that he/she knew the TMs as well as he/she could have the GL as a sounding board.

Previous experience as a TL or temporary TL was mentioned by two TLs as another factor to become more comfortable in the role. The perceived sensation of freedom with responsibility made one TL comfortable. Two TLs mentioned that their comfortability in the role varied with the stated reason being that it sometimes could be very stressful, which in turn one of them mentioned could lead to unnecessary conflicts. In case of a larger conflict, one TL mentioned that he/she will get aid of either the GLs or PM, since he/she did not have responsibility for the personnel.

One GL mentioned that he/she let a lot of responsibility to others, as he/she considered that this is how you develop and it is "not the whole world" in case something goes wrong. At the same time, the GL said that he/she could probably delegate more instead of taken the responsibility upon him-/herself.

The TLs were operators which mostly worked on-line in the production but had some extended responsibility. The amount of time spent on-line varied from group to group. The PM stated that the TL role needed to be strengthened in order to free up time for the GLs. The TL should in the future take more responsibility for the daily running such as the placing of personnel within their groups and prioritizing as well as start working with Kata and smaller types of improvements. He/she further mentioned that the TL should not be fully scheduled in the production and should be able to fill in for unscheduled absences.

One GL stated that the company did not allow to have an extra person for one of the processes, resulting in that the TLs were forced to be mostly operators. Another stated that the TLs were working on-line 80% of the time. The third stated that the TLs are busy with mostly planning and as an operator, meaning that the TLs were not able to support the other operators. One TL mentioned that he/she was supposed to work 50% as an operator and 50% to aid the TMs while another said he/she was supposed to work 60/40 or 70/30 as an operator respectively TL. This was by them not always possible, e.g. some days they had to work 100% as an operator and at the same help the TMs. The reason for this was that there were deliveries that needed to be sent. One of them mentioned that his/her group consisted of too many people and he/she thereby had to handle some of the things the TMs were supposed to do, e.g. write their own deviation reports. If a TL mostly had to work as an operator, one GL mentioned, that some TLs do not have time to report deviations in the system, which is included in their role.

When asked to report on their responsibilities as TLs, the answers varied. A majority mentioned reporting issues to GL or writing deviation reports. Several reported that it was to keep the line running and dealing with issues such as reporting or handling quality issues as well as assisting production members. One mentioned following the instructions for the process. Another reported to control the work of the TMs. A third mentioned that his/her responsibility was to attend meetings, be the communication channel to his/her GL as well as take the more difficult decisions in the group.

When asked what they thought their GL had for work tasks, some mentioned responsibility of personnel, e.g. support the group. One also mentioned that he/she did not know very well but also thought a big part was probably improvement work. Another TL did not know very well either, but thought his/her GL tries to make improvement and attend meetings. One TL

expressed that he/she thought the GLs spent too much time at meetings, rather than in the production, which he/she would had like them to do.

As far as the researchers observed, there existed no direct interactions where the GL coached the TL. The meetings observed between GL and TL/TLs were used more as a report meeting. However, all GLs had expressed that it is possible for the TLs to go to them in case they needed anything. According to themselves, they had tried to point this out to the TLs at several occasions. One also expressed that he/she tried to be available a lot. One GL mentioned that there were not much support available to help TMs and TLs develop, for instance it was not possible to grant them education.

When asked about the support the TLs have received and would like to receive, some seemed to be satisfied. E.g. one said that the GL tried to help whenever he/she asked. Another mentioned that it is good to have someone to talk with, which his/her GL always were willing to do, which the TL had been told during their personal meetings. Beyond the GL, the TL also thought it would be good to be able to talk to the other GLs which he/she thought they would be willing to do. One mentioned that he/she, and probably his/her TMs, would like to have more support in form of that the GL would have better knowledge about their processes and this would be possible if the GL would be more present. One mentioned that he/she would like support in form of that the GL would take over his/her tasks for a while, in order for him/her to perform improvement work and assist the TMs, since he/she believed there were a lot of things that was probably performed wrong, both in his/her group and others, due to they have not thought it through. One TL mentioned that he/she would like to get more positive feedback, as it was now, his/her GL only came to the group to say that they should perform 5S or to complain.

4.4.4 Gemba

If the GLs were not at their desk, they might be, according to one TL, might be attending a meeting. These could occur at different times of a day and it was visible at their calendar when they have a meeting or not. To see this, you needed internet and either a computer or smartphone to access. The easiest way to see if they were there or not was to go to their desks. It was noticeable, both from the interviews and the observations, that the TLs were always able to contact the GLs, either by phone or go see them. This applied both during the GLs work hours as well outside work hours, e.g. to aid the shifts. If the GLs are at a meeting, the GLs responded to the phone call and let the TLs know that they were at a meeting and would get back to them when they were done. If it was an urgent problem, the GLs would prioritized that instead. A problem though, mentioned by one of the TLs, was that he/she did not always wanted to call, especially if it was a minor "problem".

Some interviewees thought the GLs should be positioned closer to the teams while others thought they were at a good distance. A few years prior to the study, the GLs had their desks apart from each other and closer to the groups. By being placed together, the PM stated that the GLs obtain more consensus in decisions and decisions can also be made faster. All interviewees agreed that it was positive that the GLs are positioned in the production areas as opposed to having an office somewhere else. The reasons for this were different, e.g. the GLs were easy to get hold of and natural insight about the production. Some also mentioned that it was better

than being "upstairs", which according to one, would affect the communication negative and valuable time would be lost to walk back and forth just to see if the GLs are there, but also that it is create a certain order and higher productivity. As a negative aspect of being positioned there, one GL said that there is a lot of things around and that the TMs/TLs might go there too often while the PM said it could be difficult to talk about something sensitive and it might be too much small talks which can create a negative view of the GLs for the TMs and TLs as well as it take up significant time.

After a request of the personnel one of the GLs took a round every morning through his/her groups in order to greet them, but after that, some TLs mentioned that they rarely saw him/her. Another GL visited his/her groups at least three times a day; morning, lunch and end of the workday, as well as being present at the change of shifts. One GL mentioned that one group did not want him/her to observe the group as it was taken as watching if they did something wrong. When asked why they did not stand and observe the process for longer spans of time the GLs stated two issues, first a lack of time and secondly that the TLs would change their way of working and thus the observation would not help.

When asked if the GLs often visited them, the TLs did not think they did it too often, but one TL said that they pass through often. All TLs seemed to agree that they wanted their GL to visit more, but as one TL explained it, it cannot be too often because then it would feel as if they were being inspected. One of the GLs seemed to have walked by more often before, but as the person self-stated, because of an injury this was not done as often anymore. One of the GLs said that he/she should walked by more often since it is good to be visible for the workers and gives a good overview of the current situation. One TL mentioned that he/she would like the GL to visit more if it is a special occasions, e.g. a disturbance.

Two perceived advantages to walk by often, as stated by two TLs, were: firstly that the TMs probably would work better under supervision and secondly that it would then feel like someone cares, both for themselves and for the TMs. According to one TL, the TMs might find it annoying while another said that he/she thinks that the TMs would not mind.

Several TLs stated that they would like their GL to have a greater understanding for the work and to participate more in the daily running of the production. For instance, when asked what they wanted for support from the GL, one TL replied that his/her GL did not seem to be aware of the duration of the processes and which processes.

Some TLs wanted their GL to be more present, thus this would give them a greater understanding of the process, where one suggested that his/her GL should participate more in the group to provide support and understand how things worked. Similarly, one GL mentioned, that he/she would like to be more involved in the TMs work, trying it out and thereby get a closer understanding of their reality. The GL further mentioned that this had not been done because of a lack of time and that it would have been difficult to do it without being constantly interrupted by other issues. One TL mentioned that if the GLs would be more involved, it would be easier for them to evaluate the work of the employees, to see where they are best suitable to be placed?

[He/she] is above me [in the hierarchy], [he/she] should know what I'm doing and in turn the persons I have beside me. If they were more present, then they would see more what we do.

At several stages, the GLs expressed that they did not know why problems occurred in the processes. It emerged that they almost never stood to observe the processes that they were responsible for, only responding to issues when they arose. Also experiments initiated by the GLs were often observed to be based on descriptions from the workers of perceived problems without the GLs seeing the issues with their own eyes. Further, it was stated during several Kata meetings that the GLs did not understand what was happening and as such did not know why certain things had occurred during experiments. When the researchers asked why they did not stand and watch, they stated that the operators would probably work differently if being observed which would render the experiment pointless.

4.4.5 **Hoshin kanri**

Out of the four KPIs the company had, the groups, according to the researchers' observations, seemed to think productivity and delivery reliability were the most important. The actions of both the TLs and GLs prove that they thought it was more important to deliver products than to perform improvement works. E.g. the Katas with the TLs and the groups' 5S had been either postponed or cancelled partly due to the time had to be used to produce the products. However, one TL mentioned that it was possible for him/her to stop the production in case there were something wrong. Also, one GL mentioned that he/she had told his/her groups, when they have been sloppy, that it is okay to lower the speed in order to increase the quality. Neither of the two active Katas which the GLs had been broken down to a Kata for any of the TLs.

As been previously mentioned, the new agenda for the group meetings were to include an update about the groups' progress regarding the KPIs. Each group had a goal value for each of the KPIs and the trends and how to fulfill the goals where to be discussed, in order for the TMs and TLs to be more aware of what is expected of them. The charts visualizing the KPIs and how the groups where fulfilling them were placed so every employee would see them.

As been previously mentioned, the GLs were not sure if the standards were followed. Some of the TLs mentioned that it is important for everyone to perform the same, whereof one said if the standards are followed, it would be possible to see what works and not works. This view was also shared by the GLs and during the TL workshop, the PM also mentioned the importance of standards and why everyone needs to follow them.

5 CURRENT STATE ANALYSIS

The current state analysis is divided into four sections. The first section briefly analyze the company's continuous improvement culture. This is followed by a section each for the three research questions.

5.1 Continuous improvement culture

Judging from Imai's (1986, p xxix) definition of Kaizen as "ongoing improvement involving everyone - top management, managers, and workers", the case company had no actual Kaizen activity. The closest comparison that can be made is the Kata which two of the GLs performed. However, they focused on only a particular process and had a follow-up time of more than one week between experiments. Judging from the word ongoing or continuous, focusing on only improving one process a few times a month cannot be considered as Kaizen. Also, as Rother (2010) recommends, reaching the target condition for a person familiar with the Kata methodology should not take more than three months and for a novice somewhere in-between one to four weeks, this was not the case for the active Katas, since they were started long before the case study was conducted. This relates to what one TL mentioned, that he/she did not believe that a Kata should take years to complete.

Further, weekly 5S meetings were performed in groups at all levels at the company, which means that this CI method involved everyone at the company. However, it cannot been seen as an ongoing improvement work resulting in many suggestions, since most groups had none or a few improvement suggestions written down at their 5S improvement charts. The group that had most, had eight suggestions since the start of the study, whereof four seemed to have been implemented or solved. However, implementing 5S seemed to have resulted in a big difference in cleanliness and order from before and after 5S was introduced, this can be seen as a positive thing or also a proof of that it is, as Randhawa & Ahuja (2017) mention a tool a company which implement Lean employ as it is easy. But it seemed like the employment of the tool has been stopped after the implementation, since only a few suggestions were made and 5S meetings were either postponed or the groups did not use the whole scheduled time.

There also existed other signs that suggested that the company was not employing Kaizen. Instead of exposing problems and handle them, which is how Liker & Hoseus (2008) mention should be done, the company exposed problems but most of the time did not handle them. For example, deviations were not properly handled and there were workarounds for faulty equipment rather than fixing of the root cause. But also, even if the company had no dedicated rework department, they did have continuous activity reworking cards both within groups and separately.

The high employee turnover, in terms of either employees leaving or changing position within the company, and the lending of TMs between the group, may have resulted in a weaken homogeneity and stability of the groups. This means, according to Schein's (1984) definition, that the groups' culture are weakened. On the other hand, since there did not seem to exist a CI culture, the fluctuation of personnel in the groups may have a positive effect for the company when trying to achieve a new culture, i.e. CI culture, since the fluctuations would mean that there were no defined culture in the groups.

5.2 How does the contextual factors impact a continuous improvement culture?

This section is divided into five parts, representing an analysis of each enabler: management commitment, employee involvement, communication, continuous improvement training and standardization.

5.2.1 Management commitment

As far as could be understood from the findings, top management, aside from the PM, lacked insight into the production department. This was supported by a majority of the TLs and a majority of the GLs, who wanted the top management to be more present in the production. Within the production and quality department, the managers could be noticed to be more present than when looking at the remainder of the company. The PM had the most presence in the production department, which could be noticed by the researchers.

Byrne & Womack (2013) state that in order for a Lean transformation to succeed, it is of high importance for the CEO to lead the transformation from Gemba and engage in Kaizen activities. It cannot be said that the CEO was leading the transformation, since he/she either was seen or reported as participating in at the Gemba or in Kaizen activities, which can be seen as hurting the company's ability to have a successful Lean transformation. Further, support from the other departments was something the PM requested. Furthermore, it seemed like improvement suggestions were more likely to be granted economic funds if an economic benefit could be shown. This is connected to what Imai (1986) states regarding that you should not be concerned with immediate payoff when promoting Kaizen strategy and that a financial decision system which only focus on money does not lend itself well to CI. However, the PM, whom was the person responsible for the production department, could be seen to actively participate in both the CI activities as well as being present at the Gemba. The PM also found it more important that his/her adepts followed the process rather than gain large results which can, according to Imai (1986), be seen as being supportive of the process. The PM also seemed to see CI as a long-term vision rather than something that would happen immediately. Which concurs with that Lean is a long-term investment which needs to be continuously evaluated (Dorota Rymaszewska, 2014; Liker & Convis, 2011) as results are likely to be delayed (Hahn & Doganaksoy, 2011). Further, the changing of a culture takes time (Dorota Rymaszewska 2014). But, an implementation cannot only rely on one person as the driver (McLean et al., 2017), which seemed to be the case, since the PM was the lone driver of the Lean transformation within the top management. However, the perceived difference between the CEO's and PM's leadership might have had an adverse effect since, as Waldman et al. (1998) state, differences in leadership behavior between managers can hinder implementation.

Several findings point towards a lack of capacity as a theme at the case company. All of the morning meetings, during the period of the study, included some kind of reprioritization due to lack of personnel. A majority of the TLs expressed a lack of resources in both their own groups and in others, with both a TL and a GL expressing that even with everyone, they did not have enough personnel to man every position. Most of the times, the reprioritization resulted in lending TMs to other groups which can be seen as a consequence of a lack of personnel. The

lack of capacity could also be noticed as the first process slipped further and further behind the schedule and thus affected other processes adversely with the lack of parts as well as the significant amount of overtime worked in the production. As a result of this, a third shift was introduced in order to attempt to alleviate this issue. However, at least initially this did not seem to have the intended effect, as the required support personnel needed to fix issues was not present.

