

LAPPEENRANTA-LAHTI UNIVERSITY OF TECHNOLOGY LUT
School of Engineering Science
Degree Program in Industrial Engineering and Management



Lotta Kosonen

**CHANGE MANAGEMENT AT PRODUCTION SITE: CASE FOREST
INDUSTRY COMPANY**

Master's Thesis

Examiners: Professor Vesa Harmaakorpi
D.Sc. (Tech.) Satu Parjanen

ABSTRACT

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The ability to change is important to companies in the increasingly complex and changing environment. To stay competitive, processes must be effective and efficient and quality level maintained to fulfil customer needs. The case company of the thesis is an international exchange-listed company working in the field of renewable materials. The company has a change management process in place but nevertheless their management of changes has not been sufficient. Hence, the main objective of this thesis was to enhance the case company's current change management process in the spirit of continuous improvement. As a methodology of the thesis, constructive approach was used. Interviews as well as literature review were conducted to support the creation of the construction.

Based on literature, there is no single cross-industrial best practice for change management. However, the importance of change management is widely accepted. With adequate process in place, improvements required by e.g. quality management can be implemented effectively and efficiently. According to interviews different departments are still learning how to manage changes in accordance with current process in their day-to-day activities. Interviewees were demanding for change management culture where changes would be identified responsively and proactively. Due to the several Excel spreadsheets, interviewees felt the process included a lot of manual transfer of information and for some the different templates were hard to use. In addition, poor visibility between a change, its risks and mitigation actions were reported. In general, the perception was that risk assessments should be made with a lower threshold.

Based on the findings, an electronic change management documentation system was developed for more effortless and transparent change documentation and management. The system combined both change and related risk documentation, hence providing traceability which was previously lost when information was stored in different documents. With the change management process build into the system, following of the process is easier. Based on the literature review an optional phase was added for change follow-up after implementation. This enables change institutionalization as well as knowledge management. As the implementation of the system was not within the scope of the thesis, the potential benefits of the new process and system will realize after finalization of the thesis. Within the implementation organizational culture should be acknowledge as well so that full benefits of the study can be captured.

TIIVISTELMÄ

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Yritysten kyky muuttua on tärkeää yhä kompleksisemmässä ja muuttuvassa ympäristössä. Prosessien täytyy olla vaikuttavia, tehokkaita ja laatutaso säilytettävä, jotta pysytään kilpailukykyisinä ja täytetään asiakkaiden tarpeet. Työn case-yritys on kansainvälinen pörssiyritys, joka toimii uusiutuvien materiaalien alalla. Yrityksellä on olemassa oleva muutoshallintaprosessi, mutta siitä huolimatta muutosten hallinta ei ole toivotulla tasolla. Näin ollen diplomityön tavoitteena oli parantaa case-yrityksen nykyistä muutoshallintaprosessia jatkuvan parantamisen hengessä. Diplomityön metodologiana käytettiin konstruktio-menetelmää. Lisäksi suoritettiin haastatteluita sekä kirjallisuuskatsaus konstruktion tueksi.

Kirjallisuuden mukaan ei ole olemassa yhtä yleisesti hyväksyttyä parasta käytäntöä muutoshallintaan. Muutoshallinnan tärkeys kuitenkin tunnustetaan. Sopivalla prosessilla voidaan ottaa käyttöön esim. laadunhallinnan vaatimia muutoksia vaikuttavasti ja tehokkaasti. Tutkimuksen haastatteluiden perusteella case-yrityksen tuotanto-osastot vasta opettelevat muutosten hallintaa nykyisellä prosessilla. Tarve muutoshallintakulttuurin luomiselle oli selvä, jotta muutokset tunnustettaisiin matalalla kynnyksellä ja ennakoivasti. Useiden käytössä olevien Excel-taulukoiden vuoksi haastateltavat kokivat, että nykyinen prosessi sisältää paljon manuaalista tiedonsiirtoa ja osa taulukkopohjista koettiin vaikeakäyttöisinä. Lisäksi raportoitiin heikkoa näkyvyyttä muutoksen, sen riskien ja hallintatoimenpiteiden välillä. Yleisesti koettiin myös, että riskiarvioita pitäisi tehdä aiempaa matalammalla kynnyksellä.

Tulosten perusteella case-yritykselle kehitettiin sähköinen muutoshallintajärjestelmä. Järjestelmän tavoitteena oli vaivattomampi ja läpinäkyvämpi muutosten dokumentointi ja hallinta. Järjestelmä yhdisti sekä muutokset että niihin liittyvän riskienhallintadokumentaation, näin mahdollistaen jäljitettävyyden, jota ei aiemmin ollut johtuen prosessin hajanaisesta dokumentaatiosta. Järjestelmä kehitettiin tukemaan muutoshallintaprosessia, näin helpottaen prosessin ohjeidenmukaista käyttöä. Kirjallisuuskatsauksen perusteella muutoshallintaprosessiin lisättiin valinnainen vaihe muutoksen seurannalle toteutuksen jälkeen. Tämä mahdollistaa muutosten vakiinnuttamisen ja tiedonhallinnan. Koska järjestelmän käyttöönotto oli rajattu diplomityön ulkopuolelle, järjestelmän mahdolliset hyödyt realisoituvat vasta myöhemmin työn jälkeen. Käyttöönoton yhteydessä tulisi kuitenkin huomioida myös organisatorinen kulttuuri, jotta työn kaikki mahdolliset hyödyt voidaan saavuttaa.

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5.8.2021

Lotta Kosonen

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LIST OF ABBREVIATIONS

BPM	Business Process Management
DoE	Design of Experiment
ECM	Engineering Change Management
ERP	Enterprise Resource Planning
FDA	Food and Drug Administration
FMEA	Failure Mode Effects Analysis
HR	Human Resources
ISO	International Organization for Standardization
PDCA	Plan-Do-Check-Act
PE	Polyethylene
SPC	Statistical Process Controls
TQM	Total Quality Management
QMS	Quality Management System

1 INTRODUCTION

“There is nothing permanent except change” - a phrase from Heraclitus over 2000 years ago is still valid today. Flexibility and ability to change are demanded from companies to survive in the increasingly complex environment. The complexity shows for example as shortening product lifecycles and increasing number of product models and variants. (Krappe et al., 2006) Indeed, when looking at the S&P 500 Index, which contains the 500 largest companies in United States, the average survival rate of the companies on the Index has decreased from 61 years in 1958 to 18 years in 2015 (Albach et al., 2015).

Consequently, change is an imperative. When it comes to changes in a company, however, merely the ability to change is not enough. To stay competitive, processes must be effective and efficient and certain quality level maintained. Continuous improvement, effectiveness, and high quality of products and operations increase product reliability and hence customer satisfaction, reduce costs, and increase revenue. (Molina-Azorín et al., 2009)

1.1 Background

The case company of the thesis, hereafter also referred as “the company”, has a change management process in place. Despite, change management has had its challenges. For example, there have been cases in which events have not been identified as changes and/or effects of a change have not been properly identified and evaluated. These further caused adverse effects such as safety risks and increased workload and hence inefficiency. The company has also implemented several ISO standards, ISO 9001 to highlight one. All the standards emphasize continual improvement of management systems and processes, and thus the case company is also committed to constantly enhancing its processes. Thus, as there is both a need as well as a will to improve the change management process, the study was initiated.

1.2 Objectives and limitations

The objective of the thesis is to further enhance the case company's change management process so that it supports handling changes and is also in accordance with the industry regulations and standards. Aspects under review are for example the process model and workflow. As the current process is strongly Excel-based, another objective is to review the overall process from documentation perspective to find out whether an electronic tool would make the process more transparent and efficient. Consequently, the objective is to answer the following research question (RQ) and sub questions (SQ):

- RQ1: How to manage changes as a part of effective quality management?
 - SQ1: What type of change management process/workflow is applicable for the case company?
 - SQ2: How to increase effectiveness and transparency of the process in the case company?

Thus, in the end of the study the goal is that the enhanced process and any related improvements are ready to be implemented in the case company. Final implementation and institutionalization as well as change management reporting development will be carried out by the company personnel after the study and hence are not within the scope of the thesis.

The study has a few limitations. First, the thesis has its main focus on practical change management which has been implemented for recognition, documentation, and evaluation of changes at production sites. Hence, any other change processes or models the company might have, for example corporation level organizational change processes, are not within the scope of the research. Second, the study objective is the recognition, planning and development of enhancement actions. Implementation of the findings and generated solutions are not within the scope of the thesis. Instead, the implementation will be performed later by the company's internal development functions, mainly due to the complexity of the company's organizational model.

1.3 Methodology

A constructive approach was chosen as research methodology for the study. In the approach, the objective is to solve a managerial problem by constructing organizational processes, diagrams, plans, or models. In practice these solution producing entities, *the constructions*, can vary from intangible solutions, such as mathematical algorithms, to more tangible ones, such as new products, and anything in-between. Hence, constructive research is a form of applied studies. (Kasanen et al., 1993)

A substantial part of the approach is to combine the problem as well as the designed solution with theoretical frameworks (Figure 1). Indeed, a construction should have both a connection to existing theory but also contribute to it. Besides theoretical aspects, the created constructions should be relevant and functioning in practice too. (Kasanen et al., 1993) Here, the produced construction is the enhanced change management process which is designed during the study.

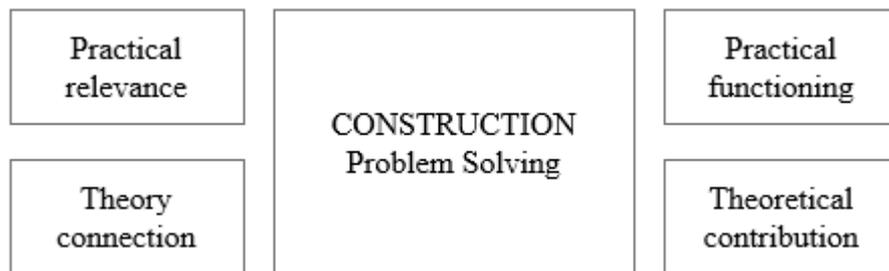


Figure 1. Elements of constructive research (Kasanen et al., 1993)

To support the creation of the construction and to include the theory connection to the study, a literature review and interviews were conducted. The objective for the interviews was in particular to understand how the current change management process is carried out in different departments of the site and to understand better the practical needs of the units for the enhancements. To achieve this, the interviews were organized as a semi-structured interview. Semi-structured interview is a flexible type of interview where predefined questions are asked but the discussion may flow freely, and unplanned follow-up questions can be asked. The overall thesis and its phases are described in Figure 2.

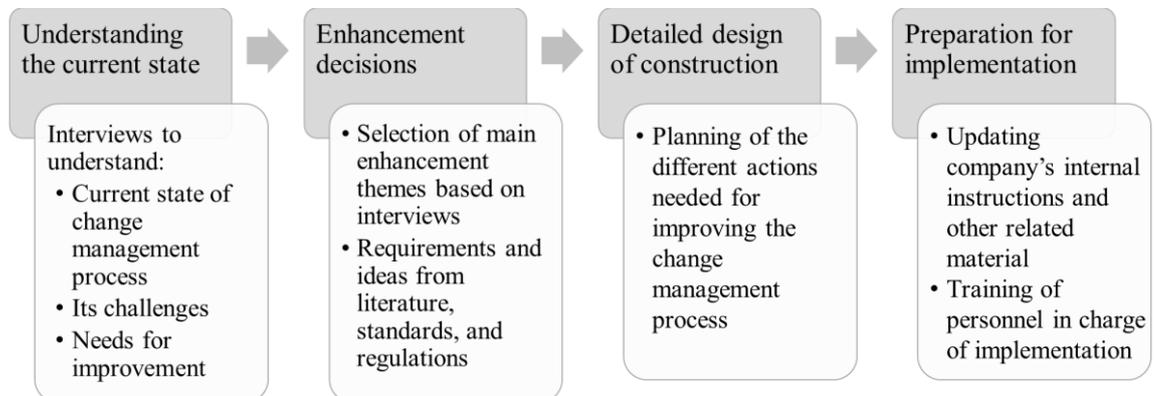


Figure 2. Phases and content of the study

The interviews were conducted in the beginning of the study. Two rounds of interviews were conducted and finally, altogether 40 people were interviewed. The first round of interviews consisted of 29 people, including especially production managers and development managers, hence people responsible for overseeing change management and its development at the departments. The second round of interviews consisted of 11 people, day and shift supervisors. Main purpose for the second round of interviews was to confirm the results of the first round with slightly different group of interviewees. From the interview results main development themes were identified. Meanwhile, the literature review was conducted. Based on the findings from both literature and interviews, the process enhancements were planned, developed, and prepared for implementation. Overall, the study was carried out from January to July in 2021.

Even though the different phases of the study are depicted in Figure 2 as separate steps, in practice the phases overlapped slightly. For example, the interviews and literature review were conducted simultaneously, as mentioned previously. In addition, the development managers responsible for implementation of the thesis outcome were included in discussions already when designing the practical improvement actions.

1.4 Structure

The thesis begins by presenting the theoretical framework regarding the topic. First, section 2 concentrates on quality – how quality thinking as evolved over time and how

quality management can be carried out. Next, section 3 presents theory about change management, what type of models there are as well as describes some supportive and challenging aspects for managing changes. Section 4 finishes the theoretical part by enlightening the topic of effectiveness and how it relates to organizations and their operations.

In the next part, section 5 presents the situation in the company as it was in the beginning of the study, including current change management process and applicable quality standards and other possible requirements. Section 6 presents the construct of the study and how it was generated, i.e., clarification of the current state and challenges of the change management process and the consequent process enhancements. Finally, section 7 contains the discussion where theory is evaluated against the created construct, conclusions and recommendations for future research and other related actions.

2 QUALITY MANAGEMENT

For as long as there has been economic trading, the concept of quality has been present. Irrespective of time, an enterprise will succeed only if it pleases customers. When looking at the history of quality management, the emphasis has changed from product quality to more comprehensive management of quality. (Weckenmann et al., 2015) Furthermore, another shift in focus is the emphasis of customer perspective. Understanding customer needs as well as creation of products and services that are of high quality and fulfil customer requirements creates sustainability and success for a company (ISO 9000, 2015).

