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CHANGE MANAGEMENT IN DIGITALIZATION OF PROJECT LOGISTICS AND IMPLEMENTATION OF A NEW LOGISTICS MANAGEMENT SYSTEM

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ABSTRACT

Lappeenranta-Lahti University of Technology LUT

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Change Management in Digitalization of Project Logistics and Implementation of a New Logistics Management System

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Keywords: logistics management, project logistics, logistics management system, change management, software implementation

The aim of this Master's thesis was to study the means of change management in the implementation of logistics software as part of the digitalization of project logistics work methods. This study was conducted as a case study for the case company, which is a Finnish, globally operating technology company. The company provides equipment and services, especially for mineral processing and metals processing.

The results of this study prove that change management in a software implementation project can be promoted in particular by everyone in the organization understanding the need and reasons for the change. The factors slowing and inhibiting the change at the case company, in turn, were the high workload of employees, inadequate training, too complex manual, and issues in co-operation and communication both with the internal stakeholders and suppliers.

Even though this study identified many issues during the first phase of the implementation, it can still be considered that the software implementation at the case company was successful. The implementation was completed and did not cause any major problems at the case company. The errors made in the first phase have been analyzed, and recommendations for corrective actions were given for the next phase of the implementation. Based on this study's results, it can be stated that there are many challenges associated with implementing a logistics management system, which can be managed by means of change management.

TIIVISTELMÄ

Lappeenrannan-Lahden teknillinen yliopisto LUT

School of Business and Management

Supply Management

Tuulia Lilja

Muutoksenhallinta projektilogistiikan digitalisoinnissa ja uuden logistiikkajärjestelmän käyttöönotossa

Pro gradu -tutkielma

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Tämän Pro gradu -tutkielman tavoitteena oli tutkia muutosjohtamisen keinoja logistiikkaohjelmiston käyttöönotossa osana projektilogistiikan työmenetelmien digitalisointia. Tämä tutkimus tehtiin tapaustutkimuksena kohdeyritykselle, joka on suomalainen, globaalisti toimiva teknologia-alan yritys. Yritys tuottaa laitteita ja palveluita erityisesti mineraalien käsittelyyn ja metallien jalostukseen.

Tutkimuksen tulokset osoittivat, että muutoksenhallintaa ohjelmiston käyttöönottoprojektissa voidaan edistää erityisesti sillä, että kaikki organisaatiossa ymmärtävät tarpeen ja syyt muutokselle. Muutosta estäviä ja hidastavia tekijöitä kohdeyrityksessä puolestaan olivat työntekijöiden korkea työkuorma, puutteellinen koulutus järjestelmän käyttöön, liian monimutkainen manuaali, ongelmat yhteistyössä ja viestinnässä sisäisten sidosryhmien sekä toimittajien kanssa.

Vaikka tässä tutkimuksessa löydettiin monia ongelmia käyttöönoton ensimmäisessä vaihessa, ohjelmiston käyttöönottoa kohdeyrityksessä voidaan silti pitää onnistuneena. Käyttöönotto saatiin suoritettua loppuun saakka, eikä se aiheuttanut suurempia ongelmia kohdeyritykselle. Ensimmäisessä vaiheessa ilmenneet ongelmat analysoitiin ja suosituksia korjaavista toimenpiteistä annettiin käyttöönoton seuraavaa vaihetta varten. Tämän tutkimuksen tulosten pohjalta voidaan todeta, että logistiikkaohjelmiston käyttöönottoon liittyy monia haasteita, joita voidaan hallita muutosjohtamisen keinoin.

TABLE OF CONTENTS

1 INTRODUCTION 9
1.1 Background of the study 10
1.2 Research objectives and limitations 11
1.3 Conceptual framework 14
1.4 Research methodology 15
1.5 Key concepts of the study 16
1.6 Structure of the thesis 18
2 LOGISTICS MANAGEMENT AND DIGITALIZATION OF LOGISTICS 19
2.1. Project logistics management 20
2.2 Logistics management systems 23
2.3 Digitalization of logistics and supply chain management 24
2.3.1 Drivers and benefits of digitalization implementation in the supply chain 25
2.3.2 Barriers and challenges of digitalization implementation in the supply chain 27
3 CHANGE MANAGEMENT 29
3.1 Change management models 30
3.1.2 Lewin's model 30
3.1.3 Kotter's model 32
3.2 Change reactions 34
3.2.1 Change readiness 34
3.2.2 Change resistance 35
3.4 Change management in implementing software and digitalization of logistics 37
3.5 User resistance and engagement in software implementations 40
4 METHODOLOGY AND DATA COLLECTION 43
4.1 Case study methodology 43
4.2 Case selection 44
4.3 Data collection 45
4.4 Data analysis 49
4.5 Reliability and validity 51
5 EMPIRICAL PART 53
5.1 Implementation project in the case company 53
5.1.1 Initial state of project logistics management in the case company 56
5.1.2 Drivers for change in the case company 60
5.1.3 Barriers for change in the case company 61
5.2 Transition 63

5.3 Outcome of the implementation 67
5.3.1 Challenges and bottlenecks of the implementation 69
5.3.2 Benefits of the change 72
6 DISCUSSION AND CONCLUSIONS 74
6.1 Theoretical implications 77
6.2 Managerial implications 81
6.3 Reliability and limitations of the study 87
6.4 Further research 88
REFERENCES 89
APPENDICES

LIST OF FIGURES

Figure 1. The conceptual framework of the study. 15
Figure 2. Parallel project logistics processes. 21
Figure 3. Potential Benefits from Digitalizing Supply Chains..... 27
Figure 4. Challenges of DSC implementation. 28
Figure 5. Kotter's eight-step model. 33
Figure 6. Prerequisites for knowledge sharing within the supply chain in order to facilitate successful ERP implementation. 40
Figure 7. Tasks and user rights of logistics users in the SMM system according to the user role... 54
Figure 8. Main reasons for acquiring the new software for project logistics management..... 60
Figure 9. Interviewees' main concerns about the new logistics management system and the implementation process..... 62
Figure 10. Timeline of the implementation for logistics users at the case company. 64
Figure 11. The efficiency of the new approach compared to the old approach. 69
Figure 12. Bottlenecks and challenges of the logistics management software implementation according to the interviewees..... 70
Figure 13. Benefits of logistics management system implementation and digitalization of logistics management at the case company. 76
Figure 14. Improvement recommendations for the case company for further expansion of the SMM implementation..... 82

LIST OF TABLES

Table 1. Features of digital supply chain. 25
Table 2. Objectives, activities, and communication needs during organizational change. 32
Table 3. Comparison of Lewin and Kotter's theories of change management. 34
Table 4. Comparison of Stages used in Lewin's Change Model and IT implementation model stages 39
Table 5. Resistance Behaviors. 41
Table 6. Management strategy framework..... 42
Table 7. Interviewees of the study. 47
Table 8. Categories created based on the analysis of the interview data. 50
Table 9. The benefits of implementing the new system according to the end-users..... 73
Table 10. Comparison of Klaus' (2015) management strategy framework to minimize user resistance in the IT-enabled changes and communication modes used at the case company..... 79

LIST OF ABBREVIATIONS

CLM	Council of Logistics Management
CPS	Cyber-Physical System
DSC	Digital Supply Chain
ERP	Enterprise Resource Planning
GPS	Global Positioning System
IoS	Internet of Services
IoT	Internet of Things
JIT	Just-in-Time
LMS	Logistics Management System
RFID	Radio-Frequency Identification
SMM	Supply and Material Management
TMS	Transport Management System
WMS	Warehouse Management System

1 INTRODUCTION

Change management is a broad concept, and it has been studied pretty widely in research. Lewin (1974a, 151; 1947b, 13) states that ”change refers to the difference between a preceding situation and the following situation which has emerged out of the first as a result of some inner or outer influences.” Change in organizations is related to the nature of organizations, and it happens constantly; only its amount and type may vary. According to Moran and Brightman (2001, 111), change management is primarily about leading the people who are the object of the change, not focusing so much on leading the change itself.

Thus, change management has been of interest to researchers for a long time because changes in organizations often do not go as planned. In fact, it has been found that more than two-thirds of large-scale organizational changes fail to achieve the targets set by the organization for the change (Worley & Mohrman 2014, 214). Concerning software implementation projects, it has been estimated that 75% of changes related to technology implementation projects fail. The failure of IT-enabled change is often due to the employee’s negative reactions to changes occurring in their tasks, used information technology systems, or in business processes. (Markus 2004, 5.)

Information systems are often used as enablers of change in organizations, but the phenomenon of user resistance makes implementing changes often difficult (Klaus, Blanton & Wingreen 2015, 57). The success of an information system implementation can be promoted by utilizing different means of change management. In Enterprise Resource Planning system implementations, change management is one of the most crucial factors determining the implementation's success (Foster, Hawking & Zhu 2007, 239). Readiness for change in the organization can be improved, for example, when employees understand the significance of change and feel that they will benefit from it. If employees can perceive the change as favorable, they can even look forward to the change instead of resisting it. (Joshi 1991, 229.)

1.1 Background of the study

The research topic for this thesis was given by a Finnish-based global technology company. The case company offers equipment, services, and complex project solutions worldwide, especially for minerals processing and metals refining industries. In summer 2019, it was announced that the company would be merged with another Finnish-based technology company, and the merger would take place in summer 2020. This thesis's topic was offered by the case company's project logistics department, which was part of the company's supply organization at the beginning of this project. A new logistics management system to be used in project logistics was introduced for the end-users at the case company at the end of 2019. This thesis's topic originated from the need to investigate how well change management has been handled during the first phase of implementing this new software. Related to the case company's merger with another company, there was a need to examine what can be learned from the first phase of the implementation in case this software would be implemented more widely at the new company. The merger makes the theme of change management even more topical for the case company.

The case company's new logistics management software for project logistics management is a cloud-based logistics management system. The software is designed especially for logistics management in large-scale plants, and there are tools available for managing logistics all the way from manufacturing to site management. The system is also integrable with other software such as ERP systems or different kinds of invoicing tools. The fact that this software implementation process takes place in a project logistics organization makes the implementation project even more challenging. From the logistics point of view, the case company's projects can be anything from delivering a few standard-sized packages to supplying everything needed to build a whole new plant. Each project is unique, and supply chains are global and often complex. According to Gudehus and Kotzab (2012, 29), efficient management of project logistics operations is extremely important for companies conducting complex project solutions in varying locations. For this kind of company, managing project logistics operations can even be considered a core competence. Furthermore, to efficiently manage logistics operations, a company must have an appropriate logistics management

system. Having an appropriate logistics management system can significantly improve a company's competitive advantage due to the more efficient operations resulting from utilizing a logistics management system (Ivic 2008, 142).