Several authors (Jaca et al., 2012; Knol et al., 2018; Powell, 1995) have found that the resources in the form of personnel with dedicated time for improvements need to be granted to a CI program. The lack of personnel seen in the production department indicates that sufficient personnel in order to allow for improvement practice was not being granted. A lack of time was evident in the production, as a significant amount of overtime and replanning activities of personnel was taking place. A lack of time can be a barrier to improvement (Dora et al., 2016) which was also seen, as improvements were not prioritized when there was a lot of work to do. Mcpolin (2014) states that an initial lowering of production expectations might be needed to allow time for CI experiments and at the case company, this time did not exist as there was a constant struggle to deliver orders. The findings point at the dedicated time to work with improvements did not exist at the company. Rather, many were already working overtime with their productive duties and thus were spending above 100% of their work time on-line, while Sterman et al. (1997) state that management support in the form of release time from the normal responsibilities is needed. At no occasion the overtime was ordered, but rather made on voluntary basis, by GLs and TLs asked the personnel who was willing. Working overtime can lead to decreases in both productivity and effort (Shepard & Clifton, 2000), quality and performance (Li et al., 2000), all of which in some way can have an adverse effect on available time for the production personnel to work with CI, as they limit the output compared to planned output either directly or through rework from quality issues. Considering that quality issues, in the form of rework and cassation, were noticed at several instances, overtime might have been a contributing factor to the time issues indirectly while lower performance contribute directly. Further, overtime can lower both attention and executive function (Proctor et al., 1996), both of which should have an impact on CI, considering that attention is important in order to discover problems, while the level of executive function should impact the ideas for solutions to said problems. The fact that the PM saw no problem with voluntary overtime and that overtime was stated by several GLs as being seen as no issue by top management, this can be regarded as a management issue as the problem is not regarded as a problem and the resources to alleviate it is not made available.

5.2.2 Employee involvement

A lack of time for working on improvement culture was identified in management commitment with significant overtime and overburdening of employees as well as TLs spending a significant amount of their time on-line. A role conflict can arise between improvement efforts and the regular demands of work (McLean et al., 2017; Zbaracki, 1998), which could be seen at the case company in the form of large demands on throughput. The TLs further felt this role conflict in the fact that they were spending significantly more time on-line than off-line, with many days spent working only with on-line duties. One of the effects of role conflict is low morale

(Sterman et al, 1997) and this could be seen during group meetings, where frustration arose from both a lack of resources and ability to rotate. Hariharan (2006) mentions that a perceived lack of time might actually be the result of a lack of motivation, which in this case can be related to the GLs who to a large degree had the ability to decide how their time was spent. However, the TLs did not have this ability to the same degree, as they to a lesser or greater extent had their time planned into the production schedule, harking back to the previously mentioned role conflict. The effects of overtime include decreased levels of motivation (Shepard & Clifton, 2000) which might have had a negative effect on the TMs' and TLs' perceived available time according to Hariharan's (2006) argument that a lack of motivation can lead to a lack of participation.

The interviewees' answers as well as observations concur that there was no system for handling spontaneous employee suggestions. This was revealed several times, where informal improvement suggestions had been made to GLs but that there in several cases had been a lack of or delay of feedback as well as implementation, which seemed to affect the employees' willingness to make further improvement suggestions negatively. This is also supported by Alves et al. (2012), who states that suggestions must be taken seriously. A lack of structure for spontaneous improvement suggestions, was also visible, judging from the findings, as these suggestions were not documented in any way. This practice could make the employee sense that his/her suggestion was not given due credit, which, according to Alves et al. (2012), can lead to a lack of sharing. Further, there were signs that suggestions made in this manner had been accepted but not implemented, with some TLs mentioning accepted suggestions made months earlier but not implemented. As "implemented employee suggestions are a critical part of any continuous improvement system" (Bessant & Francis, 1999, p. 1115), this can be seen to hurt the CI development. However, employee suggestions could be seen to be handled in a structured manner, during the group meetings where the company initiated a practice of printing notes onto whiteboards along with the person responsible for providing feedback and ensuring implementation if the suggestion was accepted. This system can be seen as a positive step, as it is important to provide feedback (Bessant & Francis, 1999; Jaca et al., 2012; Knol et al., 2018). However, the response to many of these improvement suggestions during the next meeting a month later was that the GL was awaiting feedback from other departments which runs counter to Byrne & Womack's (2013) argument regarding that improvements ideas are to be implemented as soon as possible or employees will not keep offering suggestions. This lack of motivation was described by some TLs and one GL. A number of the suggestions were also closed down without implementation, while some were implemented during the time of the study. The number of implemented suggestions can, according to Camp (2015), be used to gauge employee trust, and in the study there were signs that the TLs did not trust that the GLs would follow through on suggestions, even if stated that they would be implemented.

The company also lacked any type of reward system for either spontaneous improvement suggestions or those presented during the group meetings. Suggestion systems must credit the suggestions or workers are unlikely to share ideas (Camp 2015), while rewards were not explicitly mentioned by any interviewee, the amount of employee suggestions during the monthly group meetings was on average two per person and month. An average number of two per month and employee cannot be seen as large, considering that Kaizen, according to (Imai,

1986), is an ongoing process, and improvements should thereby occur daily. As reward is connected to motivation (Jaca et al., 2012) a lack of reward could be connected to a lack of motivation which could contribute to the motivation issue.

No-layoffs had been made at the case company as a consequence of improvement work, which, according to Mcpolin (2014), is necessary in order to not procreate fear and resistance towards a CI implementation. Fear or resistance towards CI were not detected at the case company either, as none of the interviewees seemed to be negative towards working with improvements, e.g. nobody expressed anything negative about Kata during the interviews. Also, none of the interviewees expressed being afraid of losing their work. This can be considered as a good for workers commitment to make improvements, since, as Sterman et al. (1997, p. 509) mention, if workers are threatened by layoffs their "commitment to improvement will fail." Further, reassurance of job security in regards to industry 4.0, was also noticed during the study, as the issue was raised by the PM during several production information meetings and according to Mcpolin's (2014) argument that leaders should communicate a no-layoff policy several times during implementation, this can be seen as a positive sign even if it did not relate to the CI implementation.

There were a lot of different projects ongoing in the production department meant to result to a further adoption of a Lean management system, e.g. Andon, standardization, Katas and 5S. However, as both the GLs and several TLs mentioned, there seemed to be little follow-up on these attempts of changes. Which was also stated by some of the interviewees, where one said that he/she was good at planning and doing but not as good at checking and acting, and one said that the implementation of TWI had not come further than to the planning phase. A large amount of changes can, according to Elvnäs (2017), have a negative effect on employee motivation. Further, Imai (1986) states that the heart of CI activities lies in the PDCA-cycle, and since there was little follow-up, it can be argued that the company only adapt the planning and doing in the PDCA-cycle. "When an organization embraces PDCA, it starts to grow to become a learning organization. Projects go beyond one-offs and become a continuous stream of learning opportunities on the road to excellence" (Liker & Franz, 2011, p. 20). As the company had not embraced PDCA and per previous argument could not be seen to have a CI culture, the lack of PDCA following could be seen to hurt the efforts.

5.2.3 Communication

Lack of top management commitment could also be seen in the production and quality management group, where the managers had equal authority but differed in their views of how the department was to be run. The lack of common view of the managers seemed to have an effect on the interdepartmental communication at the case company, as members of production department expressed that the issues raised by them were not prioritized by the other functions. This was also noticed in the group meeting setting where the GLs often reported that their suggestions had not been processed since the last meeting. Further, there were many complaints among the workers of testing equipment where its maintenance seemed to have fallen in between the function of flow technicians and quality and was thus not dealt with. Furthermore, there seemed to exist a cleft between the production department and those referred to as "the

upper-floor". This cleft was described as a lack of consultation and respect primarily towards the production department from surrounding departments.

The perceived lack of common direction between the sub-departments of the production and quality department seemed to have an effect on the CI implementation in the form of a lack of support from support functions. There needs to be communication between managers and their areas (Garcia et al. 2014) and while communication existed between them, the sub-departments seemed to lack a common direction which might have been the result of a lack of leadership in the production and quality management group, inheriting from all of them having equal authority. Good horizontal communication allows for coordination of improvement activities among functions (Jaca et al., 2012), and a company implementing Lean needs to have good coordination between functions (Flumerfelt et al., 2016). The lack of common direction could be seen both through the sub-departments and the entire company in a lack of priority being granted to employee suggestions raised during group meetings, where the GLs commonly had not received decisions on suggestions from the previous month's meeting in time for the following meeting. Byrne & Womack (2013) state that supportive functions need to give priority to CI during initial efforts, and this was not done due to the lack of common direction between departments which caused aforementioned issues with employee involvement where employee suggestions were not implemented. A lack of alignment of company documents and improvement activity could also be seen in the GLs, TLs and TMs role descriptions where the descriptions only mentioned 5S and standards. As a lack of integration between CI with already established organizational practices can be seen as a barrier of CI (Zbaracki, 1998). Further, Galeazzo et al. (2017) found that strategic alignment in the form of clear strategic objectives is an important factor for CI implementation. As such this could not be seen to be fulfilled.

The researchers found that there was a high degree of transparency and honesty at the case company where, both during interviews and during the participation in meetings, the persons that were interacted generally did not seem afraid to speak their minds even in group settings. Knol et al. (2018, p. 3) define communication as "Ideas, information and knowledge are exchanged honestly, clearly and transparently, both orally and in writing, in all organisational directions" with both honesty and transparency being clearly visible in the case company. Closed vertical communication meanwhile can be seen as a barrier to CI (Beer, 2003) and the researchers observed a continual exchange of experience and thoughts between the GLs, which can be seen as open vertical communication. However, among the TLs there was little interaction stated and seen between members of this role which corresponds to closed vertical communication and which also gave rise to production groups blaming one another for certain issues rather than solving their own. Further, communication among operators impacts the operators' abilities, skills and motivation in a CI implementation positively (García et al., 2014) and the lack of communication between production groups can therefore be seen to prevent learning. Vertical communication allows for the spreading of learning (Jaca et al., 2012) and there seemed to be open communication between both TL and GL as well as between GL and PM as each layer expressed no hesitation towards expressing ideas and concerns.

An Andon system was being tested out during the study and, while the results of this test could not be ascertained during the study, Andon is a way to bring problems to the surface (Shook,

2010) which is important for a CI implementation (Liker & Hoseus, 2008). Further, the company currently did not have any system for detecting gaps from the planned amount of parts per pitch, but there were plans of initiating a pitch based system where operators would be able to see how far ahead/behind of the planned production they were. This can be compared to Byrne & Womack (2013), who suggest that how well the production is doing compared to tact time, should be visible. A problem can be defined as a gap between standard and actual condition (Liker & Franz, 2011) and that the gap should be easy to see (Liker & Convis, 2011). Since there, at the time, was no such system implemented, it could be seen as hampering the case company's ability to implement Kaizen as per Liker & Hoseus's (2008) argument that bringing problems to the surface is important for CI activities. Measurement systems of this kind can direct CI efforts (Bessant & Francis, 1999) and make problems visible, as well provide evidence of successes of improvements (Goodridge et al., 2015). Furthermore, there was no system for posting outcomes of improvement initiatives, which can hinder the initiative (Bhasin, 2013) and is a lost chance to positively affect employee commitment (Sterman et al., 1997).

5.2.4 **Continuous improvement training**

As previously mentioned, a significant amount of overtime was worked in the production. Overtime can according to Shepard & Clifton (2000) lead to employee turnover, which was, as stated by the PM, visible at the operational level. Employee turnover at operational level can, according to Zbaracki (1998), have a negative effect on CI development, as new employees will lack the training needed. However, as the case company did not teach CI at employee levels, the effects of this turnover could not be witnessed directly on the CI implementation, but the need to train these employees in the work tasks as well as the initially lower output could be seen to contribute to the lack of time previously mentioned. At the beginning of each implementation of new method, i.e. Kata, 5S and SOP, some sort of initial training had taken place within the production department. However, considering that there had been quite a high turnover within the production department and that no follow-up training had been conducted with new production members, this training was unlikely to have had the intended effect and even among TLs there seemed to be little knowledge about how the procedures were supposed to be used.

There was a lot of internal repositioning witnessed at the company, where well performing TLs within the company were shifted to more administrative tasks or to be TL at another group. The funneling of successful TLs from the production department, can further hurt CI efforts according to Zbaracki's (1998) argument that the movement of managers leaves no one to sustain the efforts, which could be applicable to the TLs, since they hold a leadership role. The effect was also noticeable at the company as stated by some interviewees, where a lot of competence had vanished from the groups in light of the changes of TL. Further, this could be strengthened with the fact that the two previous TLs had had several successful Katas previous to having been moved to other positions at the company and that the current TLs did not have any active Katas at the time being.

There was no signs that the case company employed training programs for TLs who instead, as stated by both TLs and GLs, were assigned their roles and in the best of cases were allowed to work besides the previous TL for a short amount of time. Neither did the new TLs receive education in CI which runs contrary to what several authors (García et al., 2014; Jaca et al., 2012; Knol et al., 2018; McLean et al., 2017; Shook, 2010; Trenkner, 2016; Van Aken et al., 2010) state, regarding that training in CI is of high importance in order to initiate a CI culture. The lack of training could be seen among the TLs, where some of them requested a greater understanding about Kata as well as 5S. Further, it was seen in a dissimilar view on how improvement in general should be handled and who to contact for improvements.

There were signs that the company had adopted a more wide approach to implementation of Lean practices. The researchers define a wide approach as encompassing all employees while a narrow approach is only focusing on a small team. Signs supporting that the company adopted a wide approach are that they initially attempted to perform Kata with all TLs as well as all GLs simultaneously and that the current implementation of standards were attempted to be initialized to all groups and all products at the same time. However, the Andon implementation seemed to lean more towards the narrow approach with the initial area only encompassing two of the processes rather than the entire factory. There is a risk that if one attempts to make too large changes too fast, the changes may not take hold (Hackman & Wageman, 1995) which was expressed in the history of the company where previous efforts to implement TWI had taken place but had not been finished. The initial Kata implementation at TL level could be said to have failed, since there was none active Kata with the TLs at the time of the study. An initial implementation of CI should begin with a pilot area and that the methodologies should be implemented in depth before spreading it to the rest of the company (Liker & Franz, 2011) and during the development of a CI process, only a few processes should be selected at a time according to available resources (Jaca et al., 2012; McLean et al., 2017). As this was not performed at the company, no conclusions can be taken. However, this would have allowed both the PM and the GLs more time for the chosen group, which was stated as an issue. Also, the wide approach has not seen any success, except for an initial burst of activity that later died out.

There was no initiation for new TMs in either Lean, CI, or the specific Lean methods that were conducted at the case company. Implementation of CI should include basic training in problem-finding and problem-solving processes (Bessant & Francis, 1999), the effects of the lack of training was difficult to garner as there was no time available for TLs and TMs to work with CI. However, a lack of reporting of problems could be seen at the company, where issues with for instance workarounds for equipment was incorporated into the daily work rather than seen as a problem. The argument can be made that if the TMs had been trained in problem detecting, this might not have been the case and the problem would have been brought to the surface. But, as there also was a lack of proper follow-up on the issues that were actually raised, this behavior cannot be solely connected to lack of training. Further, as no, structured or unstructured, improvement work was active on TL level, except being asked for issues encountered and the at sometimes performed 5S meetings, little conclusions can be gained from this level.