The International Organization for Standardization (ISO 9000, 2015) defines quality as the “*degree to which a set of inherent characteristics of an object fulfils requirements*”. Furthermore, the management of quality has its primary focus on meeting customer requirements and expectations. The standard highlights the importance of people – creation and delivery of value to customers is not possible without people’s engagement. A distinguished quality pioneer Juran defined quality on the other hand from a more practical point of view: “*fitness for use*” (Bisgaard, 2008). As such, quality management is according to Weckenmann et al. (2015) a two-sided coin: Firstly, it is much about solving current problems and managing of risks. On the other hand, another objective for it is the identification of future problems, such as environmental crisis and social responsibility, and how to increase performance in a sustainable way.

2.1 Development of quality management concept

The start of mass production era circa 1900 can be said to be the start of the evolvement of the current quality management concepts (Figure 3). An additional process step of quality inspections was introduced to manufacturing process to assure that any products with defects would be spotted. Vast inspections turned out to be expensive, however, due to time consumption and high waste rates. (Weckenmann et al., 2015) To overcome these downsides, random variation was taken into consideration around 1920s (Bisgaard, 2008). Hence, mass production with low product variability and high production volume

was pursued, while the viewpoint of customer needs was neglected. During the time, the triangle of “Quality, Cost and Time” was created, emphasizing the manufacturing objectives of the time: high quality, low costs, short delivery time. (Weckenmann et al., 2015)

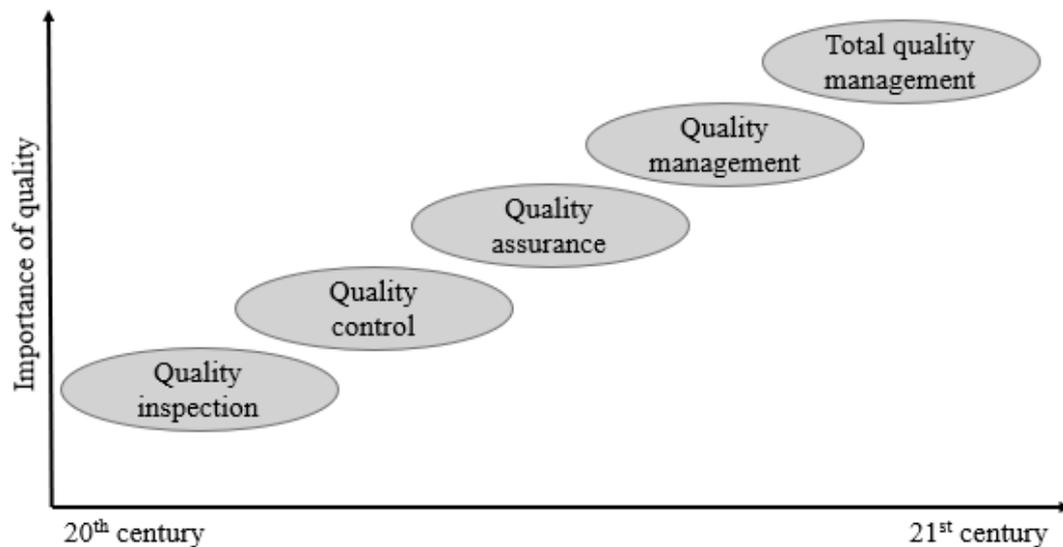


Figure 3. Quality management concepts over time (Weckenmann et al., 2015)

As the pressure on the “triangle” increased, in the 1940s attention shifted from product quality to process quality. It became evident that quality inspections were not as efficient as quality control. (Weckenmann et al., 2015) In other words, instead of trying to sort out low quality products in the end, the objective was to eliminate the origin of faulty product from the process (Bisgaard, 2008; Weckenmann et al., 2015). Furthermore, for quality control to be effective, also top management leadership should be present. This resulted in a wide variety of different quality control related tools and strategies: the seven tools for quality management, the Plan-Do-Check-Act (PDCA) cycle, the Statistical Process Control (SPC) and the statistical Design of Experiments (DoE) to name a few. Further in the 1960s, the concept was taken even further, and quality assurance emerged: assuring quality proactively by risk identification. Also the preventative quality assurance methodology introduced new tools and strategies such as Failure Mode and Effects Analysis (FMEA) and New Seven Tools (N7) emerged. (Weckenmann et al., 2015)

Following the era of quality control and assurance, the increasing customer demands, and complexity of products resulted as a need for information from users of the products. This was solved by involving customers tighter in the processes. Hence, the viewpoint shifted from linear processes to system-oriented thinking, which includes the original value-creation process but also its interdependencies within processes and organizations. For example, ISO 9000 standard series was published setting a baseline for quality management. Finally, the latest shift in the quality principles is to pursue quality as an absolute value, and not because of competitive advantage or market pressure. This has emphasized even more the importance of people. (Weckenmann et al., 2015) Thus, the concept of Total Quality Management (TQM) emerged, as it underlines the importance of relationships between leaders, employees, processes and customer needs and business outcomes (Lodgaard & Aasland, 2011; Weckenmann et al., 2015).

2.2 Total Quality Management

Total Quality Management is a holistic quality and operations management philosophy (Guimaraes & Armstrong, 1998). The core objective of the TQM philosophy is to meet or even exceed customer requirements by improving products, services, and processes. Hence, it emphasizes especially continuous improvement, customer focus and employee involvement (Guimaraes & Armstrong, 1998; Molina-Azorín et al., 2009). Furthermore, according to Powell (1995) TQM highlights follow-up of results and hence information-based decision-making and process redesign.

TQM has become a wide-spread and popular quality management method during the last decades. Advocates of TQM claim that the philosophy improves products and services, cuts costs, and improves customer satisfaction. Thus, TQM has been argued to eventually improve even company's performance. (Kaynak, 2003; Powell, 1995) However, literature and studies are not unanimous about the benefits (Kaynak, 2003). The TQM methods are questioned claiming that they create significantly high implementation and retraining costs (similarly as ISO 9000 would), increase formality and demand for unrealistic commitment of employees (Martínes-Lorente & Martínez-Costa, 2004; Powell, 1995). According to Kaynak's (2003) research, however, TQM's benefits might

not realize due to lack of commitment from the top management. The same author claims also that the reason for different study results about TQM's benefits can be due to different research design.

When evaluating effects of TQM implementation, concentration on the methods and their implementation does not seem to be enough. Based on a research conducted to U.S. companies by Powell (1995), TQM could indeed create economic benefits to a company, but this is not a platitude. Also, commitment of leaders, open organization model and involved employees affect the success. Hence, he concluded that creation of a right type of culture is more important than imitation of certain TQM procedures.

2.2.1 Continuous improvement

Continuous improvement (CI) is a philosophy which consists of "*improvement initiatives that increase success and reduce failures*" (Bhuiyan & Baghel, 2005). These initiatives can be relatively small and made step-by-step, or even bigger, radical changes. However, big changes usually take time and hence contain numerous incremental improvements but nevertheless aim to reach goals as an on-going process. (Caffyn, 1999; Kaynak, 2003)

From its background, literature presents different frameworks for continuous improvement. Some see CI as a process for incremental innovations, others as a by-product of TQM (Bhuiyan & Baghel, 2005; Caffyn, 1999). Berger (1997) on the other hand claims that CI is a philosophy for development which can be applied with or without TQM. Furthermore, the Japanese concept "*kaizen*", mostly familiar from lean methodologies, has supported the birth of CI (Berger, 1997) or is sometimes even used as a synonym to it (Bhuiyan & Baghel, 2005). Here, CI is covered as quality initiative as also the ISO 9001:2015 quality standard demands for it.

According to Bhuiyan & Baghel (2005) continuous improvement can be adopted at three different organizational level – management, group, and individual level. At the highest, management level the improvements affect strategy of the organization. One step lower on the group level the implications of CI are on broader-level tasks and processes,

whereas on the lowest, individual level the improvements fall upon more precise, daily activities and tasks. Hence, CI does not necessarily affect only management processes, but also individual employees can improve their work accordingly.

Continuous improvement is in the deep core of TQM. CI emphasizes involvement and cooperation of people from all levels of the organization. (Kaynak, 2003) With CI, organization's ability to continually improve develops over time and the process starts by a conscious decision to adopt the philosophy. Only then it can become a part of the organizational culture. (Caffyn, 1999) Indeed, also according to Kaynak (2003) continuous improvement is a compulsory aspect to have in order to change an organization effectively.

Adopting CI can offer companies significant benefits. Companies have reported significant annual savings produced by the CI (Caffyn, 1999). The positive effect could be seen in multiple different performance measures – productivity, product quality and reliability and process efficiency, to mention a few. (Caffyn, 1999; Molina-Azorín et al., 2009) For example, as quality improves, cost of discarded batches and rework are lower which can result in higher productivity and cost-efficiency (Kaynak, 2003). Motorola, a former American company proved this in practice, as the company achieved 14 billion US dollar savings as well as a five-fold increase in sales with six sigma in ten years' time period between 1987 and 1997 (Klefsjö et al., 2001). Six sigma and other CI tools are presented in more detail in the following section.

2.2.2 Tools for adoption of TQM and continuous improvement

Over time, numerous practical tools have been developed for CI. The core objective for the use of these tools is to reduce waste in processes, simplify manufacturing, and improve quality. Examples of the tools are such as six sigma and lean six sigma. (Bhuiyan & Baghel, 2005) Six sigma is an approach utilizing statistical techniques to measure process capability and to identify opportunities for process improvement and variation reduction (Klefsjö et al., 2001).

The other tool mentioned, lean six sigma, is a hybrid methodology aiming to eliminate waste and reduce variation, and more importantly, to determine the steps in achieving the two objectives. As the name indicates, its origins are in six sigma and lean manufacturing methods. The benefit of this combination is the increased value creation capability. (Bhuiyan & Baghel, 2005)

Another practical tool for CI is the Plan-Do-Check-Act (PDCA) high level method, also known as the Deming or Shewart cycle (Caffyn, 1999; Lodgaard & Aasland, 2011). The tool can be used as an aid in implementation of CI as well as in executing other improvement initiatives (Caffyn, 1999). Also, ISO 9001 (2015) mentions the model in context of ensuring that improvement possibilities are determined and exploited and there are sufficient resources and management for processes. With the cycle, it is possible to solve core issues rather than only remove symptoms and the success and the performance is also possible to assess, for example within audits (Caffyn, 1999; Lodgaard & Aasland, 2011). The different phases of the cycle are presented in Figure 4.

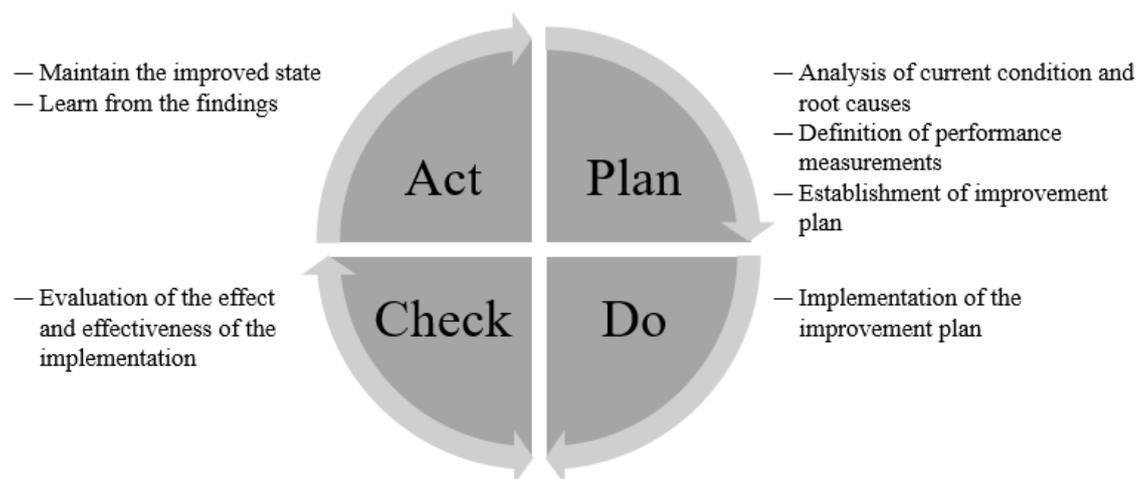


Figure 4. Plan-Do-Check-Act Cycle (Lodgaard & Aasland, 2011)

First phase starting the cycle is the plan phase. Instead of only planning needed improvement actions, the phase also considers the formation of the improvement teams, as well as analysis of the background, root causes for current state of things and measurements. Hence, the phase is usually the most time-consuming one of the cycle. In

the next “Do” phase the planned actions are implemented. As there might be several different improvement actions in the plan, it is also important to understand during the phase what worked and what did no. (Lodgaard & Aasland, 2011)

The data from implementation is further used in the “Check” phase where implementation effects are analyzed. Expected results are evaluated against the actual results. Based on the success of the actions, previous phases can be revisited, or cycle continued to “Act” phase. That is the phase where new, improved ways of working are standardized and learning is confirmed. (Lodgaard & Aasland, 2011) However, according to study conducted by Lodgaard & Aasland (2011) it seems to be common that companies do not follow the cycle precisely, but have developed in-house methods that loosely follow the phases and content of the PCDA cycle. These in-house methods might for example take less time or are otherwise “satisfactory enough”.

2.3 ISO 9001:2015 quality system

International Organization for Standardization (ISO) is an independent organization established in 1946 (ISO, n.d.a). The organization develops consensus-based and voluntary International Standards that aim to illustrate the best courses of action (ISO, n.d.a; ISO n.d.b). Indeed, the standards present general objectives about what the processes should include for example, but does not give strict instructions on how to implement the standards in practice (Armistead et al., 1999). The members of the organization compiling the standards are subject matter experts in their field representing wide variety of different organizations (ISO, n.d.b).