More precisely, this implementation project was, in fact, part of a more considerable change from switching from a conservative manual way of working towards a digital cloud-based way of working. Before implementing the new logistics management system, no specific logistics management system was used in the case company for project logistics management. Thereby, one other valuable perspective for this thesis is user engagement. It is an essential theme in this case because the project logistics workflow at the case company has been previously almost managed completely manually. The management of project logistics operations at the case company had relied mostly on Microsoft office tools such as Microsoft Office Excel and Word. If the change had been about switching from one logistics management tool to another, it would have been possible to prevent users from using the old system at some point, but it is not possible to remove employees' access rights to Microsoft Office tools. Thereby, it becomes even more essential to engage the project logistics employees in using the new system in this case.

1.2 Research objectives and limitations

The objectives of this study were mostly determined based on the case company's interest. The case company offered a research topic to study the new logistics system's implementation in project logistics. More precisely, this research's research problem is to determine the factors influencing the logistics software implementation's success in the case company. Change management during the implementation process was chosen as the research perspective for this study. This perspective was chosen because it has been found that change management is one of the most important factors determining, for example, the success of ERP (enterprise resource planning) implementations (Foster et al. 2007, 239). It can also be generally said that the importance of change management has increased in recent decades as the rate of changes in the organizations have both increased and accelerated

(Moran & Brightman 2001, 111). In order to solve this research problem, the following research question and three sub-questions were set:

How can change be managed successfully in implementing a logistics management system (LMS) as part of project logistics' digitalization?

a) *What are the factors that promote or inhibit software implementation and logistics digitalization?*
b) *What are the benefits of logistics management system implementation and digitalization of logistics management?*
c) *What can be learned from the first phase of a logistics system implementation considering possible wider implementation in the future?*

The research question summarizes the aims and objectives of the study (Kähkönen 2011, 32). The aim of this research is to investigate the means of change management in order to facilitate the implementation of software deployment projects. More precisely, the objective is to study change management in the digitalization of project logistics management and a new logistics management system implementation at the case company. Thereby, this thesis's main focus areas become change management, digitalization of logistics management, and logistics management system implementation. The research question includes the assumption that a change project in an organization, such as software deployment, does not usually occur without challenges or apparent problems. This assumption is based both on the literature review and the practical experience of the author of this thesis.

However, this study is not intended to focus on identifying any potential technical problems in software implementation or evaluate the software's functionalities. Instead, the research is intended to focus as explicitly as possible on the change management part of the implementation. Potential technical problems are only to be considered to the extent that those could have affected the success of change management during the implementation process. Even though the most significant portion of the case company's employees also in

project logistics are based in Finland, this study is not limited to the local context. Since the implementation of the new software was done globally at the case company, this research is also intended to cover other market areas than Finland as well.

It can be said that this research topic is interesting both because of the practical benefits for the case company but also from the academic point of view. As Johnson and Leender (2006, 332) claim, both researchers and practitioners have long been interested in "understanding the nature of change in supply organizations." Even though change management in organizations has been widely studied, research in change management on software implementation projects is scarcer, and research in this area tends to focus on implementing ERP systems. Studies that would focus on change management in the implementation of software other than ERP are quite rare. A similar research arrangement, in which change management would have been studied in implementing a logistics management system in capital project business in a global, big company similar to this case company, could not be found in the previous literature. This fact creates the research gap for this thesis. Therefore, the aim of this research is to study change management in software implementations and, if possible, also at a more common level, regardless of the purpose of the software. This study's best outcome would be to find the principles by which a software implementation project's success can be promoted.

As an utterly similar research design was not found in the previous literature, this study considers the research findings on ERP deployment projects, when applicable. By applying them, the aim is to find explanations for the results obtained in the empirical part by utilizing the research data of ERP deployment projects and, in part, also the general literature on the field of change management. However, it must be borne in mind that the implementation of logistics software in the case company is not as extensive as the typical ERP systems' typical deployment would be. On the other hand, it is a significant change because the change is from completely manual work to a transition to a cloud-based system, and the change also has broader implications for working methods than just changing the platform. The change also affects, for example, co-operation and communication with the case company's own workshops and external suppliers. Simultaneously, the deployment project is also linked to

a broader effort to digitalize the case company's logistics processes. For this reason, it can be justified that the theoretical part of the study also deals with the literature related to organizational change.

From the case company's point of view, it was also considered essential to find out what can be learned from the first phase of implementation in the event that the software will be more widely implemented in the new organization after the case company has merged with another company. According to Irani (2010, 926), organizations should carefully review after the software implementation phase is over what has gone well and what could have done better in the implementation to be more successful in any future software implementation projects. The post-implementation review's objective is to investigate whether targets have been achieved and also to align expected costs, benefits, and risks against the realized ones. If the change has not reached all goals set for it, it should be investigated whether supporting rationale has been provided to make re-alignment possible. If not, then the company must take action to enable the change to take place. The purpose of this thesis is to carry out precisely this post-implementation review.

1.3 Conceptual framework

This thesis's theoretical part consists of a literature review focusing on logistics management's digitalization and change management's key theories. Both of these concepts are forward-looking approaches and are also interconnected with each other. The conceptual framework of this thesis is presented in Figure 1. The purpose of the framework is to form an overall understanding of previous studies in the field and seek a background for interpreting the thesis's empirical part. So, this framework provides a theoretical basis for the analysis of the research results of this study. However, using abductive reasoning as an approach instead of pure deductive reasoning also offers the opportunity to review the framework when empirical results so demonstrate.

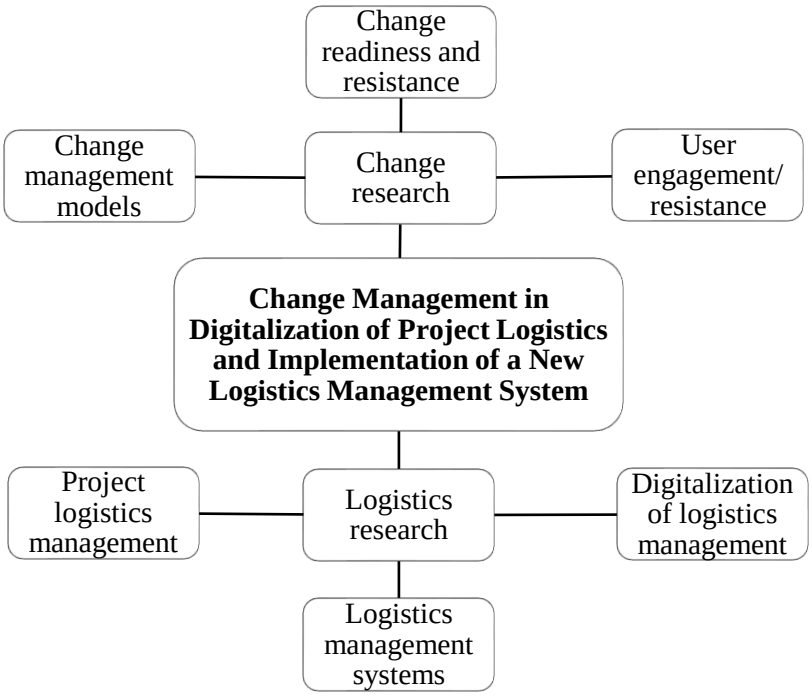

Figure 1. The conceptual framework of the study.

1.4 Research methodology

This study is conducted as a case study about logistics management software implementation at the case company. This study is a qualitative research, and the data is collected empirically. A case study is an appropriate choice when the phenomenon cannot be separated from its context (Yin 2009, 2). Scientific articles were used as the primary source of material for the literature review, and besides, other scientific references, such as conference papers and textbooks, have been used. Empirical data of this study was primarily collected through semi-structured interviews. All interviewees were employees from the case company and worked on project logistics. In total, eight interviews were conducted. Seven of the interviewees were end-users of the system. The eighth interview was arranged to discuss the objectives and background of the implementation with one of the deployment team members. Participant-observation was used as a secondary source of data as the author of this thesis works at the case company.

1.5 Key concepts of the study

This study's most central concepts are change management, logistics management, digital supply chain, and project logistics management. This section provides definitions for these concepts.

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 2001, 111). It takes place both at the operational and strategic levels. The utilization of change management helps organizations cope with the tightening market situation and the continually evolving operating environment, even when unexpected external changes occur. (By 2005, 369-370.) Change management is primarily about leading the people who are the object of the change rather than directing the change itself (Moran & Brightman 2001, 111).

Logistics management

Logistics management refers to the process of effectively planning, implementing, and controlling the flow of goods, services, and information, also considering the cost-effectiveness of the operations at the same time. Effective logistics management aims to ensure the right product's availability, in the right quantity, in the right quality, in the right place, at the right time, for the right customer, and at the right price. (Wisner 2017, 470; Rutner & Langley 2000, 73.) Logistics management can create added value for the company by providing unique services to customers, taking care of availability and delivery times, and offering products and services at a suitable price level (Langley & Holcomb 1992, 7.)

Digital supply chain

According to Büyüközkan and Göçer (2018, 157), Digital Supply chain (DSC) is a "smart, value-driven, efficient process to generate new forms of revenue and business value for organizations and to leverage new approaches with novel technological and analytical methods." In this context, the word 'digital' does not refer to whether the goods or services are delivered physically or digitally. Instead, the DSC means how the supply chain process is managed. In the DSC, the information is exchanged digitally between the different parties to enable communication and integrate all parties' internal supply chain processes involved in the same chain. The main objective of the DSC is to accomplish a transparent system. (Haddud & Khare 2020, 733.) New emerging technologies such as big data, cloud services, the Internet of Things, GPS, or RFID chips serve as enablers of the DSC. These technologies contribute to supply chains becoming more and more integrated. (Brinch & Stentoft 2017, 22.)

Project logistics management

For project logistics is characteristics the one-time implementation, uncertain nature of the process, sophisticated technology, and highs risks involved throughout the process (Zeng, Xiao, and Zhang 2015, 61). Typical examples of project logistics include managing logistics at a building site, plant, or event-specific logistics operations (Gudehus & Kotzab 2012, 29). Project logistics operations can be divided into supply logistics and site logistics. Supply logistics refers to activities and planning of operations before the delivery to the site, such as specifying the resource needs, acquiring the resources, planning supply operations, and controlling storage. Meanwhile, site logistics means planning and controlling the logistics operations at the site. (Jang, Rusell & Yi 2003, 1134.) Görçün (2018, 28) states that "each project logistic operation can be defined as tailor-made operations since it has no similarity with other operations." The physical, human, and financial resources requirements for logistics vary from project to project (Belantova, Galova & Taraba 2019, 950).

1.6 Structure of the thesis

The first chapter of this thesis explains the background of the study and introduces the research problem and research questions. This section introduces the background of the change situation in the case organization as well. The conceptual framework, created based on the literature review, is presented in this chapter. Also, a summary of the methodology is presented in the first chapter. The introduction is followed by the theoretical part, consisting of a literature review divided into two parts, based on the study's main two disciplines: logistics management and its digitalization, and change management. The first part reviews the key concepts related to logistics management and this field's digitalization. Different definitions of logistics management and its relation to supply chain management are discussed. The project logistics concept is also reviewed since this study's topic was offered by the case company's project logistics department. Next, the digitalization of logistics and supply chain management and the concept of logistics management systems are studied. This section also looks at why digitalization of the supply chain is important and what companies can achieve by digitalizing their supply chains.