During the study, a workshop for the TLs was held, where the main theme was standardization. The workshop was hosted by the PM and supported by the GLs. What was taught was that the standards was to come from below built on the initial SOPs that detailed how they presently worked, which were to be corrected and improved by the teams. Afterwards, the TLs seemed to exhibit an increased level of commitment to standards, expressing eagerness to work with standards. The TL workshop was conducted away from the TLs' workplaces, making it a theoretical training. Training can often be too theoretical (Zbaracki, 1998), however, this was not expressed during the TL workshop. Further, a long time between training and result can lead to frustration (Snee, 2010) and the workshop was not immediately followed up with action. Rather, the GLs expressed that the information would be taken to the next group meeting, up to a month away, and that after this, the process would begin in earnest. Furthermore, training should be done on real improvement projects (Snee, 2010), of which the TL workshop did not apply. The PM said he/she had plans to, instead of holding workshops in order to teach methods of CI, to make the learning in the form of experiments within the workplace. However, these attempts were not seen by the researchers during the study, aside from the two Katas active on GL level.

As far as could be gauged, no employee at the company had the official responsibility to teach CI. This runs contrary to what Byrne & Womack (2013) state regarding that a support operation should be created to support the Lean operation and Camp's (2015) statement that it is important to have a full time employee working with Lean. One result that could be gauged, was that few TLs had more than a cursory knowledge of Lean and CI methods and also expressed a want to learn more about them. Further, for the groups that were working with improvements, they seemed to not follow any methodology. Instead one TL gathered a large amount of changes before bringing it to the GL, where it was then evaluated. This stands in opposition with Liker & Franz (2011), who mention that a key concept is to try countermeasures and then check to see the learning before making the next improvement.

5.2.5 **Standardization**

The company was in the process of introducing SOPs during the period of the study. However, the process was not complete which was apparent as the GLs were not certain that TMs followed standards and that the variability in the output of pitches was high. As one of the benefits of standardization is decreased variability (Emiliani, 2008) this can be judged as a lack of standards. As standardization can be seen as essential for Kaizen (Wittenberg, 1994), this should have had an effect on the improvement work. The effect of the lack of standards could also be seen in the GLs' Kata, where at several points the two GLs whom currently performed Kata, expressed that they lacked the knowledge of how the work was actually performed which made it difficult for them to structure experiments. As standardized work can be seen as a reference point for CI (Emiliani, 2008), this reference point was not present at the company and hurt the CI work for the GLs. However, as there was a lack of time for TLs and TMs to work on improvements the effects of a lack of standards could not be seen on this level.

There did not seem to exist a culture for standardization at the company, i.e. meaning that standardization was not being conducted in a recurrent manner. For example, the researchers

observed an instance, during a group meeting, where important and valuable information was shared. This information, contained quite intricate instructions of how to handle material in order to not damage it, was not recorded and only verbal agreement existed that it was to be taken into consideration by the group. This was repeated at more instances, for example when a group had a problem with a testing equipment and one in the group described a way to work around it, the information was shared in the group but never recorded and no agreement to train those who were not there was made. To note in this case, is that the procedure to pass the products through the test departed from quality procedures, and such a departure should have involved the quality department. As standards are important for the "Transmittal of individual experience and know-how" (Imai, 1986, p. 75-76), this could be seen to hurt the organization as the information was not passed on. Further, as quiet agreement was made in the groups of workarounds to problems, problems were summarily hidden in the organization when standardization, according to Liker and Franz (2011), should expose abnormalities.

The lack of standardization could also be seen in a high variability in performance for certain procedures both when it came to throughput and quality, since Emiliani (2008) mentions that standardized work leads to reduction in variability and improved quality. This could especially be seen in the process metric of internal delivery reliability, which was a measure on if the process delivered the product to the next stage on the planned schedule, which for many processes laid around 50%. Compared to Imai's (1986) statement, i.e. that they should see the next process as a customer, and that the delivery reliability to the company's actual customers was above 90%, this was not done. The low internal delivery reliability was seen to have an effect that contributed to the problems resulting from resource shortage, where the lack of standards could mean that it is more difficult to plan, as the cycle time for the products varied and the times used for planning was therefore not accurate. The high variability in throughput, can also be interpreted as that the possibility for higher throughput was possible which could have allowed time for CI activities.

5.3 How does a Lean leader impact a continuous improvement culture?

This section is divided into five parts, representing the five principles in the Lean leadership model: improvement culture, self-development, qualification of employees, Gemba and Hoshin kanri.

5.3.1 Improvement culture

A GL should process TMs improvement suggestions and work on CI activities (Liker & Meier, 2006), this behavior was in part exhibited during group meetings, where GLs were seen to ask for problems and ideas and then proceed to write them down, initially on a paper and later as a note on a whiteboard as the new meeting methodology was introduced. The GLs then processed the ideas, sorting out those which should be taken onward to other company functions from those that could be influenced within his/her own area of control or that of the PM. Those taken onward to other functions had often not received feedback during the following meeting. However, for the ones inside the GLs' area of control, there were several instances where GLs asked the TLs or TMs on the meetings to take the issue on to the appropriate function, for

instance, flow technicians or to implement it themselves. This can be seen as a way to teach the TLs the GLs' responsibility, which, according to Marksberry (2010), is important. However, Lean leaders should also help the employees to apply ideas in practice (Dombrowski & Mielke, 2013), where the GLs can be seen to have failed, as at many times during the following meeting the improvements mentioned had not been made by the persons assigned the responsibility and thus had not received sufficient help to manage the improvement. One reason stated for not completing improvements was that there had not been time for working on it. Since Lean leaders have the responsibility to muster the resources within their authority to support Lean activities (Goodridge et al., 2015), this lack of time can be seen to be a flaw in leadership practices. This argument is supported by the fact that during the period of the study, the GLs were seen to frequently lend personnel between the groups which, granted, positively affected the ability of the other groups to deliver products on time, but negatively affected the available time within the group which had lent TMs and thus could be argued to hurt the improvement work. The practice of lending could be an effect of a lack of personnel but was also a choice made by the GLs, who favored short-term goals over long-term goals. This is also supported by the fact that a brunt of the TLs expressed a lack of time as the main issue for not performing CI. While a successful implementation of Lean requires a long-term vision, where short-term goals need to be sacrificed (Dorota Rymaszewska, 2014; Liker & Convis, 2011), this was here not seen in the GLs' actions.

Another reason for lack of processing and implementation of employee ideas, was presented in employee involvement, where GLs took over spontaneous employee suggestions without seeming to record them as well as not presenting feedback in a timely manner. The argument in that case was a lack of a system for managing these suggestions, however, as per previous argument this is also the GLs' responsibility. One issue the GLs raised for not being able to work with CI, was that they had a lack of time as there were other duties to solve, e.g. dealing with resource shortages and dealing with emergencies. Kaplan et al. (2014) define that a Lean leader needs to move away from a 'hero mentality' of primarily solving problems, which can be compared to the GLs going in and solving issues and emergencies in production. This can be related to a choice the GL made between short-term goals of meeting production deadlines and long-term goals of changing culture, where the GLs primarily showed a focus on the short-term picture. Some TLs mentioned examples of when they had not received any further information regarding the improvement suggestions they had proposed to their GL. Since positive values of trust in managers abilities will make workers more willing to participate in improvement activities (Li et al., 2015), the workers willingness to work with improvements would be seen as low.

There seemed to be ongoing improvement in several of the groups where small changes were being made in the daily working environment. Within these groups, there, according to the TLs, seemed to be an open environment where each member was allowed to contribute. Lean leaders should seek input from every member in a team in order to create a culture where all members feel free to raise issue and provide ideas (Goodridge et al., 2015). The GLs fulfilled this in part, where there seemed to be little hesitation of the TLs to contact them with improvement suggestions. Further, the participation of individuals in improvement efforts pushes the method

into the company (Zbaracki, 1998), and thus the improvements made in the groups could be seen to develop a CI culture.

Knol et al. (2018) identified that one of the most important factors, for initial Lean implementation, is that employees are allowed to make mistakes. The GLs all stated variation of the statement that a person bringing a mistake to the surface should be considered a hero rather than being admonished as it allows a problem to be exposed. This is, by Dombrowski & Mielke (2013), supported as a good practice who further state that failure is a good thing, since it elucidates a problem with the process. Furthermore, none of the TLs reported having felt blamed when reporting mistakes. Lean Leaders should avoid putting blame on persons for mistakes (Goodridge et al., 2015) since it lowers levels of trust (Knol et al., 2018). The GLs fulfilled this well which should have led to increased level of trust. However, the view diverged if the TMs always reported mistakes or problems found, with some TLs holding either view. The view also diverged on GL level, where two felt certain that their TMs reported mistakes and problem while one hoped they did. This can be seen as hamper the company's progress with CI since, as Imai (1986) states, progress within CI depends on that everyone within an organization must admit any failings or mistakes made at their job otherwise progress is impossible.

5.3.2 Self-development

All of the GLs described different skills they needed to gain in order to become better leaders. Dombrowski & Mielke (2013) state that new leadership skills are necessary, as such the GLs' expression of wanting to develop can be seen as a step in the right direction. Liker & Meier (2016) discuss that Lean leaders have started on the shop-floor before being promoted to a higher position. The GLs fulfills this, in the form of all having worked in the production earlier and thus had experience of at least one area of the production.

A lack of standardization existed on the GL level in the hierarchy. Emiliani (2008) states that standardized work can bring many of the same benefits for leadership as it does for workers and that a lack of standards can lead be both inefficient and costly. This lack of standardization on this task was also visible where the GLs shared a relatively simple administrative task, but each did it in their own way. Mann (2010) states that standards for leaders help in translating abstract concepts into concrete expectations. This lack of standardization could also be seen to hurt the self-development of leaders towards CI, as the description of the GLs duties did not include any skill related to CI and thus the GLs did not have the ability to work towards concrete expectations. This was further supported by the fact that two GLs stated that they fulfilled the documented part of their work but needed to develop in the Lean aspects as this was not part of their role description. This can be compared to Liker & Hoseus's (2008, p. 139) statement that learning the role of the person above is possible by "having clear roles and responsibilities for each job level", and the GLs' role description was not aligned with CI activities as the only things related to CI was 5S and standardization. Further, Marksberry (2010) states that the role prescriptions provide standards for how a role should play out and, for instance, the GLs' role description did not any mention improvement activities aside from 5S and standardization. A lack of integration between already established organizational practices can be seen as a barrier

for CI (Zbaracki, 1998). As the description of roles can be argued to be part of the organizational practices and that it can be a contributing factor to why the GLs did not view training of themselves as a main responsibility, it can be seen to affect the CI implementation adversely.

The GLs did not spend much time on Gemba walks, in fact the lack of presence was one of the foremost expressed complaints about the GLs' practice by the TLs. Further, the PM did not instruct the GLs using Gemba walks. Mann (2010) states that the desired outcome of a Gemba walk is that the student learn for him/herself how Lean management principles can be applied. Thus the GLs' lack of performing Gemba walks can have been seen to hurt their development of Lean practices. The sensei is the person one or two levels above in the hierarchy (Liker & Convis, 2011) and as such, the sensei for the GLs was the PM. The sensei is supposed to partake in order to teach through Gemba walks (Mann, 2010) and this participation was mentioned by neither of the GLs and was not noticed by the researchers. As such, this might have hurt the self-development of the GLs, as per Dombrowski & Mielke's (2013) argument that coaching should take place on the shop-floor.

As previously mentioned, Knol et al. (2018) identified that one of the most important factors, for initial Lean implementation, is that employees are allowed to make mistakes but also to learn from them. The PM stated that for one of the active Katas, the important thing is not the improvement itself but the teaching gained by the adept. Therefore, even when experiments are proposed that likely will not move the Kata towards the challenge, the PM would still allow the adepts to proceed because the learning is more important. As such, the PM could be seen to follow the Kata methodology where Rother (2010) states that a mentor should allow the mentee to do mistakes as long as these mistakes will not impact the customer in order for the mentee to learn. Further, the PM conducted coaching Kata for two of the GLs almost weekly, and as coaching Kata according to Rother (2010) is the way Toyota teaches the behavior that is the foundation of CI, this should help the GLs develop their problem-solving skills. As managers should get training in problem-solving methods (Garcia et al., 2014), this should help the CI efforts. However, Rother & Aulinger (2017) mention that a learner of Kata should be subject to daily coaching cycles which makes a weekly schedule rather long. Also the coach of a coach is supposed to provide feedback on the coaching (Rother & Aulinger, 2017) which was not provided the GLs and was also something that was requested by one GL, as he/she did not know how to proceed with conducting Katas with his/her TLs. As such, this lack of support from the PM could be seen to hurt the Kata activity at TL level.

5.3.3 Qualification of employees

As mentioned in CI training, there existed no training program for either TLs or TMs in CI methodology. Further, the TLs received no specific introduction into their role except for the occasional accompaniment of the previous TL, for varying periods. TMs had an introductory safety course and some introduction into the company hierarchy but the responsibility for teaching the work methods was placed on the group the TM was placed in. According to Liker & Meier (2007), GLs or skilled TLs should teach work instructions to new TMs. Further, GLs are to be responsible for the development for a training plan for job training and TLs should assist this training. Compared to this, the GLs were seen to hand of the responsibility entirely

to their groups. Training of employees was also raised as an issue during group meetings, particularly in relation to the frequent lending of personnel between groups, where, for the process, untrained personnel was lent for only one or a few days before being returned to their original group. Continually lending new and temporary workers was stated to cause issues in the groups, as the time consumed for teaching these TMs almost consumed the benefit of having an additional person in the process, as well as causing stress in the group that needed to train the worker. Further, untrained TMs prevented job rotation, which meant that TMs became stuck at certain positions for an extended period of time. Job rotation deepens the knowledge and experience of operators (Macpherson et al., 2015) and Lean teams must develop multi skilled workers through job rotation who can determine root cause deviations (Monden, 2012). Therefore, the lack of suggestions during group meetings might have in part been the result of a lack of work training to enable TMs to rotate their positions, since Liker & Hoseus (2008) state that job rotation is a strength when it comes to problem-solving. Further they state that "with job rotation there is a high level of interest in discussing all aspects of the jobs in the team" (p. 180). As the successful training of employees can be seen to be the GLs responsibility and the practice of lending is partially their responsibility, their decisions can be seen to negatively impact the group and, in turn, the CI culture.

A TL should train for the GL role (Liker & Meier, 2006) and a superior who is one or two levels above in the hierarchy should teach the work of the superior (Liker & Convis, 2011). For the TLs, the GLs were the nearest superior and should thus train the TLs to perform their job. One of the GLs expressed that part of his/her job was to train TL to replace his/her position, which can be seen to directly apply to this argument. Further, as per previous argument, the GLs were seen to challenge their TLs periodically by handing them the improvement suggestion responsibility. While this can be seen to hamper implementation, see previous argument, it can also be compared to Dombrowski & Mielke (2013) who state that the employee needs to be constantly challenged and will learn through solving the problem. Also, the same argument made about standardization of the GLs' duties can be made for the GLs' ability to teach the TLs to perform their work, as the skills required for TL to learn was not defined.