ISO 9000:2015 series is probably the world’s best-known quality standard (ISO, n.d.a). The standard aims to help its users to produce products and services that fulfil user requirements. In addition, the standard aids companies in managing risks and possibilities and in demonstrating that they are able to fulfil requirements of a quality system. In general, the standard aims to promote process approach, meaning that companies should define and manage quality system processes but also the interrelated processes. Another fundamental from the standard is risk-based thinking. This is seen necessary for an

effective management of a quality system. The ISO 9001:2015 quality management standard is built on the seven quality principles (Table 1) that have been identified as important to organizations. (ISO 9001, 2015)

Table 1. Seven quality management principles (ISO 9000, 2015)

Principle	Description
Customer focus	Quality management focuses on meeting the requirements of customers and exceeding their expectations.
Leadership	Leaders show the purpose and direction which should be taken to accomplish quality objectives of the organizations.
Engagement of people	Engaged members of an organization increase the created and delivered value.
Process approach	Once activities are understood and described as well as managed as related processes, steady result level is achieved effectively and efficiently.
Improvement	Constant focus on improvement makes successful organizations.
Evidence-based decision making	Data and information driven decisions make it easier to achieve results.
Relationship management	As stakeholders influence the performance of an organization, relationship management with them creates sustained success.

An ISO 9001 standard based quality management system (QMS) has many benefits. For example, it can create cost savings by optimization of organization's operations, increase satisfaction of customers, and also provide environmental benefits. (Chen et al., 2016) In addition, the standard's latest 2015 revision can help companies especially in risk management on strategic level as well as in considering stakeholders and their needs, and in improving knowledge management (Sari et al., 2017).

2.3.1 Process thinking in risk, opportunity, and change management

In general, the ISO 9001 (2015) standard promotes process thinking. To achieve full management of different processes a PDCA model is suggested (Figure 5). The model presented in the standard is similar to the one introduced in section 2.2.2, but is further complemented with other standard requirements such as customer requirements, organization's context as well as stakeholders and their needs. The model can be further used in conducting continual improvement in a company.

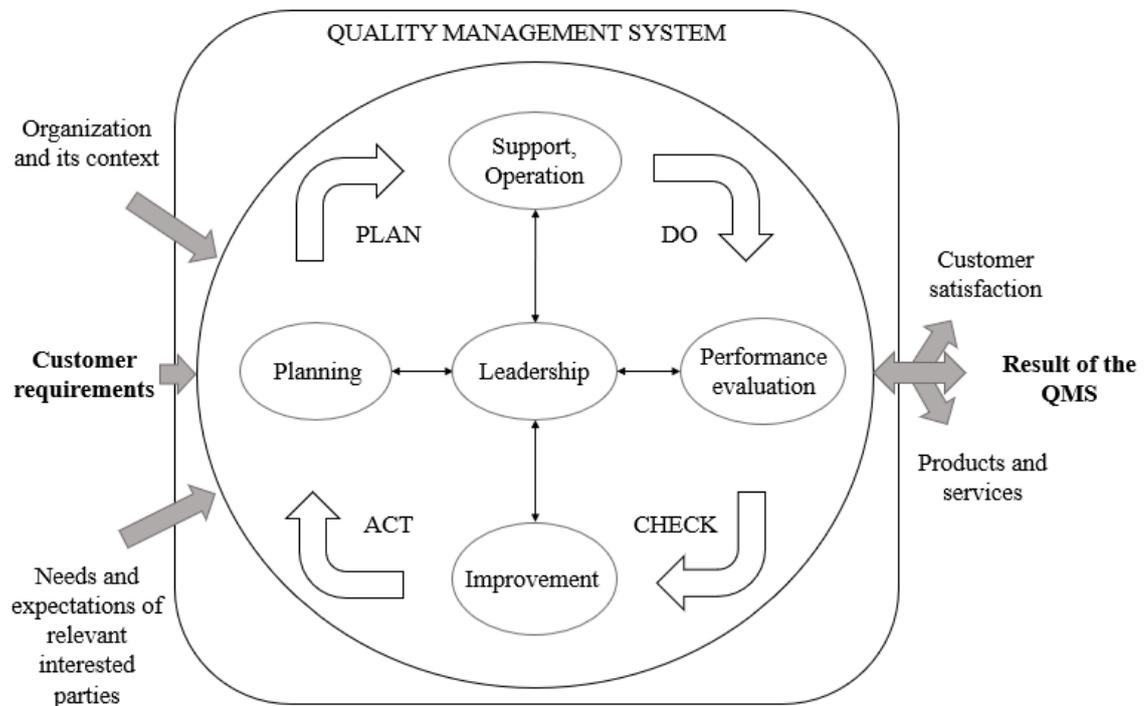


Figure 5. ISO 9001 (2015) standard's PDCA model

According to ISO 9001 (2015), an organization should determine risks related to its operations so that they can guarantee that the QMS can achieve its goals. Furthermore, by risk management it is possible to prevent or reduce undesirable outcomes and even achieve improvements. Within the quality system an organization must plan how risks are mitigated, how the severity of a risk is assessed and how these procedures are related to other quality management processes. According to the ISO 9001:2015 standard, when risk-based thinking is implemented with these practical actions, the foundations are formed for increasing quality system effectiveness and customer focus.

Similarly as risks, the quality standard (ISO 9001, 2015) urges also for determination of opportunities. This supports organizations in achieving their goals and improvement by intensifying desirable effects. Also, opportunities should be combined with a suitable action plan for their capture. In the end, whether it is an identified risk or an opportunity, the effectiveness of the action plan should be evaluated by the quality systems.

Besides the aforementioned, ISO 9001 (2015) also demands for management of changes. All changes on products or services shall be identified, reviewed, and controlled to such extent that they will not negatively affect conformity to requirements. The management of changes should be documented so that the review of changes, person approving those and actions arising from review can be demonstrated. Also changes to quality system related documents should be controlled, for example with version history. Finally, an organization should be committed to continual improvement of its quality management system and related its processes to ensure adequacy and effectiveness.

2.3.2 Criticism of the ISO 9001 standard

Despite the ISO 9001 standard's wide acceptability and application, the standard has been also criticized. According to two studies conducted by Martínez-Costa & Martínez-Lorente (2007) and Martínez-Costa et al. (2009) the effect of ISO 9000 implementation on company performance is at the very least unclear. Depending on a study and its methods the effect has been identified to be both positive and negative. However, based on the study conducted in 2007, ISO 9000 has not improved company performance but even worsened it. The outcome might be due to ISO 9000's cost of implementation (beating the created benefits) and increased bureaucracy.

However, it must be noted that both of the studies by Martínez-Costa & Martínez-Lorente and Martínez-Costa et al. were conducted around 2006 and 2008, and hence ISO 9001:2000 revision was valid at the time. The current revision was published in 2015. Therefore, it can be questioned whether the results are still applicable today, as for example risk-based thinking, top management support and overall process approach was

introduced or emphasized in the latest revision. According to Martínez-Lorente & Martínez-Costa (2004) in most of the cases the driver to implement ISO 9000 standard comes from customers, not within the company itself. This could leave some room for speculation whether the implementation benefits would be greater if the driver was internal need for standard-based quality system instead of external demand.

ISO 9001 standard based quality system has been also compared to TQM. Based on research, although conducted with previous ISO 9001 standard revisions, ISO 9001 certification does not improve company performance, whether it is implemented with or without TQM (Terziovski et al., 1997). However, the ISO 9001:2000 revision has taken a leap towards TQM with increased emphasis on management commitment, CI, and customer management (Chen et al., 2016; Martínez-Costa et al., 2009). According to (Martínez-Costa et al., 2009) companies certified with the ISO 9001:2000 revision did show TQM application at higher level but despite, the results did not seem to improve company performance.

3 CHANGE MANAGEMENT

Change management is “*the process of continually renewing an organization’s direction, structure, and capabilities to serve the ever-changing needs of external and internal customers*” (Moran & Brightman, 2000). Changes as such are a heterogeneous group of events which can vary in size and nature (By, 2005). Thus, target of the change can be a business process, product/service, or organizational structure or culture, thus impacting every organization in all industries. (By, 2005; Guimaraes & Armstrong, 1998)

Changes can be initiated internally, for example to improve something, but also due to external factors (By, 2005). Legislation for example is an external initiator that can restrict or force changes in companies (Jaeckel, 2015). It is a clear competitive advantage if a company can identify up-coming changes early, whether internal or external, act on them, and this way secure its long-lasting survival – in spite of the initial cause of the change (Krappe et al., 2006; Vedenik & Leber, 2015). Indeed, competitive companies do not only manage their processes effectively but manage change efficiently and effectively (Taskinen & Smeds, 1999).

Even though changes can differ in size, impact and nature, certain facts apply to every change. Any change can include risks or have further impacts that should be evaluated in advance so that implementation can be performed in a controlled manner (Garland, 2004; Kaplan et al., 2018; Wincek et al., 2015). Similarly, in all changes related people must be convinced about the necessity of the change – it is very challenging to institutionalize a change if people are not committed to it (Kanter, 2007). In addition, no matter how small a change, resistance to it can always appear (Pereira et al., 2019). Thus, the objective of this section is to present the theoretical framework for change management, its fundamentals, challenges and how to possibly overcome those.

3.1 Discontinuous and incremental change

In general, changes can be divided to discontinuous and incremental change by the rate of occurrence. There are slightly different definitions to both, but discontinuous change

is mainly defined as rapid, onetime change caused by internal or external shock. (By, 2005) Disruptive changes, usually innovations that change radically the way market functions, are an example of a change that is discontinuous by nature (Dedehayir et al., 2014). Long period of time can go by between changes. In incremental (or continuous) change small fundamental changes are made in continuous manner to keep up with the changing environment. Even there some peaceful times may occur in between, but in big picture the change is incrementally on-going. However, categorization of changes to discontinuous and incremental is not always so black and white and the pace can be dependent for example of the organizational level. (By, 2005)

Both of the change types have their supporters. Discontinuous change has been argued to be cost-effective as change is easily seen as an expensive process that never ends (Guimaraes & Armstrong, 1998). Additionally, it is said that change is never a steady-rate process and stability should not be expected. On the other hand, opponents say that discontinuous change is characterized by defensive and reactive behavior therefore requiring often reforming. Incremental change is seen beneficial by some, as changes are most efficiently implemented as small consecutive steps forward. (By, 2005) However, Bamford & Forrester (2003) argue that change is rarely stepping from one clearly defined, frozen state to another due to business environment complexity.

Besides the discontinuous and incremental change, By (2005) presents also a new emerging approach to change. The new approach looks at change as an on-going, open-ended adaptation process and not as a sequence of linear events. So rather than trying to plan ahead in the ever-changing environment and discontinuity, emphasis is given on the readiness to change and adaptability (Altman & Iles, 1998; By, 2005). It looks at organizations as open learning systems where decisions are made based on information processed from the environment. (Altman & Iles, 1998)

3.2 Change management models

Universally, changes can be divided roughly to two categories: physical changes and non-physical changes, also referred to as organizational changes. For example a change in a

manufacturing line is a physical change, whereas change in job responsibilities is an organizational change. (Wincek et al., 2015) As previously mentioned, several ISO standards, for example ISO 9001 Quality management and ISO 22000 Food safety management demand for management of any changes but do not specify how to do it in practice (ISO 9001, 2015; ISO 22000, 2018). Luckily, literature presents multiple more and less practical change management models (Bullock & Batten, 1985; Hamraz et al., 2013; Kanter, 2007; Kotter, 1995 to mention only few) for companies and organizations to go through a change.

Despite the numerous different models there does not seem to be a clear consensus among researchers on which model should be used by organizations. Indeed, Bamford & Daniel (2005) suggest that especially in complex changes even a few of the different models might need to be used to reach the objectives. For example, a bigger change could be a combination of both physical and organizational change. Regardless of the lack of mutual understanding, many of the change models contain nevertheless similar phases. For example, change planning before implementation is commonly emphasized for quite self-evident reasons (see for example the model presented by Koch et al., 2016, Figure 9). Similarly, many of the models also highlight the importance of institutionalizing the change after its implementation, i.e., making the changed status the new normal (model by Kotter, 1995, Figure 6).

The following sections present some of these change management models: sections 3.2.1 and 3.2.2 focus on organizational change models whereas 3.2.3 presents models that are more manufacturing oriented and hence serve management of physical changes. Effectiveness of change management from organizational and process perspective is discussed later in this report in section 4.2.

3.2.1 Kotter's 8-Step Change Model

One famous and widely referred change model for organizational changes is the "Kotter model". The model follows the previously mentioned emerging change trend which is based on organizations' change capabilities and highlights especially the early phases of

change, i.e. planning and preparation for change. Kotter (1995) has followed as over 100 companies ranging from small to large pursue to make themselves more competitive. Based on these explorations the model for organizational transformations was created (Figure 6). The model includes eight different steps which a company should undergo to be successful in their change efforts.