The second section of the theoretical part discusses the key theories and concepts of change management. A few widely cited change management models are discussed, and after that, typical reactions to change according to the literature are reviewed. The last part of this chapter discusses the relationship between change management and the implementation of digitalization in supply chains and, in particular, the utilization of change management in software implementation projects.

After the theoretical part, this study's methodology is discussed on a more detailed level. The empirical part will follow the methodology part consisting of data analysis and presenting the empirical results of this thesis. In the final chapter, the research findings are discussed against the theoretical part, and answers to the research questions are provided. This study's practical and scientific relevance is assessed as well. Then finally, the limitations of this study are discussed and ideas for further research introduced.

2 LOGISTICS MANAGEMENT AND DIGITALIZATION OF LOGISTICS

This chapter begins with the definition of logistics and supply chain management. It will also be discussed how these concepts are related to each other. After that, the concepts of project logistics management and logistics management systems are discussed as those are crucial for this thesis's topic. The last part of this chapter discusses logistics and supply chain management's digitalization to link the theme of logistics management system implementation into a wider phenomenon.

The former Council of Logistics Management (CLM) (nowadays Council of Supply Chain Management Professionals) defined logistics management by stating that logistics is "the process of planning, implementing, and controlling the efficient, effective flow and storage of goods, services, and related information from the point of origin to the point of consumption to conform to customer requirements" (Wisner 2017, 470). It is worth noting that this definition by CLM does not include any financial considerations, such as the cost-effectiveness of logistics operations, which are often included, especially in the newer definition of logistics management.

One straightforward way to define logistics is the concept of "Seven R's of Logistic," which refers to the goals of logistics, which in turn, are to ensure availability of the right product, in the right quantity, in the right quality, in the right place, at the right time, for the right customer and at the right price (Rutner & Langley 2000, 73). On the other hand, in addition to keeping costs under control, management of logistics operations also can create value for the company. The role of logistics in creating added value for the organization is strongly linked to value creation for the customer. According to Langley and Holcomb (1992, 7), in logistics, added value to the customer can be created in different ways: differentiation, efficiency, or effectiveness. By differentiation, they mean providing unique logistics services to the customer that is so valuable that they bring added value to the company. Efficiency instead refers to the availability and delivery times of products. And finally, effectiveness means a company's ability to offer a product to the customer at a price level that is the most suitable for the customer – not necessarily at the lowest possible price.

The term logistics has often been used interchangeably with the concept of supply chain management (SCM). Historically, supply chain management was viewed as logistics operations that took place outside the company, thus including both suppliers and customers of the given company. Interchangeably, the concept of logistics was used to refer to the logistics operations taking place only inside the organization. (Lambert, Cooper & Pagh 1998, 2.) The whole concept of SCM has not been emphasized a lot by companies before the 1990s. At that point, companies began to realize SCM's opportunities from a strategic perspective and as a way to improve the organization's performance overall. (Yang, Choi, Park, Suh & Chae 2007, 88.) Büyüközkan and Göçer (2018, 157) state that supply chains consist of "a series of interconnected activities that involve the coordination, planning and controlling of products and services between suppliers and customers." It is also important to consider that in addition to logistics, supply chain management overlaps more and less with other close-by research and functional areas. These include, for instance, areas such as marketing, procurement, and operations management. (Larson & Halldorsson 2004, 18.)

2.1. Project logistics management

The concept of project logistics management has not been as widely discussed in the literature as logistics management. One simple definition for project logistics is to describe it as the management of temporary logistics networks, where the latter referring to any arrangements made temporarily for a specific demand, e.g., for a particular project. Typical examples of project logistics operations include, for instance, building site logistics (building companies), plant logistics (engineering companies), and object logistics (event organizers). (Gudehus & Kotzab 2012, 29.) Görçün (2018, 30), in turn, links the definition of project logistics primarily to the nature of the cargo. He claims that project logistics mean "all logistics functions such as transportation, warehousing, and other logistics activities for non-standard cargo." In this context, non-standard cargo means that the cargo's dimensions and weights exceed the limits regulated by a given country's authorities. These limits can vary between different countries.

According to Jang et al. (2003, 1134), construction logistics involve various multidisciplinary processes simultaneously. Even though this model was originally made for the building industry, the processes are repeated quite similarly in the plant projects as well. The parallel processes of project logistics can be seen in Figure 2.

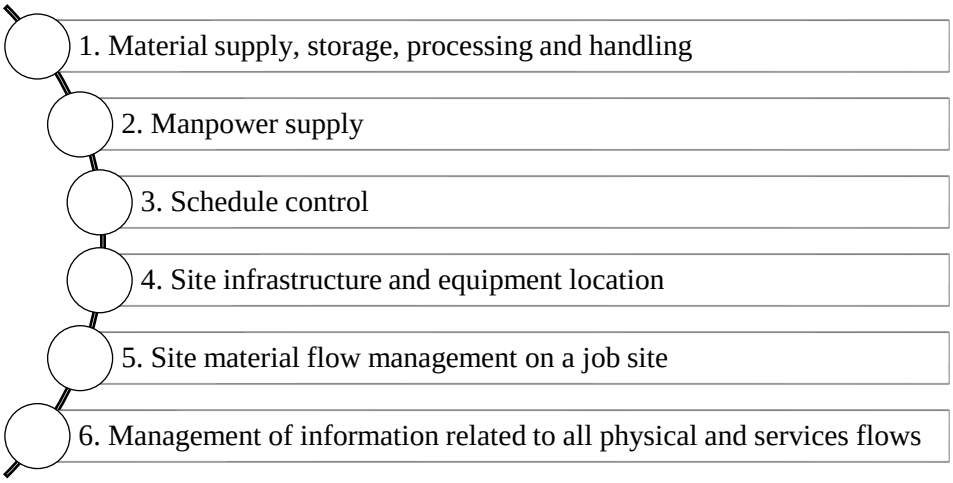

Figure 2. Parallel project logistics processes, according to Jang et al. (2003, 1134).

According to Jang et al. (2003, 1134) project logistics activities can be divided into supply logistics and site logistics. The first mentioned include specification of supply resources, such as materials and personnel, planning of supply activities, acquisition of resources, delivery to the site, and control and handling of storage. In turn, site logistics refers to planning and controlling activities of logistics processes that took place on-site. Planning of project logistics operations should be started by collecting and analyzing the data of the project cargo's specifications and the customer requirements. Also, logistics operators' technical capabilities and the legal regulations for transporting oversized cargo must be considered. The next step is to design and plan the operations at a detailed level. In the case of international transport, the planning process becomes even more complicated. Legal regulations and logistics infrastructure constraints such as the load-carrying capacity of bridges and the roads' physical condition vary from country to country. If the transport route passes through more than one country, each country's local rules must be studied separately.

After a careful planning process, it is time to implement the planned process and, finally, completion of the process. (Görçün 2018, 31.)

Due to the project cargo's oversized nature, special vehicles, trailers, and cranes are often needed for transportation and lifting project cargo. In addition to the particular requirements for equipment used in moving the oversized cargo, the operational processes need to be planned in detail. It is due to the fact that there are often many different kinds of risks involved in transporting project cargo that can materialize to varying stages of transport. Any last-minute changes to oversized cargo specifications, such as dimensions or weights, can significantly impact the schedule and the operation's chances of success or at least lead to significant delays. As a result of even a minor change in project cargo specifications, the route, vehicle type, or loading and unloading plans may need to be changed. (Görçün 2018, 30.)

Every project differs by scope, and so are different the requirements for the physical, human, and financial resources needed for logistics in each project (Belantova et al. 2019, 950). According to Zeng et al. (2015, 61), one-time implementation, uncertain nature of the process, sophisticated technology, and highs risks involved throughout the process are characteristic of project logistics. Görçün (2018, 28) states that "each project logistic operation can be defined as tailor-made operations since it has no similarity with other operations." Therefore, each project's logistics operations must be planned separately according to that given project's specificities.

The companies' ability to plan, implement, and monitor project logistics operations has become more and more essential in the current day's competitive markets. To stay up with the competition, companies must be capable of considering the time, financial, and performance guidelines for logistics operations all at the same time. (Pisz & Lapunka 2016, 199.) Project logistics' importance is particularly central for companies focused on conducting complex project solutions in varying locations. For these kinds of companies, managing project logistics operations can even be considered a core competence. (Gudehus

& Kotzab 2012, 29.) The effectiveness of a project equal directly to the success of the project. Thus, project success can be measured by looking at how well the project goals have been reached. (Pisz & Lapunka 2016, 199.)

2.2 Logistics management systems

According to Ivic (2008, 142), it can be said that having a well-designed logistics management system is one of the critical elements for a company to be able to manage and organize logistics operations efficiently. An efficient and appropriate logistics information system can significantly impact a company's competitive advantage, both because of the cost reductions and better-functioning logistics operations. However, it must be considered that the concept of logistics management systems has not been often discussed in research nor unambiguously defined.

In terms of definitions most often used in the research, the difference between logistics management systems (LMS) and other similar systems such as enterprise resource planning (ERP), transport management systems (TMS), and warehouse management systems (WMS) is that the latter mentioned are focused only on internal processes of the organization. In contrast, LMS systems may also have external functions. Typically, there are neither coordination possibilities between the different operations in ERP, TMS, or WMS systems. (Helo, Xiao & Jiao 2006, 1063-1064.) Logistics management systems typically consist of several subsystems, which are based on the companies' functional operations, like procurement, production, packaging, warehousing, distribution, and finally, the management of reverse material flows (Hart, Lukoszova & Taraba 2013, 226). In any case, the most important function of a logistics management system is to establish a connection for sharing information both with the suppliers and customers (Ivic 2008, 142).

2.3 Digitalization of logistics and supply chain management

The challenges related to supply chain management have been in researchers' interest since the 1950s, even though supply chain management became its own management discipline only in the 1990s. The emergence of supply chain management was closely related to the new possibilities of IT capabilities and the incipient era of e-business. (Farahani, Meier & Wilke 2017, 159.) Therefore, it can be said that supply chain management and digitalization have gone hand in hand from the beginning.

The concept of digitalization can be described by stating that it refers to the conversion from analog signals to binary code (Elsässer, Glas & Essig 2019, 3-4). Digitalization has recently become one of the most critical factors influencing business in general and, thereby it has also affected supply chain management (Solakivi, Ojala, Laari, Töyli, Malmsten & Lehtinen 2017, 95). Büyüközkan and Göçer (2018, 157) defined Digital Supply chain (DSC) as a "smart, value-driven, efficient process to generate new forms of revenue and business value for organizations and to leverage new approaches with novel technological and analytical methods." They highlight that, in this context, the word 'digital' does not refer to whether the goods or services are delivered physically or digitally. Instead, the concept of the DSC describes the way how the supply chain is managed. The most important features that the digital supply chain enables are flexibility and efficiency (Büyüközkan & Göçer 2018, 165). According to Haddud and Khare (2020, 733), the DSC means that information is exchanged digitally between the different supply chain parties to enable communication and integrate production processes. The main objective of the DSC is to achieve a transparent system.