The GLs did not coach their TLs in problem-solving methodologies. While officially there were Katas ongoing, where Kata is a structured way of teaching and working with improvements (Dombrowski & Mielke, 2013), there was no activity in those conducted at TL level. Considering that coaching should take place daily (Dombrowski & Mielke, 2013) and that the person responsible for this is the direct manager (Liker & Franz, 2011), this was not fulfilled at the case company. Further, the lack of daily coaching could be seen in the interviews where the TLs who had had Katas mentioned that initially there had been frequent follow-ups of around once a week but that with time that follow-up had been more and more delayed and then the coaching meetings had stopped. Considering that a learner of Kata should have daily coaching (Rother & Aulinger, 2017), a week can be considered a long interval between sessions. Some of the TLs seemed to be satisfied with the support they received at the time, while others requested more, in terms of being more present so they could either step in or get greater knowledge about the processes.

5.3.4 **Gemba**

All TLs wanted more presence from their GLs in the workplace in the form of visibility in the work area. Several also wanted their GLs to have a greater understanding in the daily work of their group. Goodridge et al. (2015) state that leaders need to be visible since it signals that the work of the TMs has priority over other duties. With the GLs having their desk in the production department they were visible by some groups, as well as close to all groups compared to previously where the direct superior of the TMs had offices upstairs. The TLs saw these changes as a positive things stating advantages such as easy to approach and gain better insight into the production. Since decisions should be based on first-hand knowledge (Dombrowski & Mielke, 2013), this nearness to production should allow the GLs to take better decisions. This was also supported by some TLs who stated that their GL did not always know how long time a product took or how much assistance was required.

A certain lack of understanding was identified when the GLs performed their Katas, where in several instances a lack of understanding regarding the investigated process, was an issue for the reliability of the experiments. In this way, the lack of understanding could be seen to directly impact the improvement work of the GLs. Further, several TLs mentioned that they wanted their GLs to observe or participate more in the work tasks of the TMs, as this would increase the GLs' understanding of the processes and thus make more informed decisions. As a Lean leader should truly understand the processes (Dombrowski & Mielke, 2013), this can be seen as an issue. However, the GLs were seen to also investigate the processes on which they did the Kata challenges, which added to their insights into these processes and thus in a way put them closer to Gemba. The lack of knowledge could be due to a lack of Gemba walks on part of the GLs. All GLs were stated to walk through Gemba at least once a day and to check the status of each process and answer questions. Time needs to be set aside to visit the Gemba each day, to recognize an employee's work and be able to answer questions (Aij & Teunissen, 2017). However, when asked if they ever stood to observe the process for a longer time, neither did, which according to them was the result of lack of time as handling of emergencies took their attention. Considering that the GLs' time was not scheduled, this can in part be considered to be their decision. As manager gains credibility and respect by taking time to comprehend the work of the employee (Gesinger, 2016), the lack of observation and understanding displayed could have hurt the respect of the GLs. As per Elvnäs's (2017) argument paying attention and evaluating work is the easiest way to motivate someone, the GLs lack of Gemba presence could have negatively affected motivation and thus employee involvement.

GLs should review the standardized work of one employee each week, while TLs should review one employee daily (Liker & Meier, 2017). This practice could be seen not to be done and could have impacted the GLs' Kata, as the GLs sometimes did not seem certain that the TMs worked according to the standard agreed for the experiment. The review would also have allowed the GLs to gain a larger insight into the work of the employee and thus put the GL closer to Gemba.

5.3.5 **Hoshin kanri**

In the previously analysis of reporting problems it was seen that all TLs felt safe reporting issues to the GL and one also expressed trying to meet the TMs with the same view as his/her GL

which can be seen as having the same view on this issue. However, several TLs as well as one GL felt uncertain if the TMs reported mistakes and problems. This can be seen as a lack of alignment between the TL level and the TM level.

One aspect of HK is to break down business strategies into clearly measurable goals (Bessant and Francis, 1999), this could be seen to be done to some extent as the TMs had access to charts detailing their internal delivery, external delivery, quality and OEE. Neither of these charts featured goal levels and was not discussed with the workers during the period of the study. However, a new agenda was supposed to be introduced for the group meetings, where these measurements were to be discussed each meeting. This can be compared to the fact that problems should be pointed out when they occur (Liker & Franz, 2011) and, considering that the group meetings took place only once a month, there was a large delay between the problems and feedback received on the performance. The GLs further had access to pitch level breakdown of the performance of the groups, but was not seen to be communicated to the groups. Leaders should make sure that employee development is integrated into company objectives (Trenkner, 2016), however, as neither the TMs' or TLs' role descriptions featured development goals this could not be seen to be done.

One aspect of the Kata is to cascade strategic level challenges through the organizational level, where a target condition on one level above becomes the challenge at one level below (Rother & Aulinger, 2017). This was not done at the company which meant that the Katas conducted at GL level were unrelated to those conducted at TL level. As per Liker & Hoseus's (2008, p. 429) argument that HK "connects leadership's vision, values, and philosophies [...] to the daily activity on the floor", this could be seen to be an issue as this connection did not happen. The lack of alignment could also be seen in the two groups that worked on improvement internally as their GLs did not seem to have insight into what direction these improvements went. As HK ensures that improvement activities do not have opposite direction to the long-term goal (Dombrowski & Mielke, 2013), this was not ensured in these groups.

There were signs that there was a lack of common values of the KPIs throughout the production department. While security and quality were the most important KPIs, the action that could be seen on the floor seemed to value productivity above quality. This could be seen both in significant rework made, productions allowed to continue despite quality issues and a large backlog of quality issue cards. Both GLs and TLs had the official ability to stop production in case of quality issues, however this was never witnessed by the researchers despite observing both reports and discussions of said issues. One of the key values for HK are aligned goals on all levels (Dombrowski & Mielke, 2013) and here the goals can be seen not to be aligned on either GL or TL level with the PM. The lack of alignment of goals could be further seen between the PM and the GL and TL level. While the PM stated that CI activities should be prioritized, this was not seen at the GL and TL level where there was an emphasis on daily delivery rather than CI.

5.4 How does the contextual factors affect a Lean leader's ability to foster a continuous improvement culture?

An adverse interaction between management commitment and the GLs ability to work with CI could be seen across all aspects of the Lean leadership model in the form of a lack of time. This took the form in that the GLs were seen to directly react on numerous issues that arose in production, e.g. handling stoppages and malfunctions. Taking care of line stoppages and malfunctions are part of a TL's work (Liker & Franz, 2011) and a GL who have to cover for TL responsibilities is one of the definitions of an over-lean system (Inamizu et al., 2014). The decision for the number of employees in each group was made by the top management, and that this number, compared to the needed throughput, directly impacted the amount of time a TL needs to spend working as an operator. This means that the management's decision impacted the GL's ability to work with CI as they are forced into over-lean behavior. The GLs covering for TL duties also further burdened the GL, which meant that they had less time for their own responsibilities. During a Lean implementation, leaders risk becoming overburdened with the additional duties (Bhasin, 2013) which might lead to lower level managers not viewing CI as essential and thus not participating (McLean et al., 2017). A version of this could be seen where the GLs did not prioritize CI activities, since they viewed it more essential to solve the issues that threatened delivery reliability. They did express that CI was important, but that there was no time available and thus was either postponed or not performed. Leaders with access to sufficient "autonomy, information, support, access to resources and access to professional development" are more likely to be able to implement Lean (Goodridge et al., 2015, p. 12). The GLs had access to autonomy and a certain amount of support from the PM, who by him-/herself discussed a lack of time as an issue, and access to professional development in the form of Lean courses. However, they lacked access to the resources needed to progress. The lack of time on the GLs' side could further be the result of the TLs and GLs being in an over-lean mode, which would force the PM to assume some duties of the GLs, this could also be seen as the PM was often involved in daily management and overseeing CI activities both of which are part of the GLs' activities (Inamizu et al., 2014).

A further interaction could be seen where a lack of management commitment adversely affected qualification of employees, improvement culture and Gemba. The lack of resources available at GL level in the form of sufficient number of TMs, could be seen to impact the GLs' ability to work on qualification of employees, as the lack of resources gave rise to frequent lending of employees which prevented job rotation in the groups and thus hurt cross functional knowledge. As previously mentioned, the lack of resources also forced TLs and GLs into over-lean behavior which prevented the GL from teaching the TL his/her job as the TL was fully consumed with production duties. This over-lean behavior further hurt the Gemba of the GLs, as they stated that they lacked the time to stand and thoroughly observe a process. It was analyzed in improvement culture that the GLs at the company seemed to prioritize short-term goals. Waldman et al. (1998) state that the implementation might encounter difficulties if middle managers and top managers exhibit differences in their leadership behavior. This could also be seen in the strategic alignment at the case company, where the GLs seemed to see it as more important to handle short-term issues, which might be the result of influence from top management who did not seem to see CI as a priority, while the PM stated that CI should be

done. At the same time, the GLs were seen to favor short-term goals in front of long-term objectives which might be the result of the top management having a focus on short-term objectives.

Employee involvement and improvement culture seemed to have a two way interaction, where the lack of employee commitment can have impacted the perceived time available for CI for TLs and TMs. However, the decisions made by GLs that resulted in a lack of implementation and feedback on employee suggestions could be seen to have an adverse effect on employee involvement.

An interaction could be seen between communication and improvement culture where the GLs' ability to process employee suggestions were impacted by the lack of common direction between departments. This took the form of a lack of support congruence centered on CI activities, which resulted in the GLs not receiving answers from other functions of employee suggestions, as they were not seen as a priority. This can in turn be seen to impact employee involvement in the CI activities as it results in lower motivation. Further, there was a lack of congruence seen between the description of the GLs work duties, as described in the documentation, and Lean practices. The documented role was more focused on the daily running of production rather than the CI implementation and could be seen to negatively affect the self-development of the GLs and TLs as it did not provide a clear description of skills to strive for. The same issue also affected the GLs ability to qualify employees, in the form of teaching them the job of the person above them in the hierarchy, as no clear definitions of their role existed.

An interaction between CI training and qualification of employees could be seen where the lack of support personnel present to help teach Lean both negatively affected the GLs' already limited time and also did not provide assistance in teaching the employees. Further, the lack of structured training programs and role descriptions for Lean leaders could be seen to hurt the GLs' ability to self-develop, as there was no assistance provided for this development.

An issue identified in Gemba was that GLs did not understand the work of the groups as well as they thought they should. This was connected to a lack of active time participating and observing Gemba. However, it can be argued that this lack of understanding could have partly been the effect of a lack of standardization as work standards would have let the GLs get at least a cursory knowledge of the process. Particularly as one aspect of the Gemba walks is to periodically review the standardized work of employees (Liker & Meier, 2007).

6 CONCLUSION

The conclusion is divided into three sections, each section representing the three research questions. The first and second section presents the conclusions drawn for each of the five enablers respectively five Lean leadership principles. The third section present the conclusion of how each of the five enablers impact the principles.

6.1 How does the contextual factors impact a continuous improvement culture?

Lack of management commitment had an adverse effect on CI in the form of limited amount of human resources resulting in overtime, additional overhead work for planners and GLs, lack of ability for job rotation and lack of time for improvement work as well as focus on short-term goals and objectives. Lack of management commitment further had an adverse effect on employee involvement and CI training, where the lack of resources assigned to the CI initiative hurt these areas, and communication where the lack of common view among top management led to support departments not supporting CI activities.

Employee involvement was seen to be negatively affected by management commitment in the form a role conflict between improvement work and regular work and overtime in the form of decreased motivation. Further there was no time available for working with CI which hurt the involvement. The lack of system for handling and giving feedback had an adverse effect on the number of employee suggestions as did a lack of implementation of said suggestions. As a no-layoff guarantee had been communicated, there was no resistance towards CI activities among the workforce.

Communication was seen to be negatively affected by management commitment in the form of a lack of strategic alignment and coordination between departments led to that improvements from the production department was not prioritized by other functions. This was the result of a lack of common direction between the managers and that organizational documents did not support CI which made it appear as unimportant. This, in turn, negatively affected employee involvement as improvement suggestions of employees were not being implemented or given feedback. The company also lacked a way to detect deviations from tact time at process level which negatively affected the ability to identify problems.

Continuous improvement training was seen to be affected by management commitment as no direct resources were established for teaching CI and no employee had this responsibility. A significant amount of employee turnover was visible at TL level which adversely affected the knowledge of CI methods. No education in CI was present at TM and TL level at the company. However, the effect of this lack of training could not be noticed at TM and TL level as no time was available for these to work on CI. The TLs interviewed expressed a lack of knowledge of both Lean and Kata both for themselves and for their TMs, where a majority stated that they wanted more understanding of these practices.

Standardization was not fully implemented at the case company which could be seen in a high variability in the processes and a lack of reference points within the GLs' Katas that hurt the improvement activity. The lack of standards' effect on TL and TM level could not be gauged

as a lack of time existed for CI activities on these levels. However, the lack of standards could be connected to the lack of time as it hurt both throughput and planning activities. The lack of a standardization culture prevented the sharing and documentation special procedures that was discussed during group meetings but not recorded.

6.2 How does Lean leaders impact a continuous improvement culture?

There was a lack of processing of employee suggestion on the GLs part, who was seen to distribute responsibility to the TLs. However, the GLs did not assign the TLs the time needed for processing improvements as they prioritized the deliveries of other groups by lending personnel between groups as well as did not provide the personal assistance in the problem-solving which prevented improvements from being made. Further, the GLs did not provide adequate and timely feedback on employee suggestions which hurt the willingness of TLs to contribute. However, the GLs seemed to have instilled a culture of allowing mistakes and opinions in the employees by repeating the message which resulted in several issues being raised during structured meetings. Groups also existed that worked with improvements internally and, while unstructured, the GLs seemed to have managed to instill a trusting culture.

A lack of standardization when it comes to leadership skills defined for the GL level could be seen, which impacted the GLs' ability to self-develop by not knowing what skills should be learnt. Further, the lack of coaching in the form of Gemba walks by the PM, as well as lack of coach on coach training, negatively affected their self-development and in turn their ability to qualify personnel. However, the PM provided coaching in the form of coaching Kata for two GLs which positively affected their self-development.

The GLs did not take sufficient responsibility for TM training where they gave this responsibility to the groups. This together with favoring short-term goals by lending personnel between groups, severely hurt both job rotation and multi skilled workers while also causing frustration within the groups. The GLs could further be seen to challenge TLs in order for them to develop but failed to provide sufficient resources in the form of time for the TLs to work on the challenge. Further, the TLs lacked training in problem-solving methods and as such stated to have little knowledge of CI methods.