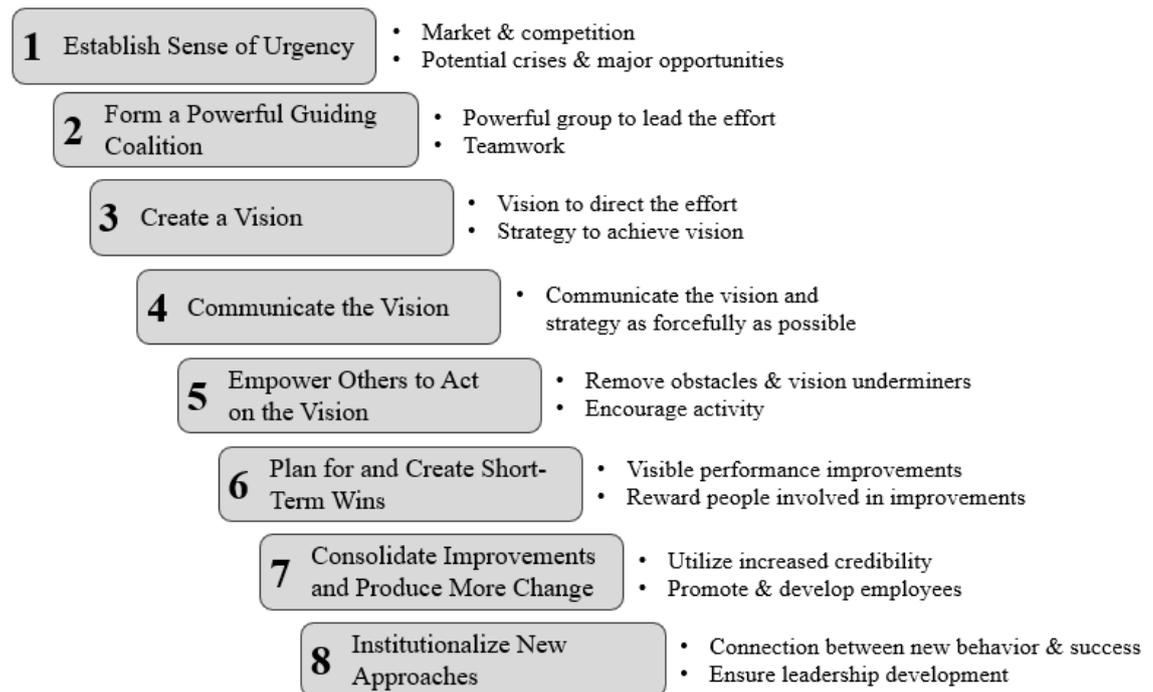


Figure 6. Kotter's 8 steps to transforming an organization (Kotter, 1995)

Kotter's model (Figure 6) start with creating a sense of urgency. According to the author, this should be done broadly and dramatically in order to get programs efficiently started and people to cooperate. Practically, 75 % of management in a company should be convinced that the current state of things is totally unacceptable. Even though a change usually starts with only couple of people, the leadership coalition grows as time goes by. Hence, in the second step a group with power should be formed around the change. Next, the coalition needs to develop a vision for the change, create a strategy that takes the company to the vision and then communicate the new vision like people's lives depend on it. (Kotter, 1995)

Once the vision is locked, any obstacles like people, attitudes or organizational structures should be removed. After this is done, people empowered by the coalition can start to act on the change – get involved and try and develop new ideas. To get people even more committed, short-term goals should be created so that people can get a sense of achievement, as big changes can take even months or years to implement. However, the coalition must be careful in not announcing victory too soon – unless new ways have truly become rooted, otherwise they are subject to fading out and old ways coming back. Thus, the urgency level should be kept high and vision clear right until the end. Finally, a connections should be established for the employees about the connection between new behavior and success, so that they understand how their own individual actions have helped in achieving the goals. (Kotter, 1995)

3.2.2 Kanter et al.'s Ten Commandments

Another widely referenced, practical approach to changes is the Ten Commandments by Kanter et al. (cited by By, 2005) presented in Figure 7. Similarly to Kotter's model, it emphasizes proper justification of the change, i.e. creating a sense of urgency related to the change, effective communication, involvement of individuals (coalition and political sponsorship) and institutionalizing the new way of working. (By, 2005) However, when compared to Kotter's steps the commandments give slightly more emphasis on analyzing the current situation before the change.

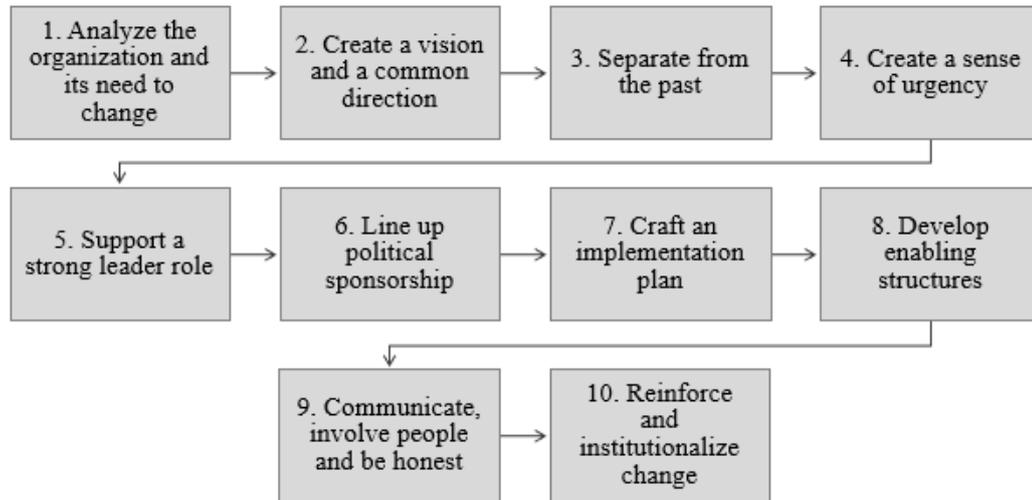


Figure 7. Kanter’s ten commandments for executing change (Kanter et al., 1992, cited by By, 2005)

3.2.3 Other models

Besides the traditional, widely referenced change management models of Kanter et al. and Kotter, literature presents also other practical models which aid companies in setting up a systematic change management process. One is for handling of Engineering Changes (EC) which can be defined as “*changes or modifications to released structure, behavior, function, or the relations between functions and behavior, or behavior and structure of a technical artefact*”. Hence, manufacturing process change for example is not an EC automatically, as the “technical artefacts” refer specifically to product changes of different extent. Engineering Change Management (ECM) is the control and execution of ECs. Figure 8 presents a process model for ECMs. (Hamraz et al., 2013) What is noteworthy of the model is that it contains a separate phase for evaluation of risks and impacts of different change possibilities and only after that the decision of the change implementation is done.

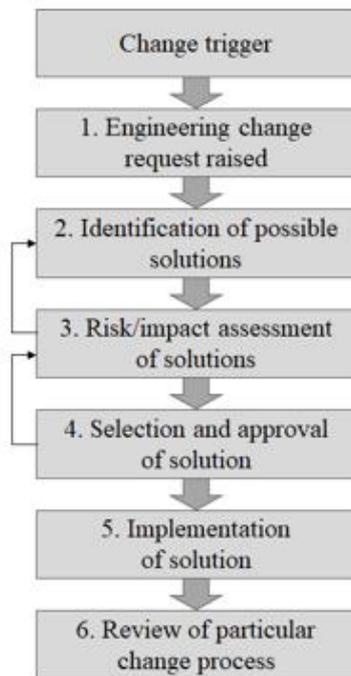


Figure 8. Engineering change management process (Hamraz et al., 2013)

Besides ECM, there are also other manufacturing related practical process models. Koch et al. (2016) derived an 8-step manufacturing change management process model (Figure 9) after evaluating a broad set of 42 different manufacturing-related change management process models from literature. These process models included ECM, among others. Similarly, as in the previously presented models (By, 2005; Kotter, 1995), here emphasis is given to preparation phases, identification of change sources and planning of change and its implementation.

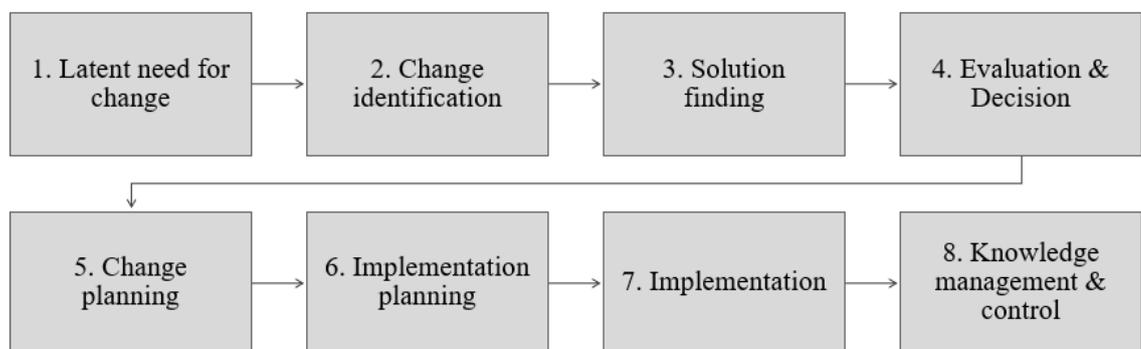


Figure 9. Manufacturing change management process (Koch et al., 2016)

3.3 Change leadership

Despite its importance, change management is not a simple task to organizations. According to Miller (2001) only 3 out of 10 changes are successful in achieving desired results. The reason behind unsuccessful changes can be for example bad strategic decisions or poor technology choices. Miller (2001) argues, however, that the main reason is failure in change execution. The failure could be avoided if leaders could implement and sustain the change long enough for the return on investment to realize. Indeed, change does not proceed automatically through predefined change process steps, but it needs to be led through them.

Similarly as with change models, there does not seem to be one universally agreed way to lead a change (Bamford & Daniel, 2005). Indeed, according to Moran & Brightman (2000) change management, especially in the case of an organizational change, is not actually about managing change, but rather about managing people. From this viewpoint as well, leadership is highly important in change management. Leaders need to personally commit to the change but at the same time allow open dialog about change content and its effects (Moran & Brightman, 2000).

When considering specific characteristics advantageous for change leaders, adaptability is one which Miller (2001) highlights. People with high adaptability are optimistic, self-assured, and collaborative as well as more likely to accept change strategies and undergo personal transition needed in question of a major change. Even though it is a paradox, leaders need to create a sense of stability to their employees but at the same time prepare them to adapt to future's changes (Moran & Brightman, 2000). Additionally, in organizations that are successful in change management, leaders seem to be very focused. They lead fewer initiatives than in unsuccessful organizations and they give as much, if not even more, emphasis on the consequences of an unsuccessful change compared to benefits. Serious consequences can be for example in changes which involve customers or shareholders. Besides being focused, prosperous change leaders are highly involved with the change and are unyielding in front of challenges. (Miller, 2001)

Kanter (2007), a well-known change management author and professor, presents seven enduring skills for change leaders (Figure 10). According to Kanter, good change leaders must have the ability to tune in to the environment to fully understand what is happening inside and outside of the organization. While doing this, leaders should evaluate everything they see and hear against the current business model – what fits and what does not. This way change needs can be identified early. Once the leaders understand the environment, they and the company act in, they should question everything they see and the assumptions they make to generate new ideas and ways of doing things.

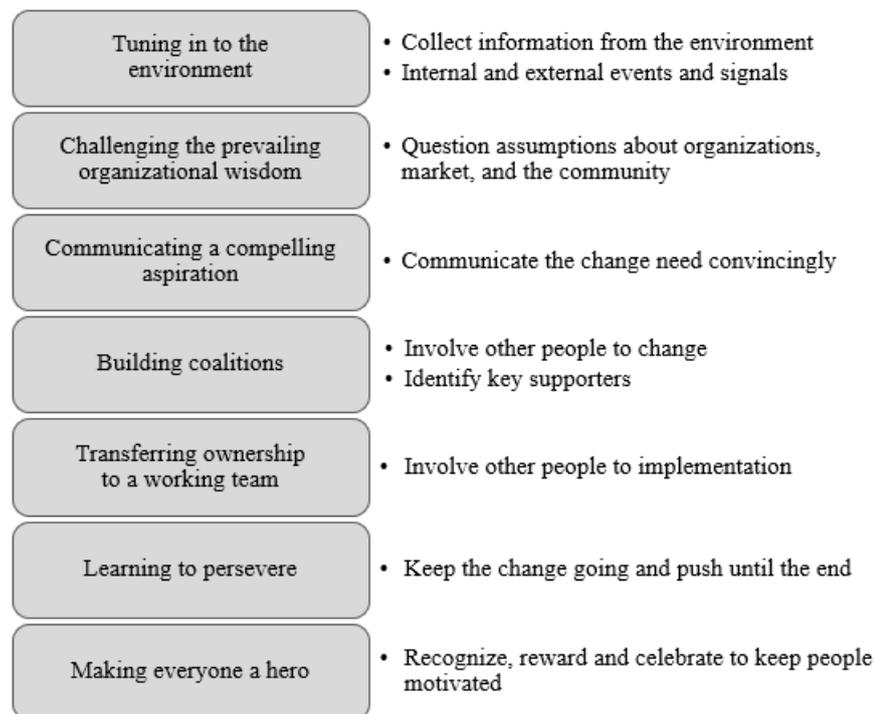


Figure 10. Kanter's seven enduring skills for change leaders (Kanter, 2007)

Once the ground work in Kanter's (2007) leadership model (Figure 10) is done, preparations for the actual change begin. Leaders must have the ability to communicate the change and convince people that it is needed to motivate people and to overcome resistance. Furthermore, even good leaders cannot make change happen alone, but they should be able to build coalitions for the change. Thereafter, ownership of the change can be transferred to people in the coalition and more people are involved in the change. However, good leaders must persevere the change, push the change and people involved until the change is fully implemented. Compared to for example Kotter's (1995)

viewpoint on change, Kanter emphasizes the perseverance stage far more. Finally, to keep people motivated, the leader should make everyone a hero. Recognizing people's accomplishments concludes that change but also motivates participants in future change efforts as well.

3.4 Changing organizational culture

Organizational culture is the shared beliefs, values, and meanings within the organization's members. In the core of culture are the basic assumptions of the individuals – how they relate to organization's environment and each other. (Austin & Claassen, 2008) Organizational climate, on the other hand, is the practices and procedures of the organization. Thus, culture is a deeper characteristic of an organization, even though it can be said to reflect the current climate. Practices can be seen and observed, unlike culture, even though it governs the behavior and actions of the organization. (Pervaiz, 1998)

Organization's performance, effectiveness, and the improvement of those, are tightly related to organizational culture (Austin & Claassen, 2008; Denison & Mishra, 1995). In addition, organizational culture influences the outcome of changes in the organization. (Austin & Claassen, 2008) However, the role of culture in changes is not clear. According to Pervaiz (1998), strong and homogenous culture gives high degree of control over organization's behavior and hence facilitate the behavior aligned with organizational principles. This enables successful implementation of changes. On the other hand, strong cultures with high uniformity and loyalty can also inhibit institutionalization of changes. Organizations with unclear cultural consensus can be more willing to try new things in order to achieve opportunities and also are more willing to take risks. (Austin & Claassen, 2008)

According to Austin & Claassen (2008), organizational culture can vary from highly formal to very in-formal culture. In-formal cultures have even a family-type of atmosphere which values relationships and teamwork. In these cultures, there are many times visionary individuals who act as the "father" of the family – making fast decision

and changes without negotiations. A role-oriented formal culture, on the other hand, is a structured environment where stability and order are emphasized. It is argued that formal culture, even though clear by procedures, does not necessarily foster critical thinking and hence can promote change resistance. Besides the level of formality, also other cultural aspects such as common values, vision, and strategy are seen important from the perspective of change and its resistance (Gill, 2003). Hence, managers should be able to affect the culture and change it towards a type in which instability is tolerated and change is seen as a necessity.