According to the report of Finland State of Logistics 2016, digitalization is expected to significantly transform companies' supply chains. For instance, real-time monitoring throughout the supply chain is expected to become more and more common. When these changes materialize, the Finnish logistics market will change strongly, and there will be a high demand for various digital services. In the future, the added value of logistics services is expected to increasingly consist of the servitization of products and the management of

data flows instead of traditional services. (Solakivi et al. 2017, 133.) Büyüközkan and Göçer (2018, 165-166) themselves found eleven features that are repeated almost invariably in all digital supply chains. Those features are presented in Table 1.

Table 1. Features of digital supply chain according to Büyüközkan and Göçer (2018, 165-166).

Feature	Definition
Speed	Ability to react fast to demand.
Flexibility	The need for agility in changing situations that may be due to political reasons, epidemics, or natural disasters.
Global connectivity	Creates a way to build efficient global hubs to deliver goods locally instead of transporting individual orders around the world.
Real-time inventory	Maintains stock at an adequate but not excessive level. Real-time allows for a quick response to changes in demand.
Intelligence	New generation technologies are capable of self-learning and autonomous decision-making according to pre-set algorithms.
Transparency	In a transparent supply chain, the links in a chain understand each other and match the behavior and needs of other links.
Cost-effectiveness	The investment costs of new technologies can be high but using these technologies and the digital ways of managing supply chains generate savings.
Scalability	The ability to scale in a changing environment facilitates process optimization, reduces duplication, and makes it easier to detect anomalies in processes.
Innovativeness	The ability to be constantly open to change and deploy new technologies and practices.
Proactivity	Anticipating problems and finding underlying issues through research by using an analytical framework and operational intelligence.
Eco-friendliness	If the DSC does not pay enough attention to environmental issues, it can lead to problems.

2.3.1 Drivers and benefits of digitalization implementation in the supply chain

The digitalization of the supply chain is directly linked to a more significant, industry-shaping phenomenon called Industry 4.0, which refers to the fourth industrial revolution. This phenomenon also has been referred to as industrial internet, integrated industry, or smart manufacturing. Industry 4.0 is primarily enabled by the utilization of the Internet of Things in manufacturing. (Tjahjono, Esplugues, Ares & Pelaez 2017, 1175; Hofmann &

Rüsch 2017, 23.) The other emerging technological capabilities that serve as enablers of the DSC include, for instance, predictive analytics and the utilization of big data, cloud services, Internet of Services (IoS), 3D printing, and mobile technologies (like GPS or RFID chips). These technologies will make it possible for supply chains to become more integrated than ever before. These kinds of capabilities will be highly needed in the increasingly complex supply chains and markets. (Brinch & Stentoft 2017, 22; Haddud & Khare 2020, 744; Hofmann & Rüsch 2017, 23.) The introduction of these new technologies will bring out new data sources that, in turn, will create new opportunities for data-driven supply chain management (Diedrich 2017, 384).

Hackius and Petersen (2017, 9) state that IoT means equipping everyday objects with electronics to enable data exchange over the internet. In logistics, IoT can be utilized to collect real-time information about the logistics network and exchange information securely between network parties. The information can be used in logistics decision-making, e.g., to improve transport coordination, for instance, by constant tracking of freight units. The gathered information can then be used, for example, to calculate the estimated time of arrival of any shipment automatically. (Gallay, Korpela, Niemi & Nurminen 2017, 19; 25.)

The business benefits of supply chain digitization come through several different sources. Büyüközkan and Göçer (2018, 158) state that most of the benefits that come with the digital supply chain do not, in fact, come directly from the DSC, but from the various solutions that emerge with the implementation of the DSC. Agrawal and Narain have studied what kind of advantages organizations can achieve through digitalizing their supply chain. These potential benefits are presented in Figure 3.

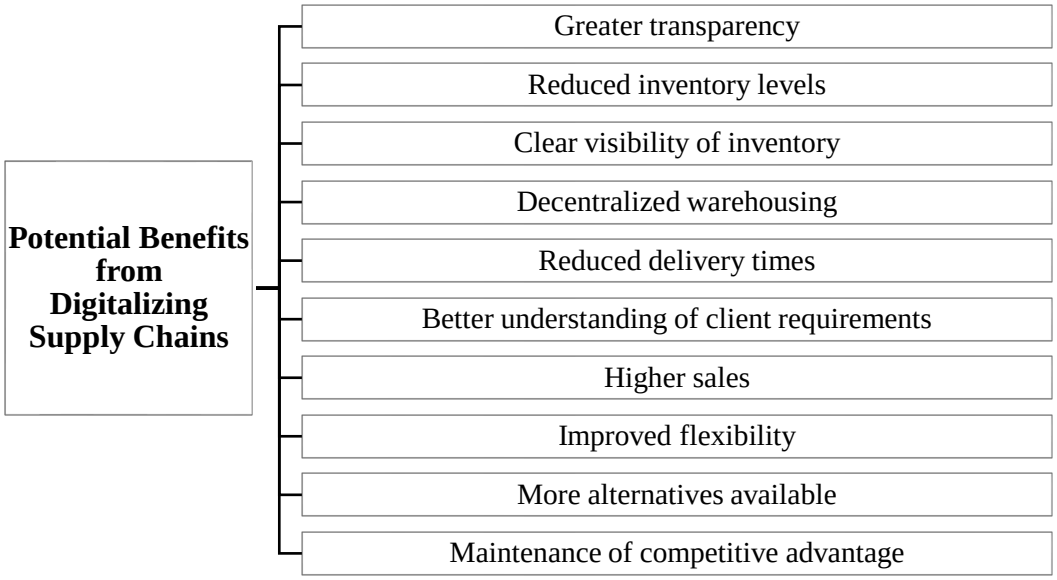

Figure 3. Potential Benefits from Digitalizing Supply Chains (Agrawal & Narain 2018, 5).

Integration throughout the supply chain enables better visibility, for instance, over the inventory levels. Delivery times can be decreased by having a decentralized warehousing system instead of having just a few centralized warehouses. Customers' requirements can be better understood due to the better identification of demand and up-to-date customer information. The greater transparency of the digital supply chain compared to traditional supply chains and more alternatives available lead to better decision-making. (Agrawal & Narain 2018, 5.) In the digital supply chain, reduced inventory levels are consequences of Just-In-Time (JIT) procurement. JIT means that everything in purchasing or manufacturing should be done just-in-time, not any earlier or later. (Wu 2009, 298.)

2.3.2 Barriers and challenges of digitalization implementation in the supply chain

The DSC is so new that its full potential for added value has not yet been realized (Büyüközkan & Göçer 2018, 157). The implementation of the DSC does not come without challenges. Based on the Danish Supply Chain Panel results, the most common problems in

implementing the DSC solutions are the lack of time, internal competencies, digitalization strategy, clear business case, and technological capabilities (Brinch & Stentoft 2017, 28). The significance of these challenges varies from company to company, depending primarily on how well the company is aware of the DSC's potential benefits. Other influencing factors include the company's current IT infrastructure as well as the support and commitment of top management to promote the digitalization of the supply chain. (Haddud & Kare 2020, 734.)

According to Xu (2014, 13), the main challenges in building the DSC are related to data gathering and processing. To be able to build a sufficient DSC, companies must gather data from many sources, ensure the quality of the data and develop a platform that enables the utilization of the data in supply chain management. Challenges often arise from poor planning and lack of communication both within the company and with other parties in the supply chain. Challenges of the DSC implementation found by Büyüközkan and Göçer in their extensive literature review are shown in Figure 4.

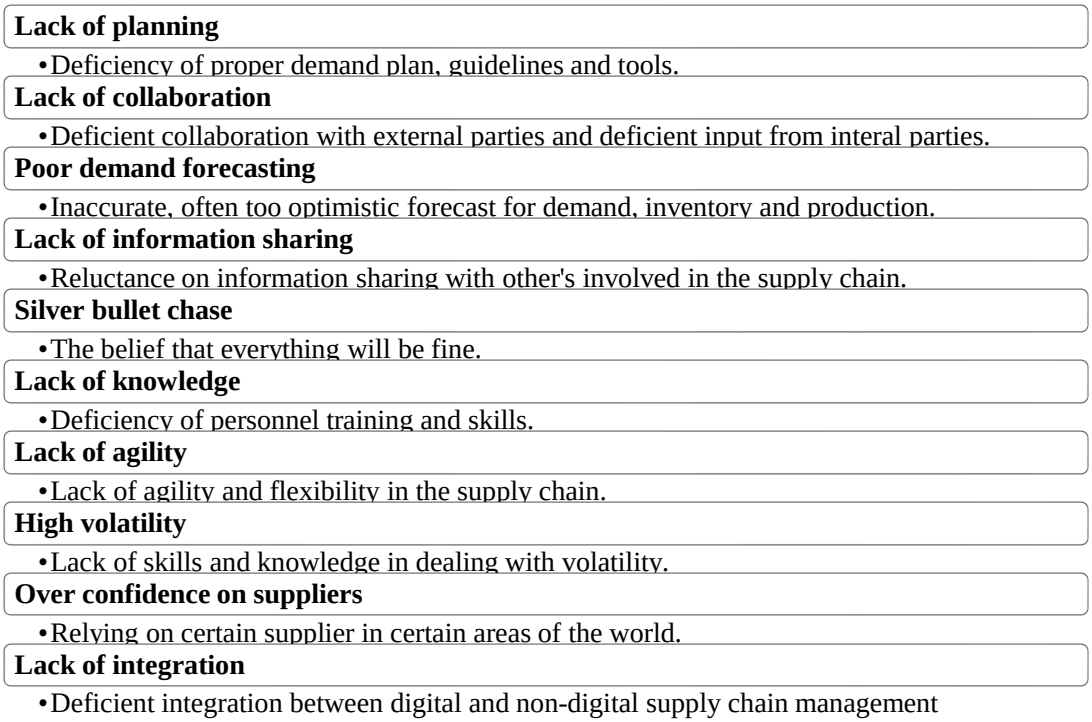

Figure 4. Challenges of DSC implementation, according to Büyüközkan and Göçer (2018, 167).

3 CHANGE MANAGEMENT

This chapter discusses the concepts related to change management from a theoretical and historical perspective to provide an understanding of later analysis. It can be said that there has been an organizational change for as long as there have been organizations. Lewin (1947a, 151) defined change in organizations by claiming that "a change refers to the difference between a preceding situation and the following situation which has emerged out of the first as a result of some inner or outer influences." On the other hand, he also states that both constancy and change are relative concepts. The only thing that may vary in different organizations and situations is the amount and type of change. (Lewin 1947b, 13.)