The GLs were situated in Gemba and did a type of Gemba walk each day, which gave them an improved insight into production. However, their improvement work was negatively impacted of a lack of specific knowledge of processes which was also requested by TLs. This lack of knowledge was the result in a lack of thorough Gemba studies. However, the Kata was stated to give increased knowledge of specific processes.

A lack of congruence was found between stated importance of KPIs and actual behavior, where quality was stated to be more important than productivity but decisions were seen to be taken that counteract this. Katas were not broken down to TL level which would have been a way to align the organization and improvement activity was ongoing that was not ensured to be aligned to the organization's goals. KPIs were in some fashion starting to be broken down to TL level but only infrequently.

6.3 How does the contextual factors affect a Lean leader's ability to foster continuous improvement culture?

The lack of management commitment, in the form of sufficient personnel, directly impacted the available time of the GLs which had a secondary negative effect on each of the five leadership principles, as well as making the GLs favor short-term objectives before long-term objectives. Further, the lack of resources directly impacted both improvement culture, in the form of lack of time for TLs and TMs to work on improvements, and qualification of employees, in the form of lending which prevented job rotation.

The identified lack of employee involvement had an adverse effect on improvement culture, in the form of a lack of time, and commitment to working with improvements. However, the effect was twofold, where the actions of the GLs also affected employee involvement.

The identified lack in communication, in the form of lack of strategic alignment, affected improvement culture adversely, as employee suggestions were not processed and thus commitment decreased. Further, the lack of alignment of company documents and Lean practices were seen to adversely affect the self-development of leaders and the qualifications of employees, in the form of a lack of definition of skills to learn or teach.

The identified lacks in CI training affected qualification of employees in the form of lack of support personnel for training, structured training plans for workers as well as a lack of a defined skillset to be learned. It also had an effect on self-development where the lack of support and skillset hampered the GLs' ability to self-develop.

The identified lack in standardization affected the Gemba knowledge in the form of making it more difficult for GLs to gain knowledge of the workers' tasks. Also, it prevented the review of workers' standardized tasks which would have given additional knowledge.

7 DISCUSSION

The discussion is divided into three sections. The first section discuss the findings, first in general and then for each research question. The second section discuss the methods applied and how it can have impacted the findings. The third discuss the future research and implications of the study, both theoretical and managerial.

7.1 Findings

One conclusion drawn in the analysis was that the case company studied did not have a CI culture, either for the company as a whole or for the production department studied. As such, the findings of this study may primarily be seen to reflect what is required for an initial CI implementation, rather than what is necessary to sustain a CI implementation.

The case company had almost doubled their workforce this century which might have impacted the result compared to a company who had had a more stable workforce. Usually smaller companies can be seen to have less rigid structures and routines and as the company grows these routines are often made stricter to compensate for the increase in distance between personnel. However, as the case company had grown rapidly, this structure might not have kept up and therefore caused some of the issues that was visible.

The analysis model was limited to only include factors that are applicable within the scope of the thesis, i.e. a production department. Therefore, factors such as supplier management as well as customer contact has been disregarded. While the inclusion of the unaccounted enablers would have strengthened the general applicability of the model, it would not have contributed to the analysis of the thesis as these interaction lay outside the scope of the study. However, the limitation might have hidden certain interactions that had an effect on the identified issues found at the case company. Further, the leadership model was applied on GL level and thus the findings of both RQ 2 and RQ 3 can be seen to be applicable mainly on this level of the a hierarchy, i.e. first management level in a company employing a Toyota like hierarchy.

How does the contextual factors impact a continuous improvement culture?

Interesting to note, is that there seem to be an interconnectedness between the chosen enablers, with all chosen enablers except for standardization showing a connection to management commitment. Several authors (Fryer et al., 2007; García et al., 2014; Jaca et al., 2012; Knol et al., 2018; McLean et al., 2017; Trenkner, 2016) state that management commitment is one important enabler. However, the thesis provides an explanation why management commitment is important for CI implementation, as well as an insight into what the factors time, resources, shown support have on other important factors. As no other enabler was seen to have the same level of interconnectedness on the system level, this confirms the importance of management commitment for a CI initiative.

For three out of the four remaining enablers (Employee involvement, Communication and Standardization), a direct effect on the CI culture and providing a thorough description of their effect which can be seen to contribute to the literature about the effect of enabler fulfillment. No direct effect could be seen for the level of fulfillment of CI training. Considering the extent of literature study confirming the importance of this enabler, the result was surprising.

However, the researchers deem it likely that the lack of direct effect of the enablers was due to a lack of time working with CI rather then that it was not of importance.

How does Lean leaders impact a continuous improvement culture?

The findings of RQ 2 elucidated that the behavior of a Lean leader does have a considerable effect on a Lean implementation in the form of choices made every day by the leader. Despite the importance of a Lean leader being previously known to literature, this thesis's contribution is in the description of the exact interaction and behaviors that lead to a Lean leader succeeding or failing. Further, the study explored the effects of GL primarily on GL level as the model was applied to this level of leadership and therefore in depth explored how these leaders can impact a CI culture.

The quality of the research into the area of Lean leadership was found to be significantly lower than that of the enablers in the company, particularly when it came to lower levels of management. While a lot of literature had investigated and stated that Lean leadership was important, the how of Lean leadership was not covered in detail and thus required the researchers to base more of the analysis on the facts of the case company, rather than drawing parallels from literature. While this can be said to weaken the claim of the study in the form of credibility, it can also be seen as to contribute to a significantly unexplored field which heightens the value of the proposition. Further, the material in this study could be used to form the basis for a future evolution of a model.

A similarity in literature between the three research areas of CI training, self-development and qualification of employees could be noticed, as well as a similarity in analysis between qualification of employees and self-development, with CI training analyzed on a more strategic level. An explanation for the similarity, in arguments and conclusions, between qualification of employees and self-development is that the GLs, which have been considered in self-development, are in their turn coached by the PM and it is through this coaching the GLs are allowed to self-develop. Therefore, the PM can be seen to apply the methods in qualification of employees but at a higher level. The difference between the PM's coaching and the GLs' coaching though, can be seen in the lack of focus on standardization and work training, however this divide cannot be detected in the literature.

How does the contextual factors affect a Lean leader's ability to foster a continuous improvement culture?

The findings from RQ 3 elucidated that the Lean leader is not a separate entity from a company and that a company cannot rely on the mere presence of a powerful personality to drive the Lean implementation, no matter how well that leader is at instilling Lean. Which confirms what Waldman et al. (1998) state regarding that leadership is not the only thing which can impact a culture. If the resources and support on system level is not present, the CI implementation seems likely to fail.

The primary uniqueness of this thesis comes in the form of the contribution of the effect of the enablers for Lean implementation on the ability of a Lean leader and, in continuation, a first line manager to foster a CI culture. Little to no literature on the subject seemed to exist and the findings within this area might help shed light on what is required not only of a Lean leader but

also from the organization behind the Lean leader. The study further contribute by specifying the interaction between specific enablers and specific leadership principles and as such can be used to see which system level capabilities need to be strengthened in order to assist Lean leaders in their weak areas.

7.2 Methodology

The focus has been on the production department at the case company meaning that interactions and connections outside of that scope has been disregarded and only information sources within this department has been regarded and, as such, the findings of this study are based on their views as well as the observations made by the researchers.. As such, there can be interactions that affect a CI culture that have not been examined. This might has biased the result, as persons were analyzed that were not allowed to voice their opinions. The risk of biased opinions should have been mitigated by that triangulation was applied and that several different sources of information has been used in forming the current state. Further the views and time constraints would still have existed if the researchers would have encompassed the top management into the findings, as the only view they could have contributed to would have been to state why certain decisions were taken but the situation within the production department would have remained the same.

One consequence of conducting semi-structured interviews was that, the interviewees did not always mention the same things. A gain was perceived in allowing interviews to move off script which allowed for further depth of investigation into emergent topic. However, the lack of coherence between interviews made the case more difficult to analyze as not all participants had answered in the same manner and therefore it was difficult to distinguish minor issues from major. Therefore, direct comparison between groups and between members of groups was made more difficult. Despite the disadvantage, the method was deemed preferable as it allowed the researchers to understand complex behaviors and connections that not otherwise would have been hidden had a more rigid script been used.

The write-up of the case consisted of summarizing views and opinions and connecting them to observations and documents in the company. As such, there is a risk that the researchers have misinterpreted the meaning of the interviewees or connected them erroneously to documents or observations. Further, the quotes used in the text have been translated from Swedish to English meaning that there is a risk that the exact phrasing and emphasis has been lost. However, these risks were mitigated as both researchers interpreted the interviews together and discussed uncertainties before writing them in the current state.

The thesis was based on the assumption that TMs perceptions of the areas under investigation would concur with the views of the TLs considering the significant amount of time the TLs spent working on-line and the relatively low amount of leadership tasks they participated in. However, there is a risk that a difference in view exists between the two employee categories, which could have impacted the conclusions of the thesis in areas where conclusions were drawn from TL interviews about the totality of the group. The extent of the issue, however, has been mitigated as the researchers participated in group meetings where the TMs were observed directly and that no significant gap in perception could be detected in these interactions.

Not all TLs were interviewed and this may have affected the validation of the study, but since seven out of nine TLs were interviewed, the researchers believe that they, together with the observations, received enough data to form a complete case. Further, all TLs who wanted and had the possibility to participate was allowed to, therefore neither the researchers nor the company made a selection. Especially since some of the interviewed TLs had been TLs for other groups before. However, as interviews were only one of three sources of information used in the study and that the majority of the TLs were interviewed, this risk should be diminished.

The researchers' presence may have impacted the actions at the production department. E.g. the researchers presence might have been a reminder of CI related activities and therefore skewed thoughts and actions in that direction. The researchers' presence may also have impacted the actions of the employees, e.g. that the employees have thought about what they do or say when the researchers have been present. A change of behavior of the persons being studied, was something Osvalder et al. (2010) mention may be the case initially when performing observations. This can thereby have affected the findings and in turn the validation of the current state. But since this the researchers were positioned in the production for a period of over three months and participated at several subsequent meetings for each group, the risk for this can be considered low as the employees had time to grow accustomed to the researchers presence.

Regarding the three sustainability factors, this thesis work has mainly focused on the social. This study will most likely generate in a larger understanding about the workers', in the production department, work situation, for the decisions makers at the company. E.g. how their ability to enhance their work environment with the aid of creating a CI culture, is affected by not only the leadership but also other factors such as management commitment. Further, the implementation of a CI culture is aimed at bringing economic gains to the company employing it which will benefit both the owners of the company as well as potential additional workers employed at the company. An increase in economic well-being will also positively impact society in the form of taxes.

7.3 Future research and implications

This section discusses the future research and implication of the findings in the study. The first section discusses the theoretical implications and future research of the study. The second section discusses the managerial implications of the findings.

7.3.1 Theoretical implications and future research

With the aim to investigate the individual effect of Lean leadership and contextual factors on the development of a CI culture, as well as the effect of the contextual factors on Lean leadership, the researchers have created an analysis model. Literature has been found both about Lean leadership and contextual factors, the latter in terms of enablers, but the relation between them has been difficult to find, which the researchers have found through this case study. The model includes five enablers, i.e. management commitment, employee involvement, communication, CI training and standardization, which are seen as important in the literature to promote a CI culture.

The Lean leadership model used in this study is based on Dombrowski & Mielke's (2013) model. The model has been both adapted and increased with theory within each area, which has enhanced its usefulness as an analysis tool. However, a significant overlap between self-development and qualification of employees was discovered when the model was applied to GL level. This overlap could be investigated further as to separate the two categories from each other in order to make the model more easily applicable. Especially the definition of how to determine if a Lean leader fulfills self-development and how to judge this development should be researched.

While the concept of the enablers proved relatively easy to evaluate where an almost checklist approach could be used, the Lean leadership model proved more difficult to apply as the concepts inherent in it was stated at more abstract levels. In order to make the model more applicable to analyzing the impact of Lean leaders, an investigation into concrete definitions of how these abstract concepts can be fulfilled would be useful.

The model has not been adapted to the case company and can be generalized. Thereby it can be applied to all companies, but important to note is that it has been established with regards to the scope, e.g. supplier management is an enabler identified by Fryer et al. (2007) which has not been included. The model can be used to evaluate a company's fulfillment of different aspects that affect a company's progress towards a CI culture, in order for the company to learn and to see what they cover, and can therefore be used as a checklist. Likewise, the model is divided into two sub-models which can be applied in solitude in order to gauge the practices of a company in regard to CI culture. This applicability also make it applicable in future research as the model as a whole can be applied.

The case company started their Lean journey 2002 and have according to the researchers' findings not yet established a CI culture. A future research could be to apply the analysis model to a company which has come further in their Lean journey, as this would probably generate conclusions about the models applicability for sustaining CI culture. It would also allow to expand the explanation of the different factors effect depending on which factors is fulfilled and which is not. Which has not been possible in this study.

If the model were to be applied to more cases, it would might be possible to see which factors that are more generalized. Which would make it possible to sort out those which are more company specific.

The Lean leadership model was found to be abstract and lacking clear definitions of the behavior that would lead to fulfillment of the principles. Future research could therefore focus on better defining specific routines that can be used to fulfill the principles and thereby improve the model.

7.3.2 Managerial implications

The findings resulted in a list of management implication that can be applied to business in order to prepare the organization for CI culture implementation. These represent the broad strokes of the content of the findings and further detail for each can be found in conclusion.

- Management support is a must for continuous improvement and initiatives has little hope of succeeding without it.
- The organization on system level must be adapted to Lean or the initiative is likely to fail as the system impact the leader.
- The individual choices of a Lean leader are still important and can have an impact on the continuous improvement culture of those below the leader in the hierarchy.

8 RECOMMENDATIONS

This chapter contains recommendations made to the case company in order to further their CI culture. The chapter is based on a mix of the researchers' own knowledge, the theoretical framework as well as information revealed during the case study. As such, the information in this chapter is not generally applicable and should not be regarded as a scientific study. Further, not all issues found in the analysis will be raised. Rather, the researchers picked those issues which they deemed should be the primary concern of the case company as the effects on these initial changes needs to be gauged before further actions are taken, in line with the PDCA-cycle.

8.1 Pilot group

Based on the lack of time displayed by both GLs and TLs as well as the lack of resources and dedication for training, the researchers propose that the first action the company take should be to form one to three pilot groups where resources will be diverted to make improvement work possible. This is supported by Liker & Franz (2011) who state that a Lean implementation begins with a pilot area where knowledge of the CI methodologies are taught in depth before spreading it to the rest of the company. One possibility is to assign one pilot group per GL which in part would lift some of the constraints of time as it would demand as much time as a wide application. The following suggestions should be seen to initially apply to only the chosen groups, and in time be applied to the remaining groups. This will also allow knowledge to be gained and mistakes to be corrected before being introduced to the entire company. Further, pilot groups would allow for relatively few initial investments to be made while still beginning to reap the benefit of a CI culture which in turn would reduce the negative impact on the economic and productivity values.

This pilot group can be seen as a proving grounds for any education material as well as changes in methods and should be allowed to heavily influence these. This would allow lessons to be learnt before a significant amount of resources have been invested into a particular method.