Leadership plays a big role in in managing and changing organizational culture. Leaders who understand the significance of culture and pursue to manage it are eventually more successful in their change initiatives (Austin & Claassen, 2008; Gill, 2003). Furthermore, leaders who listen and learn from the information they are given, who involve people and are relentless seem to facilitate cultural change more successfully. (Austin & Claassen, 2008) These qualifications are well in line with Kanter's view of good change leaders (Kanter, 2007), presented in the previous section.

3.5 Change resistance

Designing changes, for example new processes, may seem simple and straight forward on paper, but the full potential of a change cannot be captured if people do not accept it. No matter how good and well justified the change initiative is, it is very likely that some level of change resistance can arise. (Pereira et al., 2019) Thus, even though a common phenomenon, resistance to change should not be neglected for two main reasons. First, change resistance is something that can be managed (Jones & Van de Ven, 2016). And secondly, if left unmanaged resistance can slow down or even cause failure of the change initiative (Pereira et al., 2019).

Resistance can occur either at individual level or even on an organizational level. The individual's attitude towards change forms based on personality and individual's environment (Pereira et al., 2019). People might be afraid of the change, for instance there can be loss of status involved, be resistant by personalities or simply misunderstand the

concept of the change (Thomas et al., 2011). Others might not be willing to change the ‘status quo’ which can be related to loss of power, status, control or even losing of job (Pereira et al., 2019). Surprisingly, according to a study conducted by Pereira et al. (2019), employees’ hierarchical position does not affect the level of resistance.

When reviewing resistance on an individual level, Jones & Van de Ven (2016) describe that resistance consists of two dimensions: people’s behavior and cognition. Behavior describes the actions related to change – communication about change, influencing the change content and action taken to either inhibit or facilitate a change. Cognitive side of resistance contains the emotional and intentional aspects related to change.

Change resistance and acceptance can be divided into phases. Figure 11 presents the Kübler-Ross change curve which was originally compiled to describe the psychological changes of terminally ill patients – what was the process for them to come in terms with their sickness. However, the same process can be generalized to people going over any change. Literature presents multiple different models for the change curve, but the one from Kübler-Ross can be considered as the base model. In the Kübler-Ross change curve there are altogether five different phases. (Cameron & Green, 2009)

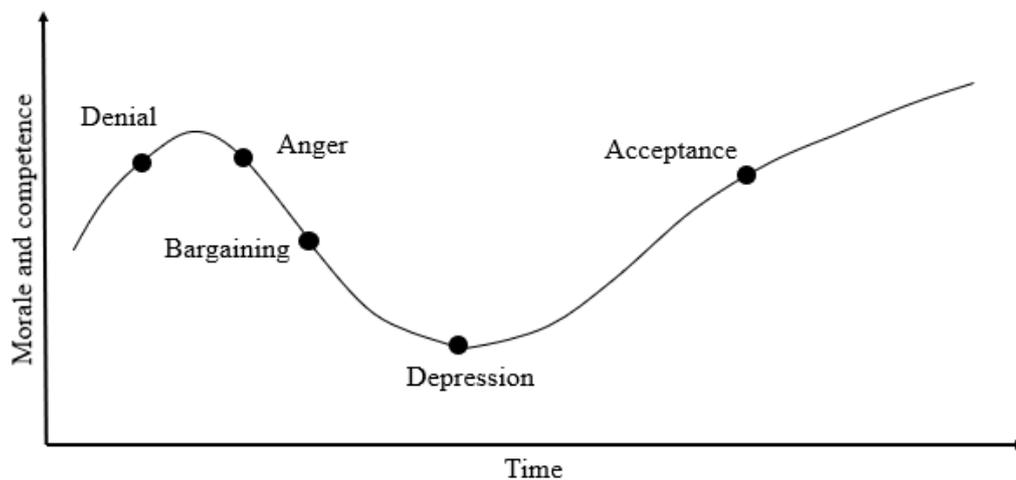


Figure 11. Kübler-Ross change curve (Cameron & Green, 2009)

First stage of the change curve (Figure 11) is denial. People do not want to hear what they are told and are even in disbelief. People do not want to be exposed to the bad news and

further think about the possible consequences. However, once they allow themselves to understand what is happening, next phase of anger follows. Questions such as ‘Why me?’ and ‘How can this be happening to me?’ might be asked. It is typical that in this phase people are looking for someone to blame, a scapegoat. Some try to find it externally, but some individuals might also blame themselves. (Cameron & Green, 2009)

After anger starts bargaining. By this, people might be attempting to reserve some control in the changing situation. Nevertheless, this stage is still mainly about disputing the facts. Once it becomes evident that no bargaining will get people out of the situation, comes depression. To aggravate, in this stage people are grieving for the loss of current state of things. When talking about change in general, for example in an organization, this phase might be expressed as sense of pointlessness. Finally, if people can overcome the depression and felt pointlessness, quiet acceptance follows. People come in terms of the changing situation are prepared for the change. (Cameron & Green, 2009)

Leadership is one clear factor that can help in managing change resistance. Based on studies, trust in management is a practical factor affecting change resistance positively. As change implementation progresses, the positive effect of trust even increases. (Pereira et al., 2019) In addition, especially supportive leadership decreases change resistance over time (Jones & Van de Ven, 2016). Yet another factor affecting change acceptance is communication. According to Thomas et al. (2011) degenerative, hostile communication can create juxtaposition and hence reduce change acceptance. On the other hand, good communication can also create trust, so the factors support one another.

According to a study by Jones & Van de Ven (2016), time has a negative impact on change resistance – thus time will not heal all wounds after all. If change resistance is ignored, it might negatively affect organization’s effectiveness and decrease individual’s commitment to the entire organization. Consequently, resistance should not be viewed as a negative thing, a rebellion that must be defeated, but rather as a natural phenomenon that is part of the change process and related negotiations (Thomas et al., 2011).

4 EFFECTIVENESS OF ORGANIZATIONS AND PROCESSES

Effectiveness is the external, strategic performance of a unit, for example an organization or company (Taskinen & Smeds, 1999). ISO 9000 standard (ISO 9000, 2015) on the other hand defines effectiveness shortly as the “*extent to which planned activities are realized and planned results are achieved*”. In other words, effective organizations “do the right things”, develop correct processes and pursue strategically justified targets. Efficiency, to which effectiveness is sometimes mixed up with, is the internal, operational performance of a unit. Efficient organizations “do things right” and successfully reach their goals with beneficial input-output ratio. (Taskinen & Smeds, 1999)

Performance and effectiveness of an organization are tightly related to its management of key processes from planning to implementation (Sussland, 2003). One example of these key processes is change management. As previously stated, successful and effective change management is a clear competitive benefit that supports cost-efficiency and quality (Koch et al., 2016). Hence, in this section effectiveness of an organization is explored from two main angles: organizations in change and change management centered process perspective.

4.1 Effective organizations and change

Two types of perspectives on organizational effectiveness and change can be found from literature. Rieley & Clarkson (2001) argue that if organizations are in constant change, which seems to be the case in many industries today and in ever-increasing pace, they cannot be effective. They argue, as Figure 12 depicts, that as the level of organizational change increases, simultaneously the potential for organizational efficiency decreases. They justify it by claiming that as people and work content change, organizational experience is lost, and common vision is unclear which further leads to ineffectiveness. However, By (2005) claims the opposite. He argues that continuous change is vital to organizations, and it can become a routine as much as any other habit or procedure. Change is a natural phenomenon that people need to be able to go through.

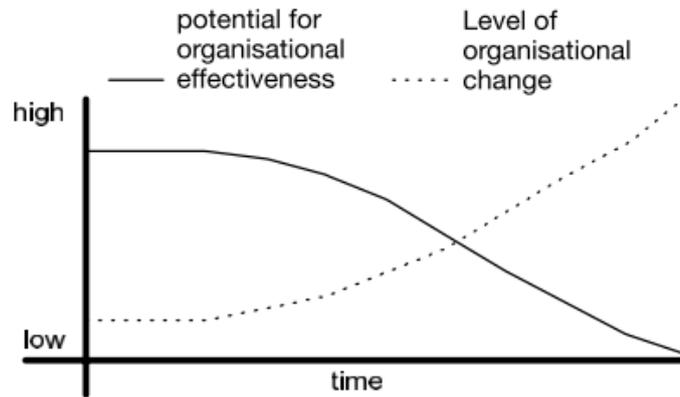


Figure 12. The relation of organizational effectiveness and change (Rieley & Clarkson, 2001)

Besides just organizations as such, effectiveness can be also associated with organizational change. Clear strategies and especially leadership are in the center of effective organizational changes. These cornerstones ensure that the entire organization has common objectives and a joint path to achieve them. (Sussland, 2003) Also Bamford & Daniel (2005) emphasize leadership in particularly changing organizations. They claim that effective leadership could create higher commitment for the organizations to the change. Gill (2003) continues by highlights leadership too – good management processes are hardly enough, but also effective leadership is needed to institutionalize changes. Effective leadership that supports change management requires both emotional and cognitive intelligence. According to Kaynak (2003) effective leadership was also recognized to have indirect effect on firm performance, so proper leadership can have significant effects even on company level.

Leadership type can also predict team effectiveness. According to a study by Pearce & Sims (2002), shared leadership, that is leadership emanated from team members instead of one chosen leader, predicts team effectiveness. The research concluded that shared leadership could be considered especially in empowered teams in which complex tasks are managed with high autonomy and freedom to decision-making. Change management teams were used as an example of such team. However, it must be noted that the results did not fully exclude the more commonly used vertical leadership either.

Besides leaders, naturally also quality of the underlying development initiatives as well as the composition of team affects organizational effectiveness. Development programs should be planned so that they attract and motivate people (Poulet, 1997). Indeed, especially the quality of program planning phase seems to determine the effectiveness of its management in general. Here again, having clear company-wide mission, vision and strategy helps. (Ates et al., 2013) When it comes to teams, Poulet (1997) makes an apt comparison between effective teams and cars: similarly, as a car will not fulfil its objectives and execute its strategy only by fueling it up, a team is not most effective when it is formed randomly. A team consisting of innovative and energetic people will become a driving force taking organization to the planned direction in any organizational program, whether it is a change project or any other development plan.

In addition, people's perception to change and the degree of change resistance are also natural factors that affect organization, its effectiveness and adaptability. Indeed, resistance to change seems to have negative correlation with employee's commitment but also with organization's effectiveness. Moreover, the correlation only increases over time. (Jones & Van de Ven, 2016) This further highlights the significance of people and individuals in change and how change resistance should not be neglected, which was already discussed in section 3.5.

4.2 Process perspective to effectiveness & change management

Also, processes can affect the effectiveness of an organization. Change management, for one, is an important business process as it enables adaptation and thereby secures competitiveness of companies (Kaplan et al., 2018; Molina-Azorín et al., 2009). When multiple organizations undergo process changes simultaneously without aligning change initiatives, the company-wide framework of processes and procedures can become a patchwork (Sussland, 2003). Indeed, as according to Miller (2001) up to 70 % of change initiatives fail to achieve their goals, companies should pay attention to the effectiveness of their change management processes.

Also Armistead et al. (1999) recognize the challenges of Business Process Management (BPM) for organizational effectiveness. Unorganized development of processes can have a negative impact on the effectiveness of an organization or even entire company (Armistead et al., 1999; Sussland, 2003). The inefficiency can be caused also from the opposite direction – badly managed organizational change can also impair processes (Wincek et al., 2015). One possible way to overcome this is to implement shared management practices to increase process efficiency and eventually company effectiveness. This could be done for example by creating clear company-wide strategies and leadership. (Sussland, 2003)

According to Guimaraes & Armstrong (1998) there are certain pre-requisites for success in effective change management. Firstly, a change should be in line with the company objectives and customer requirements and people as well as departments affected by the change should be involved in the initiative. In addition, risks and benefits related to the change should be balanced, progress of the change should be followed-up and finally, change should be communicated throughout the organization. Indeed, according to their field study, companies which rated above average in these characteristics were also significantly more effective in implementing changes. Furthermore, another finding of the study was that companies that have above average effectiveness in change management also have higher performance, i.e., they have more satisfied customers, higher market share, revenue, and profits.

From process perspective, Koch et al., (2016) list some requirements and examples for an effective change management as well (Table 2). The list has been created from the basis of a manufacturing change (previously presented in section 3.2.3) but could be applicable to any physical type of a change. The list further supports the importance of PBM as highlighted by (Armistead et al., 1999) as well as the interpretation made by Sussland (2003) about the challenge of process patchwork: Firstly, having set up processes for different activities can improve effectiveness of an organization. Furthermore, when designing these processes, they should be aligned cross-organizationally with different process interphases acknowledged too. (Koch et al., 2016)

Table 2. Aspects for effective change management (Koch et al., 2016)

Effectiveness aspect	Example requirements
Holistic view	Considers different interphases to other departments
Transparency and traceability	Clear responsibilities, transparent approach
Practicability and applicability	Enterprise-independent applications, simple methods that are easy to use
Process orientation	Processes for activities and communication
Proactivity	Identification of changes
Analytic capabilities	The cause and different impacts for the change are identified
Knowledge management	Documentation, control for lessons learned

4.3 The impact of culture on effectiveness

Besides the effectiveness in implementing product and process changes, Guimaraes & Armstrong (1998) discuss that another important factor for the high performance of companies could be the effectiveness in implementing cultural changes. Furthermore, they speculate whether effective change of company culture is the ultimate cause behind any change initiatives. This speculation is in line with Austin & Claassen's (2008) argument that acknowledgement and management of culture supports success in change initiatives. Also Moran & Brightman (2000) discuss the role of culture in effective changes: supportive culture helps people to cope with change and any emotions and reactions it might create.