Chia (2014, 10) instead states that organizations are only temporary structures from a process-philosophical perspective, and those structures are naturally in constant change. From this point of view, managing change happens by purposely relaxing the management of the organization and letting the change happen through its own volition. Moran and Brightman (2001, 111), for their part, defined change management to be "the process of continually renewing an organization's direction, structure, and capabilities to serve the ever-changing need of external and internal customers." They claim that change management is instead leading the people who are the object of the change, not focusing so much on leading or directing the change itself.

Various concepts of change can be distinguished in the field of organizational change research. The concept of organizational change typically refers to the process of change in an organization's operations, culture, or leadership. Also, the effects that follow this kind of change are part of the organizational change research. It is worth mentioning that organizational change can be either a development or a recession. The determining factor for an organizational change is that something has changed in the organization. (Burke 2002, 69.) However, it must be considered that organizational development does not mean the same as the organizational change in the literature. The difference between organizational change and organizational development can be defined through the aim of the planned change. The objective of organizational development is to improve an organization's

financial or technical capabilities rather than improve the processes themselves. (Cummings & Cummings 2014, 144.) The concepts of change management and organizational development are often used interchangeably as well, even though these concepts do not fully correspond to each other. According to Cummings and Worley (2009, 4), change management does not necessarily include organizational development, but change management is always present in organizational development.

3.1 Change management models

This chapter provides an overview of some of the classic fundamental theories of change management. Change management models will be discussed in the first place. Kurt Lewin's three-stage model for change from the 1940s and John P. Kotter's eight-step models for change are definitely among the most discussed change management models in the change literature. These models have influenced many later change management models, but of course, these models have been criticized in later research as well. The last part of this literature review on change management will discuss change management in implementing digitalization and change management in software implementation to pull these thesis's main themes altogether.

3.1.2 Lewin's model

Even though Lewin's three-stage model originates from the 1940s, it is still quite popular in understanding organizational change and has provided a historical benchmark for more recent models (Worley & Mohrman 2014, 215). Lewin's model aims to describe successful change by a framework that is based on the three-stages of change. The stages are called unfreezing, moving, and freezing. (Lewin 1947b, 36.) However, it must be considered that this model works to manage the planned change but is not valid in responding to unexpected changes (Rajan & Ganesan 2017, 183).

In the first stage, in the so-called unfreezing phase, it has already been acknowledged that there is some kind of problem in the organization that must be solved by utilizing a change. At the beginning of the unfreezing phase, there is a need to reduce the forces which would allow remaining in the current state. Change becomes possible only on the occasion that the existing equilibrium is first destabilized, i.e., unfreezed. When the state of equilibrium has been unbalanced, it becomes possible to unlearn old behavior and adopt new ways of working. (Burnes 2004, 274.)

According to Lewin (1947a), the second stage of change is the moving phase. This stage of the change process can be characterized by the need to make groups and individuals more accepting of the change. Without the support of groups and individuals, it is difficult to create a permanent change. (Burnes 2012, 25.) In the last stage of the change process, i.e., in the freezing phase, the goal is to stabilize the change as a part of the organizational culture and behavior. Therefore, the aim is to establish a new equilibrium and stabilize it as part of the organization's operations. For the change to be successful, in the stabilization phase, the most important thing is that the new behavior must, to some extent, match with the person's behavior, personality, and the norms of the surrounding environment. (Burnes 2004, 274-275.)

Klein (1996, 36) has extended Lewin's change model by combining it with the communications strategy theory. First, Klein's model is based on the presumption that change is positive for the organization. The second assumption behind the model is that the change will proceed provisionally in the organization, and evaluation will be done constantly during the implementation of the change. Based on the findings, modifications can be done even during the change process while still keeping the best practices of change as planned initially. The identified organizational communication activities, objectives, and needs during the different stages of the change process are presented in Table 2.

Table 2. Objectives, activities, and communication needs during organizational change. (Adapted from Klein 1996, 37.)

	Unfreezing phase	**Moving phase**	**Freezing phase**
Organizational objectives	Preparing the organization for change and challenging the status quo.	Starting the process and evaluating pilot efforts.	Reinforcing and institutionalizing the change.
Organizational activities	Planning the change: acquisition of resources, training, collecting data, and soliciting employees' input.	Implementing change in certain areas and monitoring the effects of change. Process modification or fine-tuning, extending the changes as warranted.	Extending the change to other areas and rewarding successes. Setting up monitoring organizational structures.
Communication needs	Explaining the needs and rationales of change, sharing instructions and first steps, reassuring employees, and informing management.	Informing employees of progress, challenging misconceptions, and continuing to reassure employees. Defining and clarifying roles and expectations.	Publicizing the achievements of the change.

3.1.3 Kotter's model

John P. Kotter's change model instead consists of eight steps, which are presented in Figure 5. The word 'step' describes this change model aptly because, like steps, these stages must always be carried out in specific order. Skipping a step would only create an illusion of rapid change, and an illusion can never lead to a sustainable outcome. According to Kotter, failure in change is often due to the neglect of some steps or an inability to implement the stages. (Kotter 1995, 59.) In the first step on Kotter's model, there is a need to establish a sense of urgency, which refers to raising awareness of the need for change in the organizations. It is important because resistance to change among employees may often be due to complacency. In turn, the great complacency can originate from constant hurry, lack of visible crisis, and external performance-based feedback, or having too low-performance standards and narrow goals. (Rajan & Ganesan 2017, 188-189.)

Figure 5. Kotter's eight-step model (Kotter 1995, 61).

While Kotter emphasized a pretty much top-down approach in change management, Pollack and Pollack (2014,51) found it essential to involve all organizational levels in the change implementation. They also criticized the model's linearity by stating that the change process's reality is much more complex and does not usually follow a linear order. Rajan and Ganesan (2017, 182), for their part, summarized the most significant issues in Kotter's model found by researchers during the last few decades. The factors that typically attribute failures while using Kotter's model include, e.g., the inability to create a sufficiently strong governing coalition and the failure to see the importance of strong vision and under-communicating it.

Thereby, Kotter's model can be said to be, in a way, an extension of Lewin's 3-stage change model. Table 3 shows how these theories compare to each other. In Kotter's steps one and two, many similarities can be seen with Lewin's unfreezing stage, where the previous practices must be abandoned. Next, Kotter's steps three through six pretty much correspond to the phase of the moving stage in Lewin's model. New ways of working are adopted at these levels. The last two steps of the Kotter model, consolidating improvements and the institutionalization of the new approaches, in turn, corresponds to Lewin's last stage, the so-called freezing stage.

Table 3. Comparison of Lewin and Kotter's theories of change management (Cummings 2002, 265).

Author	The initial stages of change	The middle stages of change	The final stages of change
Lewin (1947)	Unfreezing stage	Moving stage	Freezing stage
Kotter (1995)	Establish a sense of urgency Form a powerful guiding coalition	Create a vision Communicate the vision Empower others to act on the vision Plan for and create short-term wins	Consolidate improvements and produce more change Institutionalize new approaches

3.2 Change reactions

A rough division of change reactions can be made by dividing them into change resistance and readiness for change. Readiness for change has been described to mean an individual's attitudes and beliefs about the need for changes and the organization's ability to implement those changes (Armenakis, Harris & Mossholder 1993, 681). Resistance to change instead refers to reactions arising from a person's frustration to change combined with a robust group-induced force (Coch & French 1948, 521).

3.2.1 Change readiness

The concept of change readiness was probably first presented by Jacobson in 1957, who studied industrial change from the psychological perspective in the late 1950s (Holt, Armenakis, Feild & Harris 2007, 234; Jacobson 1957). According to Jacobson, at the time of change in an organization, employees often become concerned, for instance, about how the change affects their performance in the new situation and how their tasks will change. Because of these concerns, employees will often develop attitudes that will consequently then actually affect their performance level. (Jacobson 1957, 237.) Readiness for change among employees can be improved, for example, if employees understand the significance of change and feel that they will benefit from it. People are not, in principle, resistant to all

changes in work. If change is perceived as favorable, employees can even look forward to it. (Joshi 1991, 229.)

Change readiness can be reviewed at three different levels: studying either an individual's, team's, or organization's readiness for change (Rafferty, Jimmieson & Armenakis 2013, 110). Holt et al. (2007, 235) state that change readiness means the extent to which a person or group is both cognitively and emotionally ready to accept and embrace a particular plan to change a situation on purpose. Factors that affect employees' readiness for change include change-specific efficacy meaning the employees' capabilities to act according to the plan, appropriateness of the change, management support in the change process, and finally, the personal valence of every employee (Holt et al. 2007, 232).

3.2.2 Change resistance

In the change research, there is a universal consensus that the phenomenon of people's resistance to change definitely exists throughout the organizations. However, Dent and Galloway Goldberg (1999, 25-26) argue that calling that phenomenon change resistance is not the best option since people usually do not literally resist change. According to Kotter and Schlesinger (1979, 107), people often resist change primarily because they fear losing something valuable because of the change. It is then interpreted as people are resisting the change itself. Nevertheless, people are actually scared of losing their status, pay, or comfort. Folger and Skarlicki (1999, 36) state that the change resistance originates from the employees' experience of unfairness in the change process.

Lewin (1947b, 14) defined change resistance by stating that "Only by relating the actual degree of constancy to the strength of forces toward or away from the present state of affairs can one speak of degrees of resistance or "stability" of group life is given respect." However, it must be considered that Lewin's view on change resistance is contradictory to more recent definitions of this concept. For instance, according to Dent and Galloway Goldberg (1999,

30), Lewin's view on resistance to change was a systems phenomenon rather than a psychological theory by any means.

Kotter and Schlesinger (1979, 107-109) found four main reasons why people are resistant to change. The first reason is parochial self-interest, which refers to the fear of losing something valuable due to the change, e.g., one's status or power. The second reason to resist change is misunderstanding and lack of trust. People either do not understand the implications of the change, or there is a lack of trust between the management and the employees. The third treason to resist change is that employees see the situation differently from the management. Employees may see that there would be more costs than benefits as a result of the change, both for themselves and the company. The fourth reason is a low tolerance for change. Often people are resistant to change if they feel that they might not be able to learn the new skills that the change process requires. Later on, Joshi (1991) has added a fifth category to this theory, especially regarding IT system implementations. He stated that changes often require increased efforts or abilities from the users and these requirements lead to change resistance.

Local culture also has an impact on how people feel regarding changes. In short, the term culture can be defined by saying that it refers to the values and attitudes of the members of the given culture. Cultural values are based on deep-rooted beliefs of a person's relation to the social hierarchy, in relation to one's family relationships, and other groups in the surrounding society. (Griffin & Pustay 2015, 123-124.) Hofstede has studied how culture affects management in different countries and what kind of differences can be found between the countries (Browaeys & Price 2015, 32). According to Hofstede's model, the dimension of uncertainty avoidance is related to the level of how resistant people are to changes. For example, Finland's score of 59 (on a scale from 0 to 100) on uncertainty avoidance can be considered pretty high. This dimension defines what kind of mindsets people have against the unknown and how people can handle the future's instability. It also explains whether people are ready to take what is given to them or if they try to control the unknown future by any means. (Hofstede Insights, 2020.)