In time the resources invested in the pilot groups, in form of excess capacity and training, would repay themselves as performance in the long-term is expected to rise. As the benefits emerge, there may be employees in the groups who are no longer needed. These employees should not be fired as this act would significantly hurt further implementation (Byrne & Womack, 2013; Mcpolin, 2014; Sterman et al., 1997), instead they should be seen as valuable assets as they at this time will have accumulated significant experience in the Lean methodology and thus can be used as teachers and supports for other groups.

Considering that a significant amount of the TLs that were present during the initial implementation has been subject to employee turnover, either internally or externally, the researchers recommends that the case company considers launching their CI implementation with a series of Kaizen events for the chosen pilot groups. Byrne & Womack (2013) urge that CI implementation should begin with a series of full time Kaizen events that last for about a week and Liker & Franz (2011) states that Kaizen events are a good teaching tool for CI culture. Considering that a Kaizen event is defined as "a focused and structured improvement project, using a dedicated cross-functional team to improve a targeted work area, with specific goals, in an accelerated timeframe" (Farris et al., 2008, p. 10) and that Rother (2010) states that Kata is

a way to teach CI, the researchers recommend that this relaunch would entail a series of Kata events which are given the full attention of both PM, GLs as well as all support functions during the extent of at least a week. This would mean that the pilot groups would, during that week, display a significantly lower throughput, as time for problem-solving needs to be allowed and experiments need to be run that might lower throughput. Therefore, management commitment to this implementation will be of vital importance as they will have to allow for these expenses.

8.2 Freeing team leaders

The company was identified to be stuck in an over-lean state for TLs and GLs during the extent of the study, where the GLs performed duties which is by the literature defined as TL duties. This was seen to negatively affect the GLs in the form of a lack of time to both perform their own duties as well as providing support for the CI initiative. Therefore, to combat the issues, the group should be staffed in a way that the TL of the group can be freed from production responsibility unless there is unexpected sickness or leave within their group. Whereupon he/she would enter production as described by Inamizu et al. (2014), who states that TLs should be a relief worker who steps in on-line when a TM is missing. The presence of unscheduled TLs would also significantly diminish the need for lending in the long-run as they could cover most absences. The covering of absences would have the added benefit of keeping them close to Gemba and understanding their processes. Further, the groups chosen should be brought out of the lending and the TMs should not be lent to other groups as it would force the TL into over-lean behavior which has been seen to negatively affect the GLs' and TLs' ability to implement Lean. The freeing of TLs from production responsibility would further allow the TLs to cover more of the GLs' responsibilities, freeing up time for the GL to support the implementation of suggestions and to teach the TL part of the GLs' work. Teaching one's work to the one below is important according to Liker & Hoseus (2008) and Imanizu et al. (2014). Further, the additional time should be directed to perform Gemba walks and be generally present and available in production.

8.3 Support

The PM should also focus his/her efforts and time on coaching the GLs in aspects of these pilot groups and provide coach on coach assistance to the GLs in the Katas of the TLs. This would provide benefits to the self-development of the GLs which in turn can provide the same for the TLs, assisting in the training of internal Senseis which could henceforth spearhead further Lean implementation.

The groups should be given priority from all support functions which, according to Byrne & Womack's (2013) argument, is important for initial implementation and should further be allowed access to financial means to implement smaller suggestions with only the approval of the responsible GL, as rapid deployment of suggestions is important for employee motivation. The lack of support congruence for CI implementation where improvement suggestions were not prioritized by other functions was also seen in the FT function. As leaders of CI have the responsibility to muster the resources within their authority to support Lean activities (Goodridge et al., 2015) and as the FTs are directly within the PM's chain of command, this department should be introduced to the concept of CI and aligned to prioritize CI activities.

Further, this support should be provided by management officially through decree. But they should also show their support by personal participation in CI activities through Gemba walks and performing Katas which should make their respective departments see that CI is important.

The company was seen to have a rather stable delivery on time towards the customer, however the internal delivery on time was around the low 50 percentile while also having a significant amount of quality issues, which was seen to cause several issues for the subsequent groups. Imai (1986) states that the next process should be seen as a customer, and as the company have a high delivery on time and quality to its customers, the accountability of an internal customer would probably help elucidate the issues that comes with late internal deliveries.

8.4 Training

A training package needs to be assembled for the TMs in the production setting. This training should contain two modules. First the TM needs to be introduced to his/her group and instructed in the processes within this group. This should be done according to a set schedule where one process is taught at a time by preferably the TL of that group with the assistance of structured learning material and should proceed until the TM masters the particular process. This would allow for each group to quickly and efficiently get back to a position where each member knows the procedure which allows for job rotation. Job rotation deepens an operator's knowledge and experience (Macpherson et al., 2015) and thereby is a strength when it comes to problem solving (Liker & Hoseus, 2008). The learning material should be assembled with help from an outside source, possibly the GL. However, once it is in place responsibility should be handed over to the production group's responsibility and be continually updated to match emerging standards that the groups' improvement work leads to. The second module would be an initial Lean module to be given once the TM has learnt the procedures of the group sufficiently. This module would contain basic terminology surrounding Lean in order to ascertain that everyone speaks a similar language when talking of improvements. It should also go through the basic methodology of the methods applied at the company and the reason they are used. Further, a good addition to secure participation would be to include a couple of examples of successful Katas and 5S suggestions, especially easy ones with significant effect.

An issue of well performing TLs being funneled into administrative positions was discovered which resulted in adverse effects on the knowledge base, both on CI as well as the groups' work in general, as knowledge was lost in the process. While this can be seen as a good thing, as it spreads knowledge of the production to other parts of the company and provides the company with managers and office personnel with intimate knowledge of the production setting, the negative effects need to be countered. The suggestion for countering this comes in two steps, first a TL education package needs to be assembled. The training procedure should not be too theoretical (Zbaracki, 1998) and done at least in part on real improvement projects (Snee, 2010) and should be a continuation on the training provided for every employee within production. Secondly, a new TL should be granted sufficient time working beside the previous TL to understand and grow into their responsibility. The period of this overlap should not be based on a specific timeframe but should last until both the new TL, the previous TL and the GL, deems that sufficient knowledge has been transferred. The knowledge of new TLs could be

gauged using a matrix chart which is detailed in Liker & Hoseus (2008) and consists of a matrix where the skills needed for leadership at TL level is recorded and then the TL is evaluated continuously as they reach new degrees of fulfillment. Further, once improvement work is being conducted continually, Liker & Meier's (2006) suggestion that TLs should train for GL role could be applied to TMs and TLs. In this, the TL could allow for TMs who show proper enthusiasm and knowledge to swap with him once in a while in order to train them for the TL position and in turn record the gained knowledge in the matrix, elucidating who is suitable to in the future assume the role of TL. This type of practice is also supported Liker & Hoseus (2008) who states that lean leaders should always train employees in their roles.

8.5 Improvement suggestion system

In order to reinforce CI behavior, a management system for handling and providing feedback on ideas should be developed (Bessant & Francis, 1999; Jaca et al., 2012; Knol et al., 2018). Several authors (Bessant & Francis, 1999; Jaca et al., 2012, Knol et al., 2012) also argue for rewards, token as well as based on the size of improvement. However as the company has a policy against such rewards that argument will not be taken into consideration. The researchers urge that a bureaucratic system should be applied where an improvement suggestions are recorded on a standard sheet, which should be easy to fill in and available at each station. This note could then be handed to the GL whoms responsibility it is to examine the suggestion, go to Gemba to understand the situation and fill in any appropriate information. An initial decision should be taken at this stage whether or not the suggestion will be brought onward, and feedback given to the suggestor. If accepted, the suggestion should either be brought into the suggestion system used for group meetings if it is too large for the group to handle themselves, or it should be handled internally within the group with the GL and TL overseeing the process.

8.6 Standardization

Standardization was seen to be implemented during the extent of the study, mainly in the form of SOPs. The practice was well rooted in the groups by first using the recording of a TM to base the SOP on and then making the document from this recording. Further, as the SOPs were introduced, the groups were allowed to give feedback on them which should have helped cement them in the groups. However, at the next stage the responsibilities of handling the standards should be brought into the groups and they in turn need to handle the process of improving the standard. What is suggested here is that the daily meeting for each group should include a time set aside for presenting new standards. The TL then brings these suggestions, along with any pertinent information gathered at Gemba to the group's GL who make a suggestion on which experiment should be tested next. The experiments are then tested during a decided period, depending on the scale of the suggestion and if the experiment is positive the new standard is implemented. This would also serve as an avenue for teaching basic CI methods and the exact standards would serve as a good platform for developing teaching material.

REFERENCES

Achanga, P., Shehab, E., Roy, R., & Nelder, G. (2006). Critical success factors for lean implementation within SMEs. *Journal of Manufacturing Technology Management*, *17*(4), 460–471. Retrieved from https://doi.org/10.1108/17410380610662889874

Aij, K. H., & Teunissen, M. (2017). Lean leadership attributes: a systematic review of the literature. *Journal of Health Organization and Management*, *31*(7/8), 713–729. https://doi.org/10.1108/JHOM-12-2016-0245

Alves, A. C., Dinis-Carvalho, J., & Sousa, R. M. (2012). Lean production as promoter of thinkers to achieve companies' agility. *The Learning Organization*, *19*(3), 219–237. https://doi.org/10.1108/09696471211219930

Beer, M. (2003). Why Total Quality Management Programs Do Not Persist: The Role of Managements Quality and Implications for. *Decision Sciences*, *34*(4), 623–642. Retrieved from https://search.proquest.com/docview/198112773?pq-origsite=summon

Bessant, J., Caffyn, S., Gilbert, J., Harding, R., & Webb, S. (1994). Rediscovering continuous improvement. *Technovation*, *14*(1), 17–29. https://doi.org/10.1016/0166-4972(94)90067-1

Bessant, J., & Francis, D. (1999). Developing strategic continuous improvement capability. *International Journal of Operations & Production Management*, *19*(11), 1106–1119. Retrieved from https://doi.org/10.1108/01443579910291032

Bhasin, S. (2013). Impact of corporate culture on the adoption of the Lean principles. *International Journal of Lean Six Sigma*, *4*(2), 118–140. Retrieved from https://doi.org/10.1108/20401461311319329

Bryman, A. (2003). Triangulation. In *Encyclopedia of Social Science Research Methods* (pp. 1142–1143). https://doi.org/http://dx.doi.org/10.4135/9781412950589

Byrne, A., & Womack, J. P. (2013). *The lean turnaround : how business leaders use lean principles to create value and transform their company*. New York: McGraw-Hill.

Camp, R. B. (2015). *The lean leader: a personal journey of transformation* (1st ed.). CRC Press. Retrieved from http://library.books24x7.com.proxy.lib.chalmers.se/toc.aspx?site=Y7V97&bookid=74098

Carter, N., Bryant-Lukosius, D., DiCenso, A., Blythe, J., & Neville, A. J. (2014). The Use of Triangulation in Qualitative Research. *Oncology Nursing Forum*, *41*(5), 545–547. https://doi.org/10.1188/14.ONF.545-547

Chay, T., Xu, Y., Tiwari, A., & Chay, F. (2015). Towards lean transformation: the analysis of lean implementation frameworks. *Journal of Manufacturing Technology Management*, *26*(7), 1031–1052. Retrieved from https://doi.org/10.1108/JMTM-10-2013-0143940

Dahlke, S., Hall, W., & Phinney, A. (2015). Maximizing theoretical contributions of participant observation while managing challenges. *Qualitative Health Research*, *25*(8), 1117–1122. https://doi.org/10.1177/1049732315578636

DiCicco-Bloom, B., & Crabtree, B. F. (2006). The qualitative research interview. *Medical Education*, *40*(4), 314–321. https://doi.org/10.1111/j.1365-2929.2006.02418.x

Dombrowski, U., & Mielke, T. (2013). Lean Leadership – fundamental principles and their application. In *Procedia CIRP 7* (pp. 569–574). Elsevier. https://doi.org/10.1016/J.PROCIR.2013.06.034

Dora, M., Kumar, M., & Gellynck, X. (2016). Determinants and barriers to lean implementation in food-processing SMEs – a multiple case analysis. *Production Planning & Control*, *27*(1), 1–23. https://doi.org/10.1080/09537287.2015.1050477

Dorota Rymaszewska, A. (2014). The challenges of lean manufacturing implementation in SMEs. *Benchmarking: An International Journal*, *21*(6), 987–1002.

https://doi.org/10.1108/BIJ-10-2012-0065

Eisenhardt, K. M. (1989). Building Theories from Case Study. *The Academy of Management Review*, *14*(4), 532–550.

Elvnäs, S. (2017). *Effektfull : detaljerade studier av ledarskap - så ökar du effekten av din tid*. Volante.

Emiliani, M. . (2008). Standardized work for executive leadership. *Leadership & Organization Development Journal*, *29*(1), 24–46. https://doi.org/10.1108/01437730810845289

Farris, J. A., Van Aken, E. M., Doolen, T. L., & Worley, J. (2008). Learning From Less Successful Kaizen Events: A Case Study. *Engineering Management Journal*, *20*(3), 10–20. https://doi.org/10.1080/10429247.2008.11431772

Flumerfelt, S., Alves, A. C., Leão, C. P., & Wade, D. L. (2016). What do organizational leaders need from lean graduate programming. *European Journal of Training and Development*, *40*(5), 302–320. https://doi.org/10.1108/MRR-09-2015-0216

Fryer, K. J., Antony, J., & Douglas, A. (2007). Critical success factors of continuous improvement in the public sector: A literature review and some key findings. *The TQM Magazine*, *19*(5), 497–517. https://doi.org/10.1108/09544780710817900

Galeazzo, A., Furlan, A., & Vinelli, A. (2017). The organizational infrastructure of continuous improvement – an empirical analysis. *Operations Management Research*, *10*, 33–46. https://doi.org/10.1007/s12063-016-0112-1

García, J. L., Maldonado, A. A., Alvarado, A., & Rivera, D. G. (2014). Human critical success factors for kaizen and its impacts in industrial performance. *The International Journal of Advanced Manufacturing Technology*, *70*, 2187–2198. https://doi.org/10.1007/s00170-013-5445-4

Gesinger, S. (2106). Experiential learning. *Professional Safety*, *61*(2), 33–36. Retrieved from http://www.csrees.usda.gov/nea/family/res/pdfs/Experiential_Learning.pdf

Goodridge, D., Westhorp, G., Rotter, T., Dobson, R., & Bath, B. (2015). Lean and leadership practices: development of an initial realist program theory. *BMC Health Services Research*, *15*, 1–16. https://doi.org/10.1186/s12913-015-1030-x

Hackman, J. R., & Wageman, R. (1995). Total Quality Management: Empirical, Conceptual, and Practical Issues. *Administrative Science Quarterly*, *40*(2), 309–342.