Certain characteristics and values of an organizational culture can also predict organization's effectiveness. These are involvement of people, consistency, adaptability or in other words capability to change and finally, sense of a mission (Denison & Mishra, 1995). With these traits organizations are capable to both internal integration but also to external adaptation, in other words to find change and stability at the same time (Denison & Mishra, 1995; Pervaiz, 1998).

5 CHANGE AND QUALITY MANAGEMENT IN THE CASE COMPANY

The case company of the thesis is an international exchange-listed company working in the field of renewable materials. Its main products are different boards such as liquid packaging and carton boards, kraftliner, fluting, biomaterials such as pulp and lignin, and paper. The company has production sites in 17 countries globally and employs approximately 23 000 people, most of which in Finland, Sweden, and China. (The Company Annual Report 2020, n.d) In 2020 the turnover of the company was 8 553 million euros (The Company, n.d.a).

The company has been divided into six different divisions. The mill site in question belongs to Packaging Materials division and is one of the world's largest producers of consumer packaging board. The mill site has two production units and there altogether two pulp manufacturing departments, four packaging board departments, separate polyethylene (PE) extrusion departments, and a paper department. (The Company, n.d.b) As the production at the mill site includes products for direct food contact, the site must comply with relevant food safety regulations. In short, the food packaging materials must not cause changes to the food product or cause any hazards to consumers.

5.1 Quality management

According to the company's quality policy, the case site's target is to be in World Class level in all of their mill operations. This is achieved by acting according to the company's purpose (1) and value (2):

1. Do good for the people and the planet. Replace fossil-based materials with renewable solutions.
2. Lead and Do what's right.

On practical level the quality management methodology at the company is an ISO 9001 standard based quality management system. However, as the standard is shifting towards

total quality management approach within latest updates (Martínez-Costa et al., 2009), the company's QMS has many similarities also with TQM. In practice these are for example customer focus/satisfaction, continuous improvement, and engagement of employees. All the case company's certified ISO standards, including also other than quality related standards, are listed in Table 3. Certifications started in 1992 with the ISO 9001 quality standard and expanded from there to other standards according to the presented certification year. The list below includes only valid certifications and hence excludes any previous certificates prior to ISO standards.

Table 3. Certifications of the company

Standard	Description	Year of Certification
ISO 9001:2015	Quality management systems. Requirements.	1992
ISO 14001:2015	Environmental management systems. Requirements with guidance for use.	1997
ISO 45001:2018	Occupational health and safety management systems. Requirements with guidance for use.	2006
FSSC 22000 ¹⁾	Food Safety System Certification	2014
ISO 22000:2018	Food safety management systems. Requirements for any organization in the food chain.	2004
ISO 50001:2018	Energy management systems. Requirements with guidance for use.	2015
FDA IMS 2017	FDA Standards for Single-Service Containers & Closures for Milk & Milk Products	2007

¹⁾ Includes a technical specification as well as the ISO 22000:2018 certification
 FDA = Food and Drug Administration

Besides the standards, the mill site's quality management operations are based on the corporation and division's strategies and principles. The objective for quality management operations is to support business and achievement of goals at the mill site. Furthermore, quality management aims at improving the site's operations and processes.

The performance of quality management operations is followed-up by given metrics, such as profitability, cost-efficiency, customer satisfaction, safety, and sustainability.

The quality management operations aim also for continuous improvement. For the mill site this means recognition of best practices and distributing as well as applying those throughout organizations and teams. The general level description of how CI is used in developing daily work and operative models is presented in Figure 13.

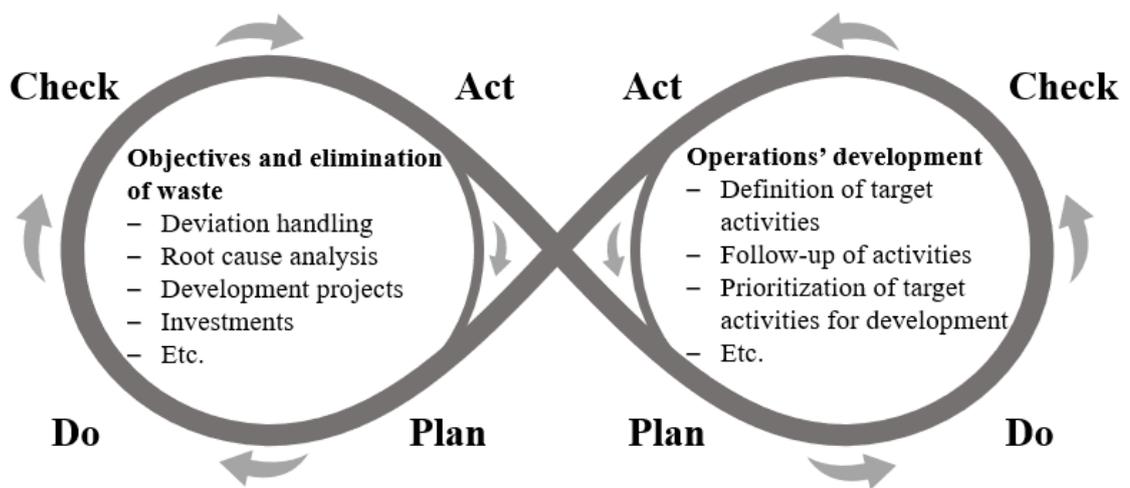


Figure 13. Case company's continuous improvement scheme

As Figure 13 above shows, the continuous improvement activities at the case company follow an infinite loop combining two separate PDCA loops (previously presented in section 2.2.2). The loop on the left covers daily processes regarding operations, such as deviation handling and root cause analysis processes. If within these day-to-day processes an incident requiring further inspection or development is identified, the infinite loop moves to the right loop containing development activities. The right loop is circled until development is finished and the loop returns to the daily operations loop. Hence, it could be said the left loop is cycled in a frequent manner and when the situation so demands, the infinite loop introduces the right development loop into the process. Table 4 below lists further CI activities that can originate improvement needs and possibilities in the left loop.

Table 4. Case company's continuous improvement activities

Activity	Description
Suggestion scheme and initiatives	Process of collecting improvement ideas, evaluating, and executing of those as well as rewarding people coming up with the idea. The objective is to canalize the expertise and creativity of employees to create additional value.
Audits	The objective is to ensure that business management processes are in accordance with requirements, efficient, comprehensive and in line with instructions and practice. In addition, objects for improvement can be identified in audits. Audits are further divided to internal, external, and supplier audits.
Management review	Follow-up of fulfilling of targets, practicality of management systems as well as identification of development needs in units, organizations, and teams.
Corrective and preventative actions	Corrective actions aim to remove a root cause of a problem affecting operations or products. Preventative actions aim to prevent an issue from happening.
Quality and development teams	Regional or process-based teams that develop operations and products as well as for solve any challenges at manufacturing units and departments.
Management system	The management system includes approved quality, product safety, environmental, energy management, management of wood origin and supply chain, occupational health as well as work safety instructions. Management system covers also the different standards listed in Table 3 and the compliance with those.

Once the objective is clear and analyzed, the round continues to the right loop. There, again, with the PCDA method the chosen objective is defined in more detail, followed-up and if needed, prioritized. Once the PCDA round for the development is done, the loop can start again from the center. This way the company keeps track of their development needs and ensures that needed development actions are taken.

5.2 Change management

The company has a change management process in place. The description of the process at the start of the thesis study is shown in Figure 14. The change starts as a need for a change is identified and the change information is documented to a change log. The log

is maintained on an Excel sheet and each manufacturing department has its own log. Documented information about the change includes for example change description, justification, responsible person and mapping possible risk types which the change might include.

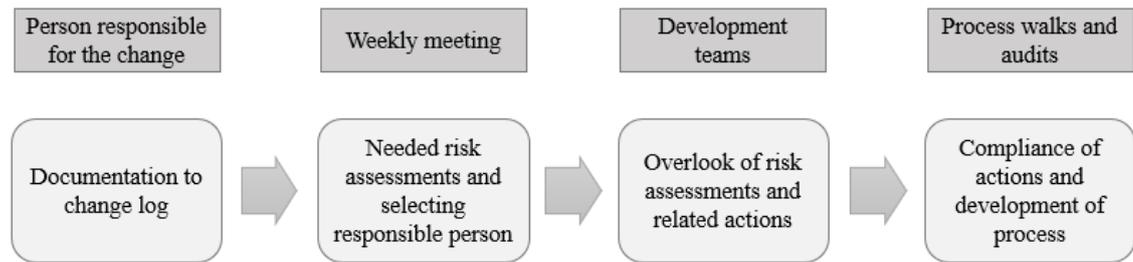


Figure 14. Change management process description in the beginning of the thesis

The change log is checked jointly in production unit's weekly meetings. Production manager is the person in charge of the meetings as well as change management topic on the agenda. In the meetings, topical changes are discussed jointly with a team consisting of production, occupational safety, and maintenance personnel at the very least. Rest of the participants might vary based on topics on agenda. Weekly meeting evaluates possible impacts of the change and decides which risk assessments should be updated.

For every required risk assessment, a person in charge is appointed by the weekly meeting. In many cases, however, there is one person who is responsible for the change and updating all risk assessments it might affect. Table 5 lists all the different risk assessment types related to change management. Each of the Excel-based risk assessments is a separate spreadsheet document stored in the company intranet. The appointed person takes care that the risk assessment in questions will be updated, and any necessary actions are taken before or during change implementation.

Table 5. Risk assessments related to change management

Risk assessment theme	Location
Occupational safety	Separate system
Food safety (department specific)	Excel-based FMEA
Food safety (mill level assessment)	Excel-based FMEA
Environment & energy	Excel-based environmental aspects assessment
Quality, efficiency, financial and HR	Excel-based FMEA
Lifecycle management and master data	Excel-based risk assessment

HR = Human Resources, FMEA = Failure Mode and Effects Analysis

Besides weekly meetings, there are also development teams at each department (separate for occupational safety, quality, efficiency, maintenance, and environment & energy) that are arranged monthly. The teams are responsible for overseeing theme-specifically past and upcoming changes, that relevant risk assessments are updated, and that all planned mitigation actions have been performed. Finally, process walks and audits are the means to ensure that change management follows the described process, and the process is developed further, if needed.

The risk assessments are stored in a few different locations in the company intranet. The change log and quality, efficiency, financial and HR FMEA are stored under Management and follow-up site, food safety and environment & energy assessment under Business management site. Both site locations have individual sub-site for each manufacturing department and each department has own risk assessment documents, respectively. Lifecycle management assessments are located to a third site considering investments. Occupational safety risk system is a separate, browser-based program, hence located apart from the rest of the assessments. This storage structure is described in Figure 15.

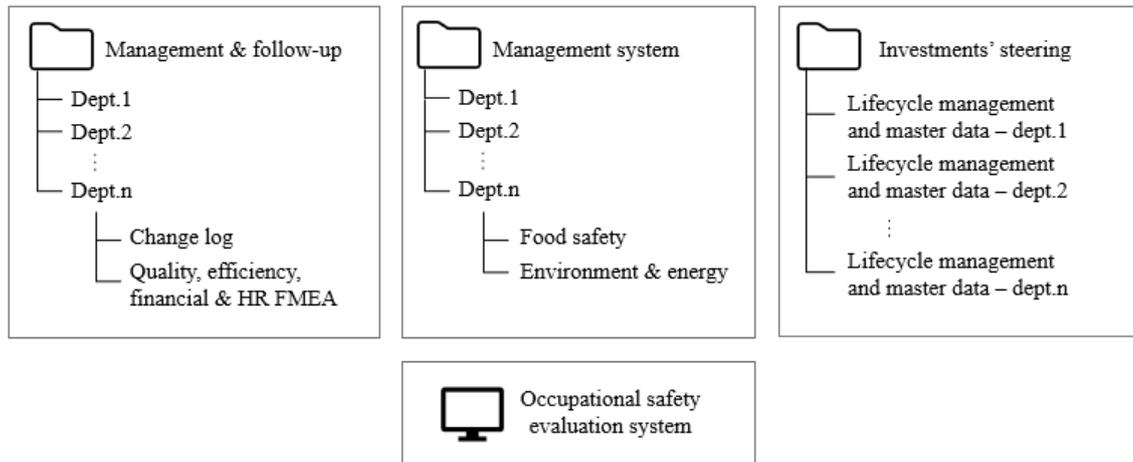


Figure 15. Folder structure of change management related documents

Thus, it can be summarized that regarding a change, information is stored in four different folder/system locations in maximum six different files and one system. However, in practice most of the changes require updating of only a few risk assessments.

In general, the target for the change management process is that every change affecting a manufacturing department is documented to department's change log. These changes might arise also from other processes than the department's internal change management activity. These processes include for example investment and major repair process, project management process as well as maintenance and production line shutdown planning processes. Each of these aforementioned processes have their own, dedicated documentation, hence the information must be transferred manually to the change log. The objective is that change log presents all changes, major and minor, taking place in the department and hence acts as a historical log for events in the department.

6 CHANGE MANAGEMENT PROCESS ENHANCEMENT

As stated, the objective for the thesis was to create a construction for enhancing the case company's change management process. In order to identify the most important aspects needing development, interviews were conducted. This chapter describes the interviews, their results as well as development of the construction.

6.1 Interviews

Interviews were conducted in the beginning of the study. The objective for the interviews was to understand the current state of change management. As there already was a harmonized change management process in place, another object for evaluation was if the process was followed similarly in every department – and if not, what is the process in practice. Finally, possible challenges with the current way of working were to be assessed as well: are there some identified challenges with the process and whether there were any enhancement ideas or needs regarding change management.

Preparations for the interviews included listing all related staff to be interviewed as well as interview questions. In the end, two separate interview rounds were conducted. The first round included variety of people working with change management – production and development managers from all production units of the mill site and people working with related risk assessment themes. These themes included occupational safety, food safety, environment, and energy efficiency. In addition, quality managers from four different mill sites were interviewed to learn how other sites handle change management. The sites belong to the same division as the case company – two sites were in Finland and two in Sweden. The interviewees of the second round consisted of day and shift supervisors from different production departments. In the end, altogether 40 people were interviewed, 29 in the first round and 11 on the second round. Interview questions for both rounds are listed in Appendix 1 and Appendix 2, respectively.