In working life, uncertainty avoidance is reflected, for instance, in that managers are expected to have accurate solutions for any given issue. Besides, people prefer to have a consensus and avoid conflicts. Consequently, this results in cultures in which uncertainty avoidance is typical; people are usually more resistant to changes because they are worried about what is unknown. (Browaeys & Price 2015, 35-36.) Nevertheless, identifying resistance to change can also lead to something positive. Successful identification of resistance allows the organization to identify the chosen change strategy's weakness, thus creating an opportunity to improve the organization’s approach to change (Rafferty et al. 2012, 129).

3.4 Change management in implementing software and digitalization of logistics

Researchers have found many reasons why change management is an essential topic in supply chain digitalization and IT system implementations during the past few decades. From the viewpoint of successful supply chain digitalization, utilizing change management becomes essential as digitalization significantly changes the working environment (Bierwirth & Schocke 2017, 95). It has also been found that even 75% of IT-enabled changes fail because of employees’ negative responses to change in their tasks and business processes (Markus 2004, 5). For this reason, it is important to find ways to promote change through change management and at the same time reduce resistance to change.

First of all, it has to be mentioned that a software implementation's success often depends on whom this question is asked. Top management typically determines the success of the implementation based on whether the system can provide wanted business benefits and if the other metrics set for the implementation have been met. Instead, the implementation project leaders usually define the success depending on whether the implementation has stayed on schedule and budget. Whereas the end-users of the system often define success based on how smooth it is to work with the new system. (Dezdar & Ainin 2011, 912.)

There are many different kinds of challenges associated with the deployment of information systems. According to Govindaraju, de Bruijin, and Fisscher (2007, 1-6), these challenges can be classified into three different groups, namely: technological, business-process related, and organizational challenges. The first mentioned are mostly related to the complexity of the ERP systems, configuration issues, and customization difficulties. The business process-related changes can be called "content-related" as well. These kinds of challenges usually arise because the systems' design is based on assumptions and generalizations about how companies work in general. The most important question then becomes to what extent enterprise processes can be adapted to fit the software's logic. Ideally, it would be most beneficial for the company to find an information system that would fit well with its existing business processes without too much customization needed. Organizational challenges, in turn, can be addressed as context-related issues. An organization's ability to respond to IT-enabled changes depends heavily on how employees are involved in the change process. This proposal indeed reinforces the need to have an appropriate strategy to manage change in software implementations.

Govindaraju et al. (2006, 7) have made a comparison of Lewin's change model and the information technology implementation model (originally presented by Zmud and Apple in 1989), shown in Table 4. The first three stages of the model take place rather at the organizational level, but the last three stages concern individual usage behavior activities. The first stage, initiation, refers to a situation in which the organization has found an IT system that meets its needs. At the adoption stage, a decision to invest organizational resources for the IT system is made. At the adaptation level, the IT system is available for usage. Acceptance instead refers to users' dedication to using the system. Routinization means that the users are so used to the system that it is no longer seen as out-of-ordinary. Infusion refers to embedding the IT system deeply and systematically into an employee or an organization's work habits. However, these levels should not be thought too harshly, and sometimes they can also occur at the same time. (Govindaraju et al. 2006, 7; Hsieh & Zmud 2006, 3.)

Table 4. Comparison of Stages used in Lewin's Change Model and IT implementation model stages, according to Govindaraju et al. (2006, 7).

Change model stages according to Lewin	IT implementation model stages
Unfreezing and Change	Initiation
	Adoption
	Adaptation
Re-freezing	Acceptance Routinization Infusion

Several different kinds of organizational strategies can be used to promote software deployments. These include, for example, the development and implementation of a change strategy, change management, project management, the utilization of organizational structures and resources, management style and ideology, communication, and coordination of the change process. (Aladwani 2001, 267.) One of the most studied organizational strategies is probably change management in software implementation, specifically in the ERP implementation projects. According to Foster et al. (2007, 239), change management has been one of the most crucial factors determining the ERP implementation's success.

Li, Wu, Zong & Li (2017) found a causal relationship between sharing inter-organizational expertise and the ERP implementation effectiveness. It proved to be useful that companies get their supply chain partners involved in the ERP implementation. Based on the results, three suggestions for organizations were given, as illustrated in Figure 6. Firstly, companies should have proper organizational structures and technological environments to have a base for inter-organizational knowledge sharing. Clear organizational structures can also help companies to minimize employee resistance towards the implementation. Secondly, top management must be involved. Their role is to provide resources and evaluate the consequences of sharing knowledge with external partners. Thirdly, management should take an attentive role in organizational resources managing to enable sharing knowledge with their partners.

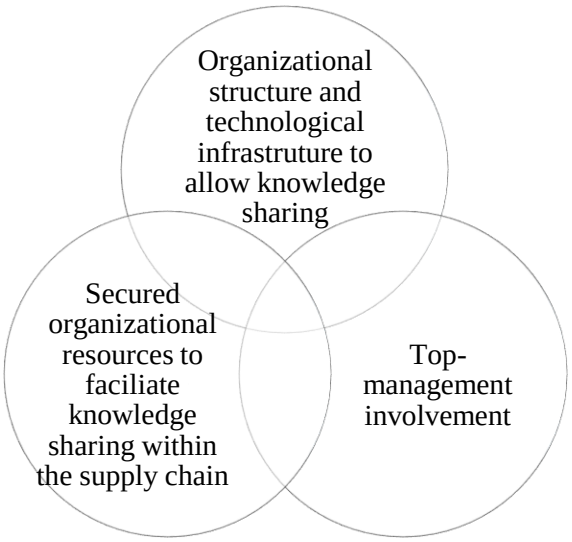

Figure 6. Prerequisites for knowledge sharing within the supply chain in order to facilitate successful ERP implementation (Li et al. 2017).

Quite similarly to Li et al., according to Dezdar and Ainin (2011, 914-915), the most important organizational factors on successful ERP implementations are top management support, user training and education, enterprise-wide communication, user satisfaction, and organizational impact. However, they link the top management support closely with the large-scale nature of the ERP implementations. Thereby, the importance of top-management support cannot be directly applied in smaller-scale software implementation, such as logistics management system implementation.

3.5 User resistance and engagement in software implementations

IT systems are often used as enablers of change in organizations, but the user resistance makes implementing changes both difficult and slow in many cases (Klaus, Blanton & Wingreen 2015, 57). The phenomenon of user resistance has been recognized as early as the late 1950s. Reasons behind the resistant behavior have been studied since the 1970s, but research in user resistance in the ERP system-like implementations has been more common

only during the past few decades. User resistance brings out the gap between the change leaders and the users of the software. When the users are resistant to the change and are more willing to maintain the status quo, they start to behave in an unwanted manner toward the change. (Shang & Su 2004, 149-150.) The phenomenon can be viewed from three different perspectives: people-oriented, system-oriented, or interaction theories. According to the people-oriented point of view, the resistance originates from the users or groups themselves. Meanwhile, from a system-oriented point of view, the resistance is due to the system characteristics. Interaction theories link the origin of the resistance to the interaction between the users and the system. (Jiang, Muhanna & Klein 2000, 26.)

According to Shang and Su (2004, 151), typical user resistance behavior occurring in software implementations can be classified into three categories, as shown in Table 5. By non-destructive resistance, they refer to employees' attempts to eliminate contact with the system completely. Proactively destructive resistance instead means attempts to directly damage the new system's implementation, e.g., by sabotaging the process. Whereas passively destructive resistance refers to more passive ways of damaging the implementation process.

Table 5. Resistance Behaviors, according to Shang and Su (2004, 151).

Type of Resistance	Resistance Behavior
Non-destructive	Requesting job transfer or withdrawal from the job Increased absenteeism or tardiness, Communicating negative feelings to co-workers
Proactively destructive	Deliberately sabotaging work process Making careless mistakes
Passively destructive	Refusing to co-operate with co-workers Neglecting work assignments Wasting time and making minimal effort to improve one's own knowledge and skills Accepting inferior quality performance Dissonance with consultants

Aladwani (2001, 271-272) has highlighted the need for extensive training in software implementations as a way to manage user resistance. According to him, arranging hands-on training for the users makes it easier for them to adapt to the change, as they can then see the benefits of the system in practice. According to Klaus et al. (2015, 65), user resistance in software implementations can be prevented by creating and utilizing a clear and extensive strategy to manage the resistance behavior. They identified three categories of management strategies to minimize user resistance in the IT-enabled changes. Those categories are effective communication, effective education or support, and effective direction or planning, as shown in Table 6.

Table 6. Management strategy framework, according to Klaus et al. (2015, 65).

Management strategy	Construct	Definition	Examples
Effective communication	Top-down communication	Top management or implementation team communicates to users.	Communicate the types of upcoming changes, benefits of the system, goals, and vision, the "whys" to users.
	Listen to feedback	Management listens and responds to the user input.	Distribute/collect questionnaires, address complaints.
Effective education/support	Provide help/support	Management offers assistance to users.	Have consultants or helpline available to provide a support system for interaction with the system.
	Training	Train the users at an appropriate time so that it suits their needs.	Trainers with knowledge and communication skills, address the needs of trainees, appropriate time frame.
	Incentives	Suitable motivators for users to learn and use the system.	Incentives to take training and to do extra work.
Effective direction/planning	Clear consistent plan	Straightforward, consistent strategies.	Clear direction, consistent management strategies, follow through with plans.
	Management expertise	Management understanding of processes and the system.	Decision-makers understand both the system and existing processes in detail.
	System customizations	Customize the system to fit in the existing processes.	Tailor the system to fit the users' preferences and needs.

4 METHODOLOGY AND DATA COLLECTION

In this chapter, the research methodology and data collection process of this thesis are introduced. This study is conducted as a qualitative research, and data collection is empirical. Qualitative research can be seen as a parent category since it does not cover only a single entity, but it is characteristically multidimensional and pluralistic. It is due to the fact that a diverse range of procedures, techniques, and tools can be used in qualitative research. (Punch 2005, 135). Typical research design in qualitative research is to find out how or why something happens. Using empirical research methodology means that data is collected from the so-called 'real world,' and the data will not be processed through an artificial model (Ellram 1996, 96.) The interview data of this study consists of eight interviews from the case company. All the interviewees represented the company's project logistics department.

4.1 Case study methodology

This study was conducted as a case study. This research method was chosen based on the research problem, and the case study method was selected since it can be used as a research method when investigating an issue or a case that cannot be separated from its context. Typical research questions in case studies begin either with the word how or why. This study method is usually used in studying phenomena related to individuals, groups, or organizations. There are six major sources of evidence used typically in case studies, which are the following: archival records, direct observation, documents, interviews, participant-observation, and physical artifacts. (Yin 2009, 2; 101.) In this case, interviews and participant-observation were used as sources of evidence.