Hahn, G. J., & Doganaksoy, N. (2011). The Challenge to Long-Term Improvement. *ASQ Six Sigma Forum Magazine*, *10*(4), 4–5. Retrieved from https://search.proquest.com/docview/900499186/fulltextPDF/A1AF9D9E19C94A59PQ/1?accountid=10041

Halling, B., & Renström, J. (2014). Lean leadership: a matter of dualism. *International Journal Human Resources Development and Management*, *14*(4), 242–253. Retrieved from https://www.inderscienceonline.com/doi/pdf/10.1504/IJHRDM.2014.069355

Hariharan, A. (2006). CEO's Guide to Six Sigma Success. *ASQ Six Sigma Forum Magazine*, *5*(3), 16–25.

Imai, M. (1986). *Kaizen: the key to Japan's competitive success* (1st ed.). New York: McGraw-Hill.

Imai, M. (1997). *Gemba kaizen: a commonsense, low-cost approach to management*. New York: McGraw Hill.

Inamizu, N., Fukuzawa, M., Fujimoto, T., Shintaku, J., & Suzuki, N. (2014). Group leaders and teamwork in the over-lean production system. *Journal of Organizational Change Management*, *27*(2), 188–205. https://doi.org/10.1108/JOCM-08-2012-0122

Ingels, J., & Maenhout, B. (2018). The impact of overtime as a time-based proactive scheduling and reactive allocation strategy on the robustness of a personnel shift roster. *Journal of Scheduling*, *21*(2), 143–165. https://doi.org/10.1007/s10951-017-0512-6

Irani, Z., Beskese, A., & Love, P. E. D. (2004). Total quality management and corporate culture: Constructs of organisational excellence. *Technovation*, *24*(8), 643–650. https://doi.org/10.1016/S0166-4972(02)00128-1

Jaca, C., Viles, E., Mateo, R., & Santos, J. (2012). Components of sustainable improvement systems: theory and practice. *The TQM Journal*, *24*(2), 142–154. https://doi.org/10.1108/17542731211215080

Kaplan, G. S., Patterson, S. H., Ching, J. M., & Blackmore, C. (2014). Why Lean doesn't work for everyone. *BMJ Quality and Safety*, *23*(12), 970–973. https://doi.org/10.1136/bmjqs-2014-003248

Kaye, M., & Anderson, R. (1999). Continuous improvement: the ten essential criteria. *International Journal of Quality & Reliability Management*, *16*(5), 485–509. https://doi.org/10.1108/02656719910249801

Knol, W. H., Slomp, J., Schouteten, R. L. J., & Lauche, K. (2018). Implementing lean practices in manufacturing SMEs: testing "critical success factors" using Necessary Condition Analysis. *International Journal of Production Research*, 1–19. https://doi.org/10.1080/00207543.2017.1419583

Kusén, R., & Ljung, A. (2013). *Respekten för människan: Innan framgång med lean kommer förändring av synen på människan.* Köping: Vulkan.

Li, B., Nahm, A. Y., Wyland, R., Ke, J.-Y., & Yan, W. (2015). Reassessing the role of Chinese workers in problem solving: a study of transformational leadership, trust and security in "lean" manufacturing. *Asia Pacific Business Review*, *21*(4), 464–481. https://doi.org/10.1080/13602381.2014.950056

Li, G., & Rajagopalan, S. (2008). Process Improvement, Learning, and Real Options. *Production and Operations Management*, *17*(1), 61–74. https://doi.org/10.3401/poms.1070.0008

Li, H., Love, P. E. D., & Drew, D. S. (2000). Effects of overtime work and additional resources on project cost and quality. *Engineering, Construction and Architectural Management*, *7*(3), 211–220. https://doi.org/10.1108/eb021146

Liker, J. K. (2004). *The Toyota way: 14 management principles from the world's greatest manufacturer*. McGraw-Hill.

Liker, J. K., & Ballé, M. (2013). Lean managers must be teachers. *Journal of Enterprise Transformation*, *3*(1), 16–32. https://doi.org/10.1080/19488289.2013.784222

Liker, J. K., & Convis, G. L. (2011). *The Toyota way to lean leadership : achieving and sustaining excellence through leadership development*. McGraw-Hill.

Liker, J. K., & Franz, J. K. (2011). *The Toyota way to continuous improvement : linking strategy with operational excellence to achieve superior performance*. New York: McGraw-Hill.

Liker, J. K., & Hoseus, M. (2008). *Toyota Culture: The Heart and Soul of the Toyota Way*. New York: McGraw-Hill.

Liker, J. K., & Meier, D. (2006). *The Toyota way fieldbook: a practical guide for implementing Toyota's 4Ps*. McGraw-Hill.

Liker, J. K., & Meier, D. (2007). *Toyota talent: developing your people the Toyota way*. McGraw-Hill.

Lodgaard, E., Ingvaldsen, J. A., Aschehoug, S., & Gamme, I. (2016). Barriers to continuous improvement: perceptions of top managers, middle managers and workers. *Procedia CIRP*, *41*, 1119–1124. https://doi.org/10.1016/j.procir.2016.01.012

Ma, J., Lin, Z., & Lau, C. K. (2017). Prioritising the enablers for the successful implementation of Kaizen in China: A fuzzy AHP study. *International Journal of Quality & Reliability Management*, *34*(5), 549–568. https://doi.org/10.1108/IJQRM-12-2015-0173

Macpherson, W. G., Lockhart, J. C., Kavan, H., & Iaquinto, A. L. (2015). Kaizen: a Japanese

philosophy and system for business excellence. *Journal of Business Strategy*, *36*(5), 3–9. https://doi.org/10.1108/JBS-07-2014-0083

Mann, D. (2010). *Creating a lean culture: tools to sustain lean conversions*. Productivity Press. Retrieved from http://library.books24x7.com.proxy.lib.chalmers.se/toc.aspx?site=Y7V97&bookid=36922

Marksberry, P. W. (2010). A new approach in analysing social-technical roles at Toyota: the team leader. *Int. J. Human Resources Development and Management*, *10*(4), 395–412. https://doi.org/10.1504/IJHRDM.2010.036090

McLean, R. S., Antony, J., & Dahlgaard, J. J. (2017). Failure of Continuous Improvement initiatives in manufacturing environments: a systematic review of the evidence. *Total Quality Management & Business Excellence*, *28*(3–4), 219–237. https://doi.org/10.1080/14783363.2015.1063414

Mcpolin, M. J. (2014). *Leadership requirements for sucessfull large-scale cultural change using continuous process improvement methods: a mixed methods research study*. Colorado Technical University.

Miller, J. (Business consultant), Wroblewski, M., & Villafuerte, J. (2014). *Creating a Kaizen culture : align the organization, achieve breakthrough results, and sustain the gains*. McGraw-Hill. Retrieved from http://accessengineeringlibrary.com.proxy.lib.chalmers.se/browse/creating-a-kaizen-culture-align-the-organization-achieve-breakthrough-results-and-sustain-the-gains

Monden, Y. (2012). *Toyota production system: an integrated approach to just-in-time*. CRC Press. Retrieved from https://www.crcpress.com/Toyota-Production-System-An-Integrated-Approach-to-Just-In-Time-4th-Edition/Monden/p/book/9781439820971

Northouse, P. G. (1997). *Leadership: Theory and Practice*. Thousand Oaks, CA: Sage Publications.

Oakland, J. (2011). Leadership and policy deployment: The backbone of TQM. *Total Quality Management and Business Excellence*, *22*(5), 517–534. https://doi.org/10.1080/14783363.2011.579407

Osvalder, A.-L., Rose, L., & Karlsson, S. (2010). Metoder. In *Arbete och teknik på människans villkor* (2nd ed., p. 738). Stockholm: Prevent.

Pascale, R., Millemann, M., & Gioja, L. (1997). Changing the way we change. *Harvard Business Review*, *75*(6), 126–139. https://doi.org/10.1037/e602082007-001

Poksinska, B., Swartling, D., & Drotz, E. (2013). The daily work of Lean leaders – lessons from manufacturing and healthcare. *Total Quality Management & Business Excellence*, *24*(7–8), 886–898. https://doi.org/10.1080/14783363.2013.791098

Powell, T. C. (1995). Total Quality Management as Competitive Advantage: A Review and Empirical Study. *Strategic Management Journal*, *16*(1), 15–37. https://doi.org/10.2307/2486944

Proctor, S. P., White, R. F., Robins, T. G., Echeverria, D., & Rocskay, A. Z. (1996). Effect of overtime work on cognitive function in automotive workers. *Scandinavian Journal of Work, Environment and Health*, *22*(2), 124–132. https://doi.org/10.5271/sjweh.120

Randhawa, J. S., & Ahuja, I. S. (2017). 5S implementation methodologies: literature review and directions. *International Journal of Productivity and Quality Management*, *20*(1), 48. https://doi.org/10.1504/IJPQM.2017.080692

Ridder, H.-G. (2017). The theory contribution of case study research designs. *Business Research*, *10*(2), 281–305. https://doi.org/10.1007/s40685-017-0045-z

Rother, M. (2010). *Toyota kata: managing people for improvement, adaptiveness, and superior results*. New York: McGraw Hill.

Rother, M., & Aulinger, G. (2017). *Toyota Kata Culture: Building Organizational Capability and Mindset through Kata Coaching*. McGraw-Hill Education.

Sackmann, S. A. (1991). Uncovering Culture in Organizations. *The Journal of Applied Behavioral Science*, *27*(3), 295–317. https://doi.org/10.1177/0021886391273005

Schein, E. H. (1984). Coming to a New Awareness of Organizational Culture. *Sloan Management Review*, *25*(2), 3–16.

Schein, E. H., & Scheiner, P. (2017). *Organizational Culture and Leadership*.

Seidel, A., Saurin, T. A., Marodin, G. A., & Ribeiro, J. L. D. (2017). Lean leadership competencies: a multi-method study. *Management Decision*, *55*(10), 2163–2180. https://doi.org/10.1108/MD-01-2017-0045

Shepard, E., & Clifton, T. (2000). Are longer hours reducing productivity in manufacturing? *International Journal of Manpower*, *21*(7), 540–553. https://doi.org/10.1108/01437720010378999

Shook, J. (2010). How to Change a Culture: Lessons From NUMMI. *MIT Sloan Management Review*, *51*(2), 62–68. Retrieved from https://search-proquest-com.proxy.lib.chalmers.se/docview/224959703?pq-origsite=summon

Silay, I., & Ebrahimpourz, M. (2003). Examination and comparison of the critical factors of total quality management (TQM) across countries. *International Journal of Production Research*, *41*(2), 235–268. https://doi.org/10.1080/0020754021000022212

Snee, R. D. (2010). Lean Six Sigma – getting better all the time. *International Journal of Lean Six Sigma*, *1*(1), 9–29. https://doi.org/10.1108/20401461011033130

Soltani, E., Lai, P., & Gharneh, N. S. (2005). Breaking through barriers to TQM effectiveness: Lack of commitment of upper-level management. *Total Quality Management & Business Excellence*, *16*(8–9), 1009–1021. https://doi.org/10.1080/14783360500163201

Soriano-Meier, H., & Forrester, P. L. (2002). A model for evaluating the degree of leanness of manufacturing firms. *Integrated Manufacturing Systems*, *13*(2), 104–109. https://doi.org/10.1108/09576060210415437

Spear, S. (2004). Learning to Lead at Toyota. *Harvard Business Review*. Retrieved from https://chalmers.summon.serialssolutions.com/en/search?ho=t&q=Pfeffer (1994)#!/search?ho=t&l=en&q=learning to lead at Toyota

Spear, S., & Bowen, H. K. (1999). Decoding the DNA of the Toyota Production System. *Harvard Business Review*, *77*(5), 96–106. Retrieved from http://search.ebscohost.com/login.aspx?direct=true&db=bth&AN=2216294&site=ehost-live&scope=site

Sterman, J. D., Repenning, N. P., & Kofman, F. (1997). Unanticipated Side Effects of Successful Quality Programs: Exploring a Paradox of Organizational Improvement. *Management Science*, *43*(4), 503–521. Retrieved from http://www.jstor.org/stable/2634562

Toyota motor corporation. (2012). Toyota Way 2001. Retrieved March 15, 2018, from http://www.toyota-global.com/company/history_of_toyota/75years/data/conditions/philosophy/toyotaway2001.html

Trenkner, M. (2016). Implementation of lean leadership. *Management*, *20*(2), 129–142. https://doi.org/10.1515/manment-2015-0055

van Aartsengel, A., & Kurtoglu, S. (2013). *A Guide to Continous improvement Transformation - Concepts, Processes, Implementation* (1st ed.). New York: Springer. https://doi.org/10.1007/978-3-642-35904-0

Van Aken, E. M., Farris, J. A., Glover, W. J., & Letens, G. (2010). A framework for designing, managing, and improving Kaizen event programs. *International Journal of Productivity*

and *Performance Management*, *59*(7), 641–667. https://doi.org/10.1108/17410401011075648

Waldman, D. A., Lituchy, T., Gopalakrishnan, M., Laframboise, K., Galperin, B., & Kaltsounakis, Z. (1998). A qualitative analysis of leadership and quality improvement. *The Leadership Quarterly*, *9*(2), 177–201. https://doi.org/10.1016/S1048-9843(98)90004-2

Wittenberg, G. (1994). Kaizen—The many ways of getting better. *Assembly Automation*, *14*(4), 12–17. https://doi.org/10.1108/EUM0000000004213

Woehl, J. H. (2011). *How leadership styles reflect on lean manufacturing practices and culture*. Capella University. Retrieved from https://search.proquest.com/docview/894429006?pq-origsite=summon

Woodside, A. G. (2010). Building Theory from Case Study Research. In *Case Study Research : Theory, Methods and Practice*. Emerald Publishing Limited. Retrieved from https://ebookcentral.proquest.com/lib/chalmers/detail.action?docID=554822

Yin, R. K. (2014). *Case study research : design and methods* (5th ed.). London: Sage.

Yukl, G. A. (2013). *Leadership in organizations* (8th ed.). Upper Saddle River, N.J.: Pearson.

Zbaracki, M. J. (1998). The Rhetoric and Reality of Total Quality Management. *Administrative Science Quarterly*, *43*(3), 602–636. Retrieved from http://www.jstor.org/stable/2393677

APPENDIX A – Interview guide for production manager

Bakgrundsfrågor

- Beskriv kortfattat vad du gjort innan du började på Aros?
- Hur länge har du arbetat på Aros?
- Vilka positioner har du haft, när och hur länge på varje?

Arbetsuppgifter

- Vad ingår i din roll som Produktionschef?
- Hur uppfyller du det och till vilken grad?
- Vad skulle du vilja förändra med rollen?

PL

- Vad ingår i PLs roll?
  - Hur utför dem den idag?
  - Hur vill du att den ska vara?
- Hur skulle du förklara hur en typisk arbetsdag ser ut för varje PL?
  - Hur mycket tid tror du dom lägger på akut problemlösning?
  - Hur mycket tid tror du de lägger på förbättringsarbete?
  - Hur skulle du vilja att den såg ut i framtiden?
- Hur introducerades PL i sin roll?
  - Hur har de vidareutvecklas?
  - Hur stöttade du dem när de introducerades till sin roll?