As previously stated, the interviews were organized as a semi-structured interview. As it was important to deeply understand the current state of change management, its

challenges and people's needs, semi-structured interview offered the flexibility for any additional questions or discussions. On the other hand, having a predefined list of questions helped interviewees to prepare for the interview and secured that same themes were covered with each and every interviewee. Hence, in this case all prepared questions were asked in the planned order, but additional questions were asked as well, depending on the direction of the discussion.

6.1.1 Results of first round of interviews

In general, all production departments of the mill site had in place the current change management process as described in section 5.2. However, some sites had taken the process into use only a few weeks before the time of the interview, whereas other departments had used the process for over a year. Furthermore, there was to some variability in how the process was used. Some departments used it as described, when on the other hand some departments used only the change log and part of the described risk assessments. All the departments had change management on their weekly and development meetings' agenda, but the discussion seemed to differ. Again, there were departments which reviewed up-coming changes in the meetings and departments which raised already implemented changes to discussion retrospectively. The latter, however, was in some cases reported to originate from the fact that the department had just recently implemented the change management process and they were currently bringing older changes, their documentation and risk assessments, up to date.

To drill down deeper into the interview results, the results were first summarized so that similar interview findings were counted to find out the occurrence of certain result. Next, the results were categorized to identified challenges, enhancement ideas, and current good aspects of the process, in accordance with the interview questions. Similarly, the findings were divided into different themes to better understand the overview of results – which themes recur. This way the findings and themes could be ranked. The overview of results is presented in Table 6.

Table 6. Interview results based on top 3 themes in each category

Challenges	Enhancement ideas	Current good aspects
1. Risk assessments	1. Process	1. Risk assessments
2. Process	2. Stakeholders and supporting teams ¹	2. Documentation
3. Documentation	3. Roles	3. Stakeholders and supporting teams ¹
	3. Documentation	

¹Supporting teams are e.g., steering groups and development teams which oversee and support change planning and execution.

Based on the result summary, top three themes in change management challenges were risk assessments, process, and documentation. Overall, the respondents reported far more challenges than enhancement ideas or good aspects in the current way of working. Most of the enhancement ideas covered the themes of process, stakeholders and change management supporting teams, and roles and documentation on the shared third place. Top themes about current good ways of working were about risk assessments, documentation and stakeholders and change management supporting teams.

Regarding change management challenges, the most recurring problem that was reported by over 90 % of the interviewed managers was that they are still learning to work with the current change management process in their day-to-day life. Similarly, almost half of the managers said that there seems to be too many risk assessments tables. With multiple different risk assessment templates there is a great possibility that usage, for example filling of different columns, can vary among users. They also wished people would be more proactive in updating risk assessments as currently they feel people must be reminded about it.

“We still need more repetition with risk assessments so that evaluating risks regarding a change becomes a routine”.

Over 60 % of managers reported that they as well as their subordinates seem to be unsure about the threshold for documentation – which changes should be documented to change log? Furthermore, updating the change log required constant reminding. In the big picture the process was seen as copy-pasting same information between multiple different

documents and systems, such the Enterprise Resource Planning system (ERP) and production system. Over 30 % of the managers felt also unsure whether the mitigative actions from risk assessments are all truly performed. As there are so many different risk assessment documents, there is no transparency to all planned actions and their statuses.

For the enhancement ideas, over third of all interviewees reported that they wish for better change management culture where people would be more aware of the process and change their thinking from reactive to proactive. Similarly, interviewees raised that production personnel working in shifts should be more active and also utilized more in the change management process, for example in risk assessments and weekly meeting discussions. The background for this was that operators who work closely with the production line have a lot of practical know-how that is valuable in evaluations.

“The most efficient way of working is by proactive rather than reactive actions.”

Nearly a fifth of respondents said they would improve the follow-up of changes. For example, according to interviews there had been cases where after change implementation the outcome of the change had not been evaluated. Thereby, it was not noticed that the change had had unknown effects and would have needed still some further actions. Finally, four respondents wished for a simple, clear change management process that would give more support to the manufacturing department.

“In change management we need a process that supports the production departments in managing changes, not the other way around that the department supports the process.”

For current good aspects interviewees mentioned the fact that there is a change management process in the first place, and it includes risk assessments. In addition, respondents found it as a positive aspect that there is one clear place where all changes are documented (the change logs). Risk assessments were praised as well – *“once a group*

of people with sufficient knowledge about the topic comes together, the quality of the assessments is very high”.

6.1.2 Second round of interviews

Within the first round of interviews most of the production managers seemed interested in the topic and indicated that proactive change management and risk identification is important. However, some of the interviewed managers demanded for more active participation from their subordinates. Hence, to get an even better understanding about the change management culture in the production departments from the subordinates' point of view, second round of interviews was conducted for shift and day supervisors. The objective for the second round was to learn how they were introduced to the current change management process, what is their impression about the weekly and development team meetings and what they see as a challenge. Thus, the interview questions were slightly modified for this second round of interviews (as shown in Appendix 2). The interview was conducted as semi-structured interview, similarly as the first round.

For these interviews altogether 11 employees were interviewed: three shift supervisors and eight day supervisors so that at least one person was interviewed from each of the production department. Number of interviewed shift supervisors was lower compared to the first round of interview due to the supplementary nature of the second round. In addition, during the first shift supervisor interviews it became clear that currently they do not participate to the change management process when it comes to for example the weekly meetings and using the change log. Hence, interviews were finally targeted more to day supervisors, who participate in the weekly and some development team meetings on regular basis.

Similarly, as in the first round of interviews also the results of second round were grouped based on the answer to find out the occurrence. It must be noted that the interviews in the second round were shorter than in the first, thus resulting in less single results. In general, the results confirmed main findings of the first round of interviews. According to the interview, practices vary within different departments. For example, even though change

log is on the harmonized agenda of each weekly and development team meeting, the discussion about changes varies. Identifying changes is seen challenging and the process overall either as a bit unclear or foreign.

Third of the respondents said they are not very familiar or confident with the change management process. However, another third used the process precisely by the book. Over half of the respondents did not remember receiving any training or introduction to change management. They further speculated that there either was no such session, they could not attend to it due to other urgent tasks or had already forgotten it. Considering that the process has been implemented quite recently, approximately a year ago, the finding was slightly surprising. On the other hand, one respondent praised the training session their department received about the change management process.

Roughly third of respondents said they see identification of changes as the biggest challenge in change management. Workdays are hectic which many times according to interviewees “*does not leave you time to think*”. In other words, most of workday is spent running from one urgent task to another and tasks like documentation falls easily behind.

When the interviewees were asked how they would improve the process, almost 30 % of respondents demanded for more simpler process where documents are in one location instead of scattered to multiple different intranet sites: “*Evaluation of a risk usually starts with the challenge of finding the right document*”. Two respondents highlighted risk assessments, saying those could be lighter to fill. Single interviewees also said that the institutionalization of the new process is still under work and each employee should be motivated to the process.

In the end, the results confirmed that challenges regarding change management at production site are very similar between managers and shift supervisors. People have hard time identifying changes and the process is not routine to all. Thus, the second round fulfilled its objectives by supporting the findings of the first round.

Based on the results from the two interview rounds, the themes chosen for further development were the overall process especially from the documentation perspective (regarding both change log and risk assessments). Furthermore, the results indicated that a system combining both change documentation as well as risk assessments could indeed enhance the process the way interviewees wished for: By decreasing manual transfer of information and by harmonizing the different risk assessment templates. With all change management process related information in one place, also transparency could be increased. Hence, the change management system to be developed would form major part of the study construct.

6.2 Process enhancement: Change and risk assessment documentation

To enhance the change management process, and its related documentation in particular, the target was to create one joint system that would support the systematic execution of change management process throughout the production units. In addition, it was seen important to bring also risk assessments to the same system so that the process and its documentation would be transparent and efficient. Before the start of the system development, a few general requirements were defined. The system objectives and requirements are summarized in Table 7 with corresponding justifications. In addition, after the interviews a process diagram (presented in Appendix 3) was compiled of the process to create a more detailed visualization of the process, its steps, and roles. The process diagram form made it also easier to compare the model with workflows presented in literature.

Table 7. Objectives and requirements for the new documentation system

Objective	Requirement	Justification
Moving the change log from department-specific Excel sheets to one, joint digital solution.	Digital solution should be a system already in use at the mill site and accessible to all.	No additional costs, users are already familiar with the tool. Every employee at the department has access to the system and can thus document changes.
	Digital solution should be usable with the company credentials.	System is easier to access if same company credentials can be used, no new ID or passwords to remember.
	Digital solution should allow integration to mill site reporting systems, for example PowerBI or similar.	In the future ability to create reports effortlessly and combine data from different data sources. Supports data-driven decision-making.
	Filtering of results should be possible.	Easy access to relevant data for every department, despite common system.
Moving risk assessments from separate documents to the change management system.	Decrease the amount of related but separate risk assessment documents	Increased transparency and information flow, easiness of use also to infrequent users
	“One glance” visibility to a change, its risks, and the assessment	Easy access to relevant data for every department, improved transparency, and information flow
	Ability to browse and filter risks related to changes, based on for example risk type	Easy access to relevant data for every department, improved transparency, and information flow

6.2.1 Selection of documentation system for development

With the set objectives and requirements, digital solutions were practically narrowed down to systems provided by Microsoft: SharePoint and PowerApps. SharePoint is a collaboration platform used in web browser, that allows users to manage different types of content, for example files, data, news and other resources, and share it. SharePoint is highly configurable and thus usable in many different circumstances. (Microsoft, n.d.a). At the case company, SharePoint is used as an intranet, where different departments and teams have collaboration sites. One solution supported by these sites is SharePoint lists that resemble Excel spreadsheets. The main difference to Excel, however, is the user-friendly interphase and the way to add or modify items on the list.

PowerApps is a system that provides development of applications. The development requires only minor amount of code-based development; thus, it can be used also by non-software developers. (Microsoft, n.d.b) Similarly as SharePoint, PowerApps has a simple user interphase, and it is therefore easy to learn and use.

Microsoft enables integration between SharePoint and PowerApps, which means that SharePoint lists can be edited through an application created with PowerApps. This enables flexibility and vast customization possibilities when it comes to collecting, storing, and presenting data. (Microsoft, n.d.c) Indeed, the company had utilized SharePoint and PowerApps in different solutions already previously and with good results. Thus, SharePoint list with PowerApps integration was chosen as the development subject for the new change log including risk assessments.

6.2.2 Change management system created with PowerApps and SharePoint

Construction of the thesis, the change management system development was started by creation of SharePoint lists. Three lists were created: one for change-specific information (to replace the change log), second for risk assessments (to replace the risk assessment Excels) and third for maintaining the relationship between changes and risks. As one requirement for the system was that there should be visibility between change and its risks, in the end two-way “many-to-many” linking was enabled. In practice this means that a change can be associated with multiple risks and vice versa one risk can be associated with multiple changes.

The described “many-to-many” linking enables flexible management of changes but also risks: In the system also non-change related risks could be documented, for example environmental or food safety risks caused by the operations in general. These risk assessments must be maintained according to corresponding ISO standards, and they might not have anything to do with changes in the first place. However, the case company could implement changes that affect already evaluated risks and hence the upkeep of all risk assessments was included in the system. This allows firstly transparent management of both changes and risks without documenting same things in multiple locations, but also

discarding of multiple Excel spreadsheets from the process. One Excel-based risk assessment remained in the process due to technical reasons along with the occupational safety risk assessment tool. However, direct links to both were inserted into the system so that despite the external location, the system would still support the process as far as possible. Besides risks, also documentation of possibilities was enabled in the system, in accordance with ISO 9001 (2015).

Once the system was set up and its technical functionality was confirmed, end-user testing was conducted. The main objective of testing was to confirm the concept: Do the different system views fulfil the needs of each change management process step and support actions to be performed? Such process steps are for example review of changes in weekly meetings and in development team meetings (process steps were mentioned in Figure 14). Thus, the end-users selected for the testing were development and production managers, as they are responsible for implementing process enhancements to their department as well as change management's daily execution. Once testing was finished, the system was updated based on findings and feedback and otherwise finalized regarding for example dropdown lists, filtering, and other fine-tuning. Finally, end-user documentation, such as instructions, were created.

Thus, to summarize, the construction for the study was a comprehensive change management system developed for the case company. However, as it has been mentioned multiple times, implementation of the construct was not within the scope of the thesis. Instead, it will be carried out later during 2021 by the company's development functions.

7 DISCUSSION

Meeting customer demands is in the center of successful quality management. Considering the complex and changing business environment, this is not possible without adequate management of changes. (ISO 9001, 2015) Based on literature review and interview results, a change management system was created for pursuit of enhanced change management process with transparency and efficiency. Here, the created construction and other changes are discussed from process and more precisely documentation perspective. Also, the effects of these changes are evaluated with regards to the case company's change management culture. Finally, some recommendations and limitations are listed.

Quality management includes continuous evaluation of different processes and activities and implementing enhancing changes to those whenever needed. Change management process as such is one of the processes under the microscope. In addition, change management process is used in implementing enhancements. The main RQ of this study was about how change management should be conducted as a part of effective quality management. In the light of the conducted literature review, the two viewpoints to change management process should be considered. Change management process should be evaluated regularly from process perspective and improvements implemented to it as needed. On the other hand, any improvements needed to maintain adequate quality level, regardless of area or process, should be implemented with appropriate quality management tools and by following the change management process. In doing so, many aspects should be considered: which tools and models to use, who is leading the change and how to prepare organizations for the change with minimal resistance but maximum effectiveness.

7.1 Change management process enhancements

In this study the general objective was to further enhance the existing change management process incrementally in the spirit of continuous improvement. Based on the results of the conducted interviews, the process needed most improvement regarding documentation.

Hence, the high-level process as such was not changed drastically. However, the documentation of both changes and related risks was updated from multiple Excel spreadsheets to a new system, the thesis construct, working through SharePoint and PowerApps. Weckenmann et al. (2015) highlights how risk identification also improves quality. Thus, as the system can potentially also improve the quality management at the site.