As there was only one case company used in this research, this is a single-case study. The most significant benefit of single case studies is the possibility to study the case more intensely than it would be possible when studying multiple cases at once. On the other hand, the disadvantages of single-case studies are mostly related to the inadequacies that are due to having small data. The possible shortcomings include issues such as the risk of

exaggerating the results of the single case. (Voss, Tsikriktsis & Frohlich 2002, 203.) Ellram (1996) has studied the case study methodology, especially in the logistics context. Her research on case study methodology also proves that case studies suit well for building theories as case studies can provide very detailed information on best practices in logistics management.

4.2 Case selection

The case company in this study is an internationally operating technology company which is headquartered in Finland. The company offers a wide range of equipment, services, and complex project solutions for customers in various industries around the world. The case company's customers typically operate, for instance, in the fields of minerals processing or metals refining. The author of this thesis works at the case company, and the topic was offered by the case company's project logistics department, which was part of the company's supply organization at the beginning of this project. Project logistics specialists and managers working at the case company are responsible for managing the logistics operations in capital projects, which can be either smaller equipment delivery projects or bigger and more complex plant solution deliveries. The sales value of capital projects at the case company can vary from less than one hundred thousand euros to several hundred million euros. The project logistics employees' tasks at the case company include planning and managing logistics operations, including transportation, warehousing, and customs clearance arrangements. The logistics operations at the case company can take place around the globe.

The case company merged with another company in the summer of 2020, which made the theme of change management even more topical for the case company. Before the merger, the case company had around 4,000 employees globally, and its annual turnover was EUR 1.3 billion in 2018. Due to the recent merger, official annual financial statements for the new company are not so far available. However, the two companies' total illustrative combined sales were in total EUR 4.2 billion in 2019. After the merger, the new company has

approximately 15,000 employees working in over 50 countries. Thereby, the merged company became one of the top three players in its field worldwide.

4.3 Data collection

In this study, the evidence was based mostly on interviews. There are different kinds of classifications for interviews, but the simplest way to classify interviews is to divide them into three groups: structured, semi-structured, and unstructured interviews. The interview method selection depends on the purpose of the study, the need to create personal contact, the data collection requirements, and the time limit for interviews, and the completeness of the process. (Saunders, Lewis & Thornhill 2016, 390-393.) In this case, semi-structured interviews were used for the data collection as it fits best for this study. As the name implies, semi-structured interviews are only partly standardized. It means that the themes of the interviews are predetermined, but questions may vary from interview to interview to reflect the given context and, specifically, the flow of the conversation. To conclude, the nature of semi-structured interviews makes flexibility possible during the interviews. (Farquhar 2012, 73; Saunders et al. 2016, 391.)

According to Yin (2009, 102), the interview method's advantages in case studies are focus and insight. The focus is directly on the topic of the case study, and the interviews provide information about the observed cause-and-effect relationships as well as the explanations for them. Weaknesses in the use of interviews, on the other hand, may include, for example, bias due to poorly articulated questions, response bias, or inaccuracies caused by poor recall. Reflexivity must be considered, and interviewees tend to say what they think the interviewer wants to hear. In this case, these problems were avoided by emphasizing the confidentiality of the interviews and, on the other hand, also emphasizing the fact that only truthful answers will help to develop processes in the future.

All the interviewees of this research were employees of the case company, and all of them worked on project logistics. Prior to the interviews, two separate target groups had been

identified. The first target group was the development and deployment team of the new logistics management tool, and the second group was the end-users of the software. The purpose of interviewing someone also from the deployment team was to gather information on the implementation project itself. The aim was to determine why the company wanted to acquire a new information system, how the implementation was planned, and what goals had been set for it.

In contrast, the main target group for the interviews was the software's end-users to study their perspective on the implementation process's success. The aim was also to interview at least one key-user to find out what their role was in the implementation project and how they have experienced it. Since the case company operates globally, and the software has been implemented globally, the interviews must reflect this situation as well. So, the interviews could not be limited to Finland but must cover the case company's other global entities too.

The interviews in this study were conducted as individual interviews. There were in total eight interviews; five of the interviewees work in Finland and three in the case company's other global entities. The main selection criteria for the interviewees were that they worked on project logistics and had been involved in the software implementation. The interviewees working in Finland were chosen to represent people working with as many different kinds of projects as possible. In this case, the typical size of the projects the employee usually handles and a variety of destination countries were used as determinants. The aim was to obtain as diverse information as possible on the topic of how the implementation of the system has been experienced in various kinds of projects. In the case company, a project logistics employee may either be working on only one large project for a long time, while a person working on smaller projects may have a dozen active projects simultaneously. Interviewees working outside Finland were chosen in a way that all of them would represent a different market area. They were located in Sweden, China, and Mexico. A summary of the interviewees can be seen in Table 7. To maintain the interviewees' anonymity and confidentiality, all interviewees were given an identification code. The duration of the interviews varied between 25 and 75 minutes.

Table 7. Interviewees of the study.

Title	Length of the interview	Area	Interview theme	Code
Logistics Specialist	50 min	Finland	End-user experience	LF1
Logistics Specialist	32 min	Finland	End-user experience	LF2
Logistics Manager	36 min	Finland	End-user experience	LF3
Logistics Manager	75 min	Finland	Key-user role and experience	LF4
Sourcing Manager, Logistics	56 min	Finland	Background of the implementation process and the objectives of the implementation	SM
Logistics Manager	45 min	Other global entity	End-user experience	LO1
Logistics Specialist	25 min	Other global entity	End-user experience	LO2
Logistics Specialist	30 min	Other global entity	End-user experience	LO3

The researcher's position is affected by the fact that the researcher also works at the case company. As the researcher was already a familiar person to most interviewees, it made it easier to create an open and confidential atmosphere. All interviews were conducted in June 2020 over a few weeks. The aim was to complete the interviews before the merger with another company took place. The reason behind that objective was that all interviews could be conducted in as a similar situation as possible. One benefit of conducting all the interviews within a short timeframe is that all users would have approximately the same length of experience using the program. Due to the tight schedule and summer holiday season in the Northern Hemisphere, it was impossible to find a suitable interview time with all potential interviewees.

Three of the interviews were conducted in Finnish and five in English, depending on the interviewee’s language skills and their preferred language. All interviews were conducted remotely, both due to the COVID-19 situation and because of the long distances for some interviewees. Microsoft Teams was a natural selection as a communication platform since it is the official distance communication platform at the case company, and thereby, it was

familiar for both the interviewer and the interviewees. Interviews were conducted audio-only, as there has not been the habit of using video in the meetings between project logistics employees in the case company. All interviews were recorded by using the recording functionality of Microsoft Teams. Permission to record was asked at the beginning of each interview, and each interviewee gave permission. In addition to recording the interviews, notes were also taken during the discussions.

In connection with the interview invitation, a list of interview questions was sent to the interviewees to allow them to prepare for the interview. Three different sets of questions were made because the interviewees represented three groups. The first group consisted of end-users of the system, a total of six of whom were interviewed. Second, the role and experiences of key-user in the implementation were discussed with one interviewee. Third, the Sourcing Manager, Logistics (from now on referred to as SM), was interviewed to discuss the background of the implementation process and the goals of the implementation. The lists of interview questions can be seen in Appendices 1-3. Appendix 1 includes the questions for the end-users, appendix 2 for the key-user, and appendix 3 for the SM. As these interviews were semi-structured, the list of questions only served as a general structure and plan of the interview. Additional questions were asked from the interviewees according to the conversation flow and depending on the interviewee's responses.

Also, observation was used as a secondary data collection method in this study. The author of this thesis has worked at the case company's project logistics team since April 2019 and has also taken part in the software implementation process as an end-user. In addition to the practical experience of implementing and working in the project logistics team, the author also had access to internal material at the case company. This method is also called participant-observation, meaning that the author, in fact, takes part in the event the research relates (Yin 2009, 111). When several different kinds of qualitative research methods are used, then the study can be called multi-method qualitative research (Saunders 2016, 168.)

4.4 Data analysis

Case studies are typically mostly based on inductive reasoning, as case studies create new theories rather than test existing theories (Farquhar 2013, 29). However, when considering the theoretical perspective of case studies as well, it becomes possible to link a case study to the theoretical knowledge of the subject area. Simultaneously, it creates a basis for the analytical framework for the study's data analysis (Saunders 2016, 570). The combination of inductive and deductive reasoning is called the abductive approach, which is the data analysis method used in this study. In abductive research, theory-based reasoning guides the analysis, but methods are not limited to theoretical reasoning alone. (Ketokivi & Choi 2014, 234.)

The use of an abductive method of reasoning can also be justified because a suitable model describing change management in the implementation of similar software was not found. Change management has been studied extensively in the ERP systems implementation, but the ERP implementations usually concern a more extensive range of operations than the LMS system, and thereby the risks are more notable too. For the above reasons, an ERP implementation's overall impact on the organization’s overall performance is more significant than implementing software limited to a narrower business area. The implementation in question in this study is small on a company-wide scale, and therefore the risks are relatively low. It should also be noted that the company’s old way of managing project logistics was enabled by using tools included in the Microsoft Office package such as Word or Excel. If the new logistics software implementation had encountered significant problems or even failed, returning to the old way would have been easy from a practical point of view. For this reason, it is important to exercise caution when applying theories related to ERP system implementation to a case like this.

The data analysis of this research was initiated by transcribing the interviews at a rough level. The clean-written material was then collected into one excel file, and the material was arranged according to the themes of the interview framework. A few categories were added

along with the themes that repeatedly emerged in the interviews. Responses were divided into all categories to which the response was interpreted to relate. These categories can be seen in Table 8. The material was then reduced according to the following principle: answers that were irrelevant to the study's topic were omitted from the data.

Moreover, similarities and differences between the theory and interview material were sought in the condensed material. This kind of data classification made it possible to find recurring relevant findings and then, later on, compare the interviewees' responses. When processing the data, the aim was to find answers to the main research question, i.e., to analyze how to manage change in logistics management system implementation successfully. There were also single comments that were considered relevant but did not fit any of the other categories. The last category, “other comments,” was created for that purpose.

Table 8. Categories created based on the analysis of the interview data.

1. Project logistics management before the new system
2. The effectiveness of the old way
3. Satisfaction in the old way
4. Expectations for the new system
5. Concerns about the new system before the implementation
6. Satisfaction on user rights
7. Satisfaction on communication during the implementation process
8. Received training
9. Satisfaction with the training
10. Own competence after training
11. The success of the implementation
12. Proposed changes related to the implementation
13. Bottlenecks on the implementation
14. Benefits of the new system
15. Need for further training with the system
16. Challenges faced with the new system
17. Ways to solve problems with the new system
18. Satisfaction on the received support
19. The impact of the software on logistics performance
20. Other comments

Anonymized and preliminarily processed, and classified interview data was shared with the case company's project logistics department management in November 2020. Preliminary results of this study were distributed already at this stage so that the management of the

project logistics department would have all the information available when making plans for expanding the implementation in early 2021. After that, data processing and analysis were continued at a more detailed level.