TL

- Vilka målsättningar har du för TL i deras dagliga arbete?
- Hur arbetar TL idag?
- Hur introducerades TL i sin roll?
  - Vad har de vidare fått för stöd?

Allmänt/Respekt

- Vad är en vanlig avvikelse som uppstår i produktionen?
  - Beskriv hur en sådan avvikelse generellt hanteras?
    - Vilken väg brukar informationen om avvikelsen ta? Från TM och vidare?
    - Hur följer ni upp att det blir löst? Görs det alltid?
    - Hur följer ni upp att det inte sker igen?
  - Hur skulle du önska att avvikelser hanteras i framtiden med avseende på samma aspekter?
    - Vad behövs för att nå dit?
- Vad tänker du på när du ger återkoppling?
  - Vilken typ av återkoppling ger du? (*positiv/negativ*)
  - Vid vilka tillfällen ger du den? *(När/hur)*
  - Hur uppfattas den tror du?
  - Hur viktigt anser du att det är att ge återkoppling?
- Om en TM respektive TL gör ett misstag, tror du att de vågar nämna det för sin TL respektive PL?
- Hur mycket tid spenderar du nere på fabriksgolvet (*dvs hur ofta sitter du där*)?
  - Vad tycker du är positivt respektive negativt med av att vara positionerad i produktionen?
  - Vad tror du PL respektive TM/TL tycker om det?

- o Vad var det ni ville åstadkomma och har ni nått det?
- Hur ser du på mängden resurser i produktionen?
- Hur stor personalomsättning har ni inom produktionen?
  - o Vad tror du den beror på?
  - o Vad får nyanställda inom produktionen för introduktion?
    - ▪ Tar ni upp information om Kata, CI, Aros produktionssystem?
    - ▪ Vem ansvarar för detta?
  - o Vad anser du är de viktigaste egenskaperna när du anställer någon i produktionen?
- Hur modererar du vad du säger utefter vilka personer som finns i närheten och kan höra?
- Varifrån får du coaching angående ditt ledarskap?

Förbättringsarbete allmänt

- Hur ser du på standardisering?
- Hur arbetar ni med ständigt förbättringsarbete?
  - o Kan du definiera vad det innebär?
  - o Använder ni någon annan metod än Kata?
  - o Hur skulle du vilja se att ert förbättringsarbete utvecklas framöver?
- Kan operatörerna komma med förslag på förbättringar av sin arbetsplats?
  - o Om ja:
    - ▪ Hur går de i så fall tillväga? (Dvs vilken väg tar de?)
    - ▪ Hur uppmärksammas deras förslag direkt?
    - ▪ Finns det några rutiner för det? Vilka?
    - ▪ Tror du att de känner sig trygga i att komma med förslag?
    - ▪ Tror du att de känner att deras förslag är uppskattade?
    - ▪ Hur får de återkoppling på deras förslag, vid senare skede?
    - ▪ Får de någon möjlighet att själva driva frågan vidare?
  - o Om inte: Hur tänker du angående att ni inte har något sätt att komma med förslag nedifrån?
    - ▪ Hur tror du detta uppfattas av operatörerna?
    - ▪ Ser du en framtid där operatörerna skulle kunna vara det?
  - o Hur tycker du att man ska gå tillväga för att involvera TM/TL mer i förbättringsarbete?
- Vad anser du är det största hindret för vidareutveckling av förbättringsarbete?
  - o Vilka andra hinder finns, kan du rangordna dem?
- Vad har ledningen för insyn i ert förbättringsarbete?
  - o Hur tror du att ledningen vill att ert förbättringsarbete utvecklas?
  - o Känner du att du har stöd uppifrån för att driva/genomföra förbättringsarbete? Hur?
- Hur följer ni upp eventuella implementeringar för att se deras långsiktiga effekt?
  - o Vad tar ni hänsyn till?
  - o Utvärderar ni hela processen eller enbart resultatet?

APPENDIX B – Interview guide for GLs

Bakgrundsfrågor

- Beskriv kortfattat vad du gjort innan du började på Aros?
- Hur länge har du arbetat på Aros?
- Vilka positioner har du haft, när och hur länge på varje?

Arbetsuppgifter

PL

- Vad ingår i din roll som PL?
    - Hur uppfyller du det och till vilken grad?
    - Mäter ni för att se hur ni uppfyller det du ska, hur i så fall?
- Hur skulle du säga att en typisk arbetsdag ser ut för dig?
    - Vi har fyra kategorier som vi anser man kan dela upp sina arbetsuppgifter i: Hantera personalfrågor, dvs fylla vakanser, sköta administrativa frågor och liknande; Släcka bränder, dvs lösa akuta problem i produktionen; Driva proaktivt förbättringsarbete; samt att coacha medarbetare att förbättra processer. Har du någon mer kategori som vi har missat och du vill tillägga?
    - Hur skulle du dela upp en arbetsvecka i de kategorierna?
    - Hur skulle du vilja fördela arbetsveckan i framtiden?
    - Hur tror du att PC vill att du ska fördela dem?
    - Hur skulle du vilja förändra ditt arbetssätt för framtiden?
- Hur introducerades du i din roll?
    - Hur har du vidareutvecklas?
    - Hur lång tid tog det för er att bli bekväma i er roll när ni började som PL?
        - Vad krävdes för att i skulle känna er bekväma?
        - Vad skulle du vilja ha mer stöttning med som ledare?

TM/TL

- Vilka målsättningar har du för TM respektive TL i deras dagliga arbete?
- Hur arbetar TL idag?
- Hur introducerades TL i sin roll?
    - Vad har de vidare fått för stöd?
- Hur arbetar du med dina teamleaders?
    - Vilken roll uppfattar du att du har? Både formellt och informellt.
    - Hur skulle du vilja förändra den rollen?
- Vad anser du är de viktigaste egenskaperna när ni anställer någon i produktionen?

Allmänt/Respekt

- Vad är en vanlig avvikelse som uppstår i produktionen?
    - Beskriv hur en sådan avvikelse generellt hanteras?
        - Vilken väg brukar informationen om avvikelsen ta? Från TM och vidare?
        - Hur följer ni upp att det blir löst? Görs det alltid?
        - Hur följer ni upp att det inte sker igen?
    - Hur skulle du önska att avvikelser hanteras i framtiden med avseende på samma aspekter?
        - Vad behövs för att nå dit?
- Hur ger du återkoppling?

- o Vid vilka tillfällen? *(När/hur/positiv/negativ)*
- o Hur uppfattas den tror du?
- o Hur viktigt anser du att det är att ge återkoppling?
- o Hur får du återkoppling av Kent?
- Om en TM respektive TL gör ett misstag, tror du att de vågar nämna det för sin TL respektive dig?
- (Sedan du blev placerad som PL nere i produktionen, vad har du märkt för skillnad?)
  - o Vad tycker du är positivt respektive negativt med av att vara positionerad i produktionen?
  - o Vad var det ni ville åstadkomma och har ni nått det?
  - o Vad tror du att TM/TL tycker om det?
  - o Är det någon skillnad de dagar PC är på sitt kontor kontra de dagar hen sitter nere i produktionen?
  - o Hur mkt tid spenderar du med att gå runt i produktionen?
    - ▪ Vad gör du under denna tid?
    - ▪ Vad hade du velat göra under denna tid?
  - o Vad tror du att dina TM/TL tror att du gör om dagarna?
  - o Vet dina teammedlemmar när du är på möte? Hur?
- Hur modererar du vad du säger utefter vilka personer som finns i närheten och kan höra?

Förbättringsarbete allmänt

- Hur arbetar ni med ständigt förbättringsarbete?
  - o Kan du definiera vad det innebär?
  - o Använder ni någon annan metod än Kata?
  - o Hur skulle du vilja se att ert förbättringsarbete utvecklas framöver?
  - o Hur tror du att ledningen vill att ert förbättringsarbete utvecklas?
- Kan operatörerna komma med förslag på förbättringar av sin arbetsplats?
  - o Om ja:
    - ▪ Hur går de i så fall tillväga? (Dvs vilken väg tar de?)
    - ▪ Hur uppmärksammas deras förslag direkt?
    - ▪ Finns det några rutiner? Vilka?
    - ▪ Tror du att de känner sig trygga i att komma med förslag?
    - ▪ Tror du att de känner att deras förslag är uppskattade?
    - ▪ Hur får de återkoppling på deras förslag, vid senare skede?
    - ▪ Får de någon möjlighet att själva driva frågan vidare?
  - o Om inte: Hur tänker du angående att ni inte har något sätt att komma med förslag nedifrån?
    - ▪ Hur tror du detta uppfattas av operatörerna?
    - ▪ Ser du en framtid där de skulle kunna vara det?
  - o Hur tycker du att man ska gå tillväga för att involvera TM/TL mer i förbättringsarbete?
- Vad anser du är det största hindret för vidareutveckling av förbättringsarbete?
  - o Vilka andra hinder finns, kan du rangordna dem?
- Känner du att du har stöd uppifrån (ovanför PC) för att driva/genomföra förbättringsarbete? Hur?
- Hur följer ni upp eventuella implementeringar för att se deras långsiktiga effekt?
  - o Vad tar ni hänsyn till?
  - o Utvärderar ni hela processen eller enbart resultatet?

Kata

- Hur går ni tillväga i ert Kata arbete?
  - Kan du förklara proceduren?
  - Vad är meningen med Kata arbetet från ditt perspektiv?
  - Tycker du att det är ett lämpligt tillvägagångssätt?
    - Om inte: vad hade du velat ha för förändring (t.ex. kontinuerligt, struktur)?
    - Har du möjlighet att förändra proceduren?
  - Var lärde du dig den?
  - Hur introducerades du för att hålla i Kata arbete?
  - Vad skiljer det mellan en TL och TM i ett Kata arbete?
- Hur anser du att en coach i Kata ska vara?
  - Vad anser du är viktigast att tänka på som coach?
  - Till hur stor del efterföljer du denna bild, Dvs:
    - Hur gör du idag?
    - Hur skulle du önska att det var?
    - Vad skulle krävas för att nå målbilden?
  - Vilka förutsättningar krävs för att vara en bra coach i Kata arbete?
    - Vilka har du?
    - Vilka behöver du? Behöver du något för att bli en bättre coach? Vad? *(t.ex. mer stöttning från ledning, vad isf?)*
  - Hur stor vikt placerar du vid att lära ut jämfört med att uppnå det resultat som önskas?
  - När PC agerar coach till dig, till hur stor del anser du att hen styr konversationen mot ett eget mål?
  - Händer det att er coach är med när ni coachar en TL i Kata arbete?

APPENDIX C – Interview guide for TLs

Bakgrundsfrågor

- Beskriv kortfattat vad du gjort innan du började på Aros?
- Hur länge har du arbetat på Aros?
- Vilka positioner har du haft, när och hur länge på varje?
- Vad är dina arbetsuppgifter/ansvarsområde?
- Hur introducerades du i din roll som TL?
  - Vad får du nu för stöttning av din PL?
    - Vad skulle du vilja ha mer/mindre av?
  - Vad skulle du önskat att du fick för introduktion?

Allmänna/Förtroende

- Är du bekväm i din roll?
  - Om ja: Vad gör att du är det?
  - Om nej: Vad skulle krävas för att du skulle bli det?
- Om du gör ett misstag i produktionen. Säg att du tappar ett kort eller hanterar det på fel sätt. Vad gör du då?
  - Meddelar du din PL?
    - Varför?
      - Hur bemöts du i de fallen?
    - Varför inte?
      - Vad skulle göra att du skulle meddela?
  - Vem meddelar du om din PL inte är där?
- PL är placerade i produktionen, vad tycker du om det?
  - Ser du din PL ofta gå runt i produktionen?
    - Vad tycker du om det?
    - Vad gör din PL då?
    - Vad hade du önskat att din PL gjorde?
  - Vad tror du att din PL gör?
  - Har du koll på när de är på möten? Hur/Varför?
- Har ni tillräckligt mycket personer i gruppen för att täcka upp ert behov?
  - Är det samma läge i resten av produktionen?
- Önskar du att du fick mer feedback på det du gör och vad man kan göra annorlunda?

Förbättringsarbete allmänt

- Om det finns något du skulle vilja förändra med din arbetssituation, vad är det då?
- Vad har du för uppfattning om standarder?
- Har ni standarder för hur ni skall arbeta?
  - Följer ni i så fall dem?
- Hur arbetar ni med förbättringar i produktionen?
  - Hur fick du lära dig hur du ska gå tillväga?
- Känner du att du har möjlighet att påverka din arbetsplats? Hur då? Varför?
  - Vilken typ av förändringar har du möjlighet att göra utan godkännande av PL eller PC?
  - Hur fick du vetskap om detta?
- Ser du något problem med din nuvarande arbetsplats eller tillvägagångssätt när du arbetar i produktionen? Det kan gälla utrustning, hur du arbetar, hur arbetet är planerat etc.
  - Tror du din PL känner till detta problem?

- o Har du framfört att det är ett problem? Var?
- Har du någon gång framfört en idé för att lösa ett problem?
  - o Om ja:
    - Hur känner du att det mottogs?
    - Vad var resultatet?
    - Vad hände efter?
    - Fick du resultatet återkopplat till dig? Hur?
  - o Om nej:
    - Om du skulle ha en idé, känner du att du har möjlighet att framföra den typen av lösning?
      - Varför?
      - Hur skulle du gå tillväga?
- Hur viktiga tror du att produktionsledningen anser dina förslag?

Kata

- Vad tänker du när du hör begreppet 'Kata arbete'?
  - o Kan du förklara proceduren?
  - o Vad är meningen med Kata arbetet från ditt perspektiv?
  - o Tycker du att det är lämpligt tillvägagångssätt?
    - Om inte: vad hade du velat ha för förändring (t.ex. kontinuerligt, struktur)?
  - o Var/Hur lärde du dig den?
  - o Om du varit Adept, vad har du fått för utbildning i att hålla Kata arbete?

Extra frågor
- Har du någon erfarenhet av Kata arbete?
  - o om ja: Tänk på det pågående eller senaste arbetet
    - Vad handlar/handlade det om?
    - Hur fick du arbetet introducerat?
    - På vilket sätt var du inblandad?
      - Om Adept: Vad var dina ansvarsområden kontra en gruppmedlem?
        - o Hur tycker du att du uppfyllde dem?
    - Hade du några förslag på lösningar?
      - Hur framförde du dem?
      - Hur mottogs dem?
    - Känner du att dina förslag blev uppmärksammade? Vad hände?
    - Hur ofta jobbar/jobbade ni med ert Kata projekt?
      - Hur ofta följer/följde din Coach/PL upp?
      - När har/hade ni möjlighet att arbeta med projektet?
        - o Finns/Fanns det avsatta tider?
        - o Var tidsperioden lagom/för lång/för kort?
        - o Hur anser du att tiden skulle fördelas? Mer eller mindre tid?
    - Har/Hade du någon möjlighet att förändra proceduren?
- Vad vet du om Lean?
  - o Vilka erfarenheter har du av Lean i ditt arbete?
  - o Vad anser du om Lean?
  - o Vad har du fått för träning/utbildning i Lean *(t.ex. PDCA)*?