The first research SQ was about the process workflow. According to the interviews the institutionalization of even the current change management process was still in progress and hence no drastic changes were made to the process, excluding documentation. Once the change management process has become an established way of working at all of the departments, further harmonized, reliable enhancement decisions can be made based on experience. Also, when compared to the practical change management models presented by Hamraz et al. (2013) and Koch et al. (2016) the company's model had in general the same phases: Change identification, evaluation, and implementation.

What was missing from the case company's process, however, was the control of change after implementation. The phase was presented in both Hamraz et al. (2013) and Koch et al.'s (2016) model and also in the list by Guimaraes & Armstrong (1998) for pre-requisites in effective change management. In addition, this was also raised up by some of the interviewees. In fact, as changes can be initiated for example to improve safety or efficiency, it is important to verify that these important objectives are achieved. Lessons learned can be gathered from specific change implementations too.

For the follow-up purposes, the corresponding fields were added to the PowerApps system so that the user is in the future guided to evaluate the need for follow-up. In addition, the phase was also acknowledged on the process description of the new process (Appendix 4). In the process description also safety risks were changed so that those were divided into occupational safety and process & chemical safety due to enhancement activities external to the thesis. Similarly, stakeholder processes were depicted in the diagram. This was also an external requirement but nevertheless well in line with ISO 9001 (2015) requirements for process thinking.

7.2 Improved change documentation

The second research SQ covered process especially from transparency and effectiveness point of view. With the new change management documentation system, jumping between multiple different Excel spreadsheets was diminished. Instead, the new change management system guides the user through the process from initial change documentation to risk assessments and finally follow-up of the change. From single department point of view, altogether four Excel spreadsheets were discarded from the process. As previously stated, the process does contain some documentation locations external to the system, but these were directly linked in the system, hence creating a straight-forward way to work as possible.

The change management system has been evaluated to have multiple benefits. It makes the change management process more transparent as there is full visibility to change plan, its risks and mitigation actions. With multiple Excel spreadsheets there is always the risk that the template is not up to date. In the joint system updates appear to all users at the same time, making the process easy to manage from documentation perspective. This further increases the systematic way of working throughout the mill site. The fact that the data is in reportable form in SharePoint creates a possibility for even further improvement of transparency with modern reporting capabilities. The pursued benefits are also in line with Koch et al.'s (2016) characteristics for efficient change management (Table 2).

7.3 Change management culture

In the end, the thesis topic worked around the two dimensions of change: practical changes that the new system helps to manage but also organizational change due to the system implementation as well as the change management culture development. Hence, even though the company's organizational change management model was not within the scope of the thesis, it could be considered at the time of implementation. As Bamford & Daniel (2005) suggest, combining multiple change models could be beneficial in the case of big or complex changes.

Developing change management culture is important for the acceptance of the new documentation system but also for improving the overall change management performance at the mill site. Like Peter Ducker famously said “*culture eats strategy for breakfast*“ – if people do not share the same values and culture for change management and understand its value, no strategy, system nor practical process change will in the end improve the practical change management. According to Austin & Claassen (2008) leaders have a huge impact in managing culture in their organization. Therefore, leaders should prepare organizations to change and most importantly, make sure that the change is institutionalized, as highlighted by both Kotter (1995) and Kanter et al. (1992, cited by By, 2005). For example Kanter's (2007) skills for leaders (Figure 10) could help leaders in change initiatives along the organizational change models.

During the interviews of shift and day supervisors, it was found out that over 50 % of the interviewees either did not receive or did not remember to have received any introduction or training to change management. As the new change management system is implemented, trainings are needed to secure that everyone knows how to use the system. This is a great opportunity to also go over the overall change management process and why it is important. These trainings could further enhance the change management culture but also quality management culture, as more people would be involved in the process. Involvement and empowerment of people is also in line with the latest ISO 9001 (2015) standard as well as the spirit of TQM, hence supporting quality management (Guimaraes & Armstrong, 1998; Molina-Azorín et al., 2009). It can have far-reaching benefits as according to Denison & Mishra (1995) it can even improve organizational effectiveness. Involving people widely can also increase the identification of changes, as more people are aware and active regarding change management process and have an easy access to the system to document changes.

Even though changing the organizational culture is all about leadership, the groundwork was started already during the thesis. The interview results, in other words the justification for the up-coming change, as well as the new change management system were presented in multiple different meetings and forums along the study timeline. Similarly, the end-user testing was important from the point of view of securing the system concept

technically but also from the change resistance point of view. People were offered a route of communication, a chance to have a say of what the system will look like, how it could work and therefore also time to process the up-coming change.

7.4 Recommendations

First recommendation for future is naturally implementation of the new change management system with adequate trainings. When viewing the study for example from the PDCA cycle perspective (Lodgaard & Aasland, 2011), the thesis constituted only the planning phase of the model. Thus, the PDCA cycle with rest of its phases could be used as a supportive tool in the implementation of the system. This way the implementation and its effectiveness would be secured for continuous improvement.

Despite the conducted testing, it is possible that after go-live defects or inconsistencies are found from the system. Or similarly, it is possible that users come up with new feature requirements or improvement ideas regarding the system, which could for example enhance the process further or make it more efficient. These findings should be followed-up, fixed and developed based on urgency.

Another future development possibility that should be considered is integrating the system to the production system used at the site. Many of the interviewees manage for example task lists in the production system. Within the integration, information such as open changes or risk mitigation actions could show automatically on the task list, real-time without manual transfer. Respectively, integrations could be considered also in case any other new systems are being developed with overlapping with the change management system and/or process. Another development possibility is fitting the system to mobile phone screens. This would enable even more flexible usage, especially when it comes to documenting identified changes “on-the-go”, out of reach of computers.

Once the system has been taken into use in departments and data (changes and risks) have been collected to it by time, a reporting tool could be utilized. One solution that is already in use at the company is PowerBI. The advantage of PowerBI is that it can retrieve data

from multiple different data sources, naturally with some limitation, but would nevertheless allow combination of various data sources and this way again decrease the amount of manual transfer or making searches in multiple systems. Furthermore, with reporting the process performance could be monitored and management would have access to site-wide change management information, which is challenging to access in current setting due to multiple file locations. If the process were again iteratively enhanced with the PDCA model, improved reporting capabilities would benefit the performance measurements in planning phase.

7.5 Limitations

According to Kasanen et al. (1993) an important aspect of the used methodology, constructive approach, is that the usability of the generated construction is demonstrated through implementation. However, in this study, as per wish of the case company, the implementation of the construction – the change management system – will be performed after the study. Hence, implementation of the construction is not included in the study despite the applied methodology. Nevertheless, the generated construction was tested by both developer and end users and also by importing example data into it. In addition, the feedback from end user testing was very positive. Thus, it can be said that the system seems fit for use already prior to implementation.

The interviewed departments were in very different phases when it comes to usage of the current change management process. At the time of the interview, the usage time ranged approximately from almost two years to as low as a month. Thus, it could be speculated that the challenges the departments are facing are different at the time of implementation compared to the time after two years of usage. If so, this could decrease the generalizability of the interview results to all departments. However, the vast majority of the departments had used the system for a year or more. Also, grouping of results and arrangement by occurrence ensures that the challenges of the majority were taken under closer consideration.

Regarding the interviews, also the interpretation of the results had a few limitations. First, the division of qualitative interview results to different themes could be said to be open to interpretations – risk assessments are to some extent also documentation and so on. However, the analysis was performed also from the single answer occurrence point of view and after grouping altogether 70 findings were listed. Hence, the different themes were used only to highlight different groups of results instead listing numerous individual answers.

Even though it was stated that no major changes were made into to upper-level change management process, it must be noted that naturally change in the documentation is a change to the process too. In practice this could mean that the departments are taken back on the learning curve of change management. However, the benefits of the new system were seen so significant for the process that this was an accepted risk. Furthermore, the new system was built in respect of the current process, hence supporting it. Finally, if the system turns out to be easy to use and hence widely accepted by end-users, it can help in creation of change management culture and clarify the process in the long run.

8 CONCLUSIONS

According to literature, there is no single model, workflow, or process that could be considered as a silver bullet in change management. Despite, the importance of change management is clear throughout publications. As companies have the need to maintain quality of their products as well as processes, identified improvements have to be implemented in a controlled manner, in other words with an adequate change management process. The more effective the implementation, related processes and organizations, the higher the competitiveness of the company.

The main objective of this thesis was to enhance the case company's change management process. Based on the findings from literature and conducted interviews, it can be concluded that aspects needing most enhancement were improvement of the process documentation as well as securing follow-up of changes. The follow-up step is important for change institutionalization as well as knowledge management. With the new change management system, manual transfer of information can be decreased, and the process is easier to follow for users, as the system supports each step of the process. These potential benefits were both mentioned in the interviews as aspects needing development.

The study provided highly valuable information about the current state of change management in the case company and also pinpointed development needs for future. In general, the study presented a practical case example about change management and its documentation with requirements such as ISO 9001 taken into account. Next, the most important step is to implement the new system into use. Furthermore, iterative tools such as the PDCA cycle could be used to secure accomplishment of full benefits. As the new process and system are implemented and institutionalized, attention should be paid for the organizational change management culture as well through leadership and management. This way the change management culture can be improved which can lead to improved identification of changes as well as lower threshold for assessing risks.

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APPENDICES

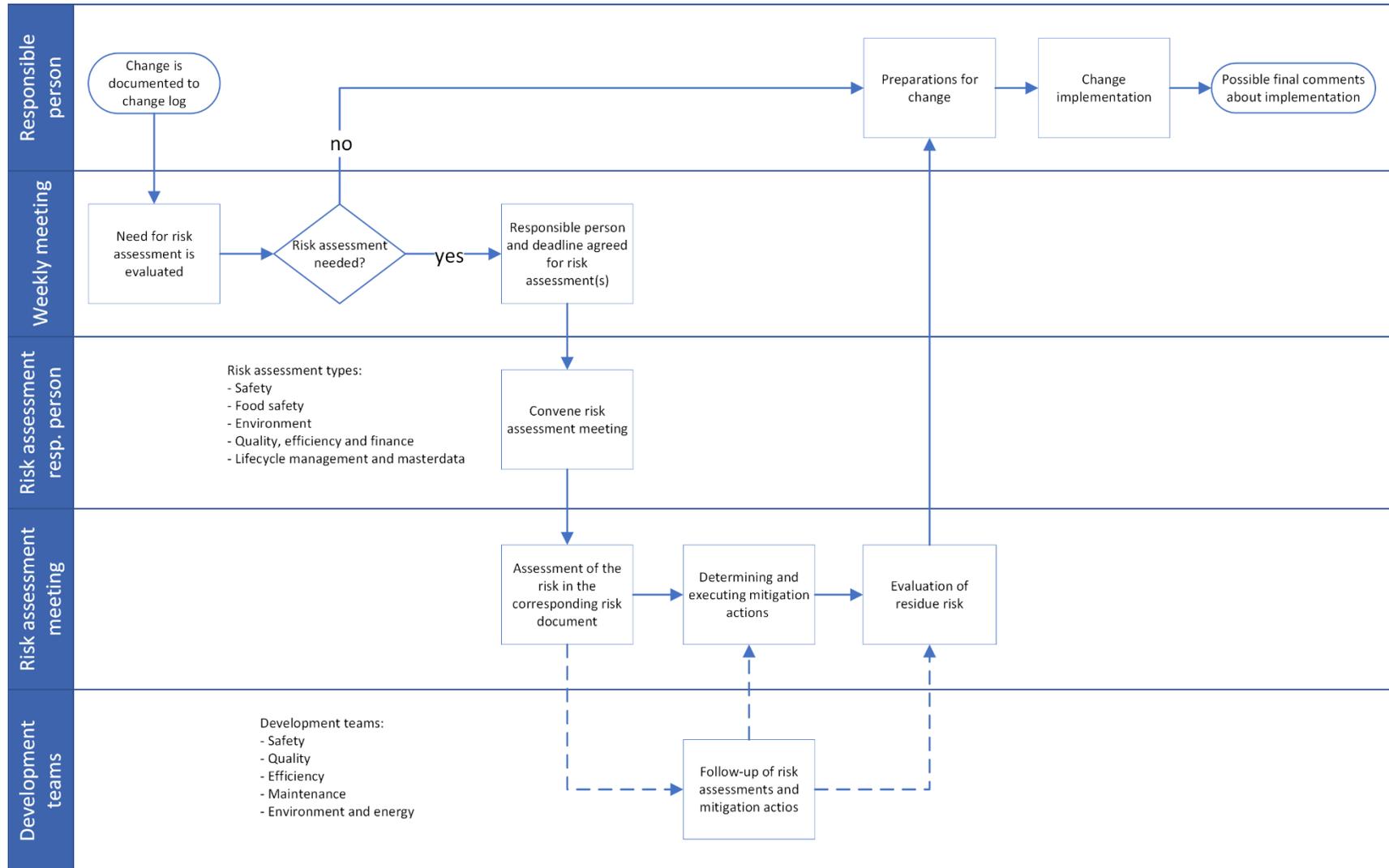
Appendix 1. Interview questions, round one

1. Describe how the change management process is carried out in your department currently?
2. In your opinion, what is the current state of the following themes in change management process?
 - 2.1. People's roles – are the roles and division of work and responsibilities clear?
 - 2.2. Different process phases – is each process phase completed successfully?
 - Documentation in change log.
 - Evaluation of need for a risk assessment and selecting person in charge in weekly meetings.
 - Documentation of risk assessment.
 - Implementation of change.
 - 2.3. Risk assessment
3. What is good about the current change management process – what works well?
4. In your opinion, what are currently the biggest challenges in change management?
5. Which part of the current process would need enhancement the most – why and how?

Appendix 2. Interview questions, round two

1. Please describe how change management shows in your workday.
2. Can you recall the time when the current change management process (including change log and risk assessments) was taken into use? How was this new way of working informed and/or trained to production personnel?
3. How is the change log used and gone through in weekly meetings? Are you involved in filling the log?
4. Have you been involved in a meeting where risk assessment for a change is compiled? If yes, what is your experience about the current risk assessment documents?
5. What do you think are the biggest challenges in change management?
6. How would you improve the challenges or the process in general?

Appendix 3. Change management process in the company at the start of the study



Appendix 4. Change management process in the end of the study