4.5 Reliability and validity

Common misconceptions related to case studies include the assumption that rigorous design methodology would not be used, and because of the nature of the case study methodology, the results could not be generalizable (Ellram 1996, 94). However, a theory also plays a vital role in the case of studies. It is due to the fact that the theory is used to limit a case to a specific area of research. In this way, research can provide more information for this limited research area. Four dimensions should be considered when verifying the quality of a case study research: construct validity, external validity, internal validity, and reliability of the study. These dimensions have also been called four tests. These have been historically used, especially in the evaluation of the quality of empirical social research. (Yin 2009, 35; 40-41.) Stuart, McCutcheon, Handfield, McLachlin, and Samson (2002, 425) state that the most critical dimensions for evaluating a case study are construct validity and internal validity. It is because case studies aim to study an individual case as accurately as possible.

Construct validity means that the study has been conducted by appropriate means. This perspective is taken into account in this research, for instance, by describing the data collection as precisely as possible. Using multiple sources of evidence and having key informants to review the draft case study report increases the study's construct validity. Internal validity refers to whether the cause-and-effect relationship arising in certain circumstances and the research environment is reproducible. Data analysis is the stage where internal validity is built, and, thereby, proper use of analysis methods and using logic methods are essential for this test. (Stuart et al. 2002, 430; Yin 2009, 41.) The internal validity of this work has been improved by interviewing multiple end-users. Thereby, the importance of an individual interviewee's answer decreases, and it becomes possible to see whether the same themes are repeated in several interviewees' responses or not.

The level of external validity can be measured by whether the results derived from the project served as the study's context can be generalized outside the project. External validity is reinforced in the research design phase by establishing a detailed understanding of the research context and the phenomenon under study. For this understanding to be conveyed and verified, the research's limitations must be described in a reasoned manner. (Yin 2009, 41; Stuart et al. 2002, 430.) Indeed, the findings of a single-case study cannot be statistically generalized, but the analytical generalization is possible if research is appropriately conducted (Kähkönen 2011, 39).

Nevertheless, the results of a case study can be useful, for instance, for clarifying existing theories or bringing additions to them (Yin 2009, 47). To achieve this objective, this study's aim has been limited to change management in software implementation and utilization of digitalization in logistics management as precisely as possible. If the research does not have a clear focus, the generalization of research results becomes more complicated.

Finally, the study can also be evaluated based on its reliability. The results of a study that can be considered reliable research are neither random nor research dependent. Instead, the results would be repeated in the same way if someone else were to repeat the study. Another key concept related to reliability is transparency. It is possible to improve reliability by accurately documenting the different phases of the study. (Farquhar 2013, 103.) By doing so, the reader of the study will know precisely how the study was done, and thereby, the reader will also be able to evaluate the study's reliability.

5 EMPIRICAL PART

This chapter presents the research's empirical results and forms a picture of change management in logistics software implementation and digitalization utilization in logistics management at the case company. The empirical results of this study are presented by following Lewin's model of change management. The empirical part is divided into three subsections, according to Lewin's theory. The first section presents the initial situation at the case company before the change process (Lewin’s unfreezing phase), and the objectives of the implementation are discussed as well. The second section (Lewin's moving phase) discusses the actual change process at the case company. Then, lastly, the third section (Lewin’s unfreezing phase) discusses the outcome of the change process.

5.1 Implementation project in the case company

The starting points of the implementation at the case company were quite different in Finland and other countries, as, in Finland, there was quite a big team in project logistics, and face-to-face support could be arranged for the end-users as well when needed. At the beginning of the implementation project, there were around 35 employees at the case company. They either worked only on capital projects logistics or handled logistics operations in capital projects alongside services logistics. The Finnish project logistics team consisted of 10 employees and one trainee. Meanwhile, two of the interviewees located outside Finland were the only logistics users of the system in their locations. Thereby, this analysis is also intended to pay attention if there are major differences in the answers of the Finland-based interviewees and interviewees located in other countries.

Before implementing this system, the case company had previously attempted to acquire an information system for logistics management several years earlier, but these trials had ended in non-performance due to a lack of management support and resources. Small-scale testing with the chosen logistics management system was conducted already in summer 2018 at the case company. However, the testing did not lead to further actions either this time as the top

management of the supply organization did not give approval, and because of lack of resources for the implementation. The management's approval was received in 2019 and, the new logistics management tool to be used in project logistics management was introduced for the end-users at the end of the year 2019. Prior to the actual implementation, a pilot was organized. The pilot started in the summer of 2019, during which some of the future end-users had the possibility to test the software and give feedback about it. The official launch for the end-users took place during Q4 in 2019.

The case company has three different roles for the logistics users within the logistics system, as presented with the responsibilities in Figure 7.

Super users	Key users	Logistics users
• Contact point to the software provider • Escalation contact and support for key users • Development and customization of the software	• Access rights for logistics users and package engineers • Opening of new projects • Make changes in the project setup e.g. available templates • Support for operational users and assistance in immediate operational issues • Contact point for development initiatives	• Request packing information from the suppliers • Request package engineers to check the packing information • Planning and preparing of shipments • Issue and archive shipping documents

Figure 7. Tasks and user rights of logistics users in the SMM system according to the user role.

The implementation team was led by the Senior Category Sourcing Manager, Logistics, and supported by the Process Owner of Supply Base Management, Sourcing Manager, Logistics and Director of Supply Operations, Germany. During the implementation period, most project logistics employees did not work under these managers, except the German project

logistics team, who reported to the Director of Supply Operations, Germany. In Finland, the project logistics employees were instead positioned under the procurement department, and their manager was not part of this implementation team. Meanwhile, logistics departments' organizational arrangements in other countries varied, but all logistics employees reported to local managers located in the same area as where they were working. It is also worth noting that the case company could not arrange any additional human resources for the implementation process. In practice, the active management of the deployment project was handled only by two managers. The entire implementation was handled by existing employees alongside the operational work and their other tasks.

The company did not set any specific numeric targets for the implementation, but the need for modernization of work methods and transition to digital data processing was huge. In the first phase of the implementation, most of the efforts were targeted for Finland and Germany, as these countries have the biggest project logistics organizations. The reason for this decision was that in smaller entities, the benefits of immediate implementation were not seen as beneficial as in the bigger entities. There can only be one or just a few employees in charge of the logistics in the case company's smallest entities. These employees are usually loaded, and they often handle both capital projects and services (including services projects, project spares, and standard spare parts) shipments.

One of the biggest challenges with the small entities is that these employees are not working under the implementation leaders' supervisory power. It is impossible to provide local face-to-face support in these areas, but support can be provided only remotely. Having only remote support available can be problematic, especially if the issue is not just about solving a technical problem, but the employee would also need motivational support to face the change and overcome their uncertainties related to the new system. Thereby, the implementation's success heavily depends on these workers' attitudes towards the implementation and their personal capabilities to learn how to use new systems. Meanwhile, in Finland and Germany, it has been possible to organize support on the spot for the users if needed. In these locations, users who had needed help with the system could have received

support either from their peers, or personalized training could have been arranged face-to-face.

The merger with another company, which was introduced in July 2019, of course, caused some uncertainty for the implementation project. The company still felt it necessary to keep developing its operations further and decided to carry out the project as planned. In contrast, according to SM, the COVID-19 pandemic was not perceived to pose any major challenges for the implementation process. Even before the onset of the pandemic, various distance training and meetings were common in the organization.

5.1.1 Initial state of project logistics management in the case company

All the interviewees, both in Finland and in other countries, said that they had not had any actual logistics software in use before the implementation of the new logistics software. Logistics planning and shipping documents were handled mainly with Microsoft Excel. All Finland-based employees mentioned that they had used an Excel document generated with macros to create shipping documents. The Excel-based packing list generator was coded by an old employee of the company approximately ten years ago. This Excel application no longer worked properly, and because its creator had not worked for the company for years, it had been very difficult to fix the deficiencies of the application.

With the Excel-based solution, logistics employees were able to create most of the shipping documents such as packing lists, shipping marks, commercial invoices, and container loading lists based on the information received from the suppliers. There was a specific template for suppliers to fill in the packing information. Once the logistics employee received the filled template, they could copy and paste the information to the excel-based packing list generator. Interviewee LF4 pointed out that many suppliers knew the old process so well that they could actually fill the template without even asking. Logistics employees in Finland also utilized data from the company's ERP system (e.g., sales order and purchase order data).

At the same time, the company was managing all services logistics operations in the ERP system, but it had been found that managing project logistics was not possible in that system. It was due to the complex nature of the project logistic operations and one-time implementation. To put it more precisely, the main issue in using the company ERP in capital project shipments is the lack of itemized material data for project purchases and sales. It is impossible to issue shipping documents with the company ERP without having the purchase orders and sales orders broken down on an item level. Instead of itemized material data, the case company used category items on purchase and sales orders on the capital project business. On top of the packing list generator, other Excel documents were also in use, such as a logistics plan, which is a simple Excel document without any macros. In the case company, logistics employees are instructed to create that logistics plan at the beginning of each project and update the plan throughout the project implementation.

Finnish-based logistics employees mentioned the flexibility of the old way of working both as an advantage and disadvantage. One of the positive things, for example, was that the employees were able to perform their tasks in whichever order they wanted or needed to. The system was also very flexible for any special requirements for the documents. Special requests could come either from the customer or in some destination countries; special requirements for the documents could be in place for customs clearance purposes. On the other hand, each logistics employee could use the Excel-based packing list generator a bit differently. Sometimes, when employees needed to substitute someone during the holidays or search old projects for some reason, it was not always easy to understand the logic of how the setup for the project had been made. Due to the system's infinite flexibility, also the layout of the documents created with the packing list generator could vary depending on who had made the documents. From the company perspective, the flexibility and almost unlimited editing possibilities meant that the used document templates were not, in fact, harmonized even in Finland, as they should have been.

Another issue in Finland was that the finished documents were archived in project folders in the network drives according to the company guidelines. Getting access there required

sending a ticket to the global IT service desk and getting approval from the project manager for the access rights. This way of working also caused problems during the holiday season and when old projects needed to be investigated. Getting the access could take even several days, which is a long time, for instance, in case a shipment is stuck in customs, and the documents should be revised. In the new system, access rights for the logistics users to the projects can be given by all key and super users based on a simple request without any bureaucratic process.

Finland-based interviewees mentioned that the Excel-based packing list generator had other major disadvantages as well; for example, it could collapse unexpectedly. Even though it was just an Excel document, in the end, it was too heavy to run for the logistics employees' computers. For example, creating documents with the system could hang the computer completely. Interviewees LF 2 and LF3 mentioned that converting large amounts of documents from Excel's xlsx format to pdf format could take even hours. It was also mentioned that if there were any mistakes in the documents, it took a lot of time to fix the issues. The choices were either fixing the issue in every document individually (commercial invoice, packing lists, shipping mark, et cetera) or correcting the mistake in the packing list generator and converting the files again.

Even though the Excel-based packing list generator was not extensively used outside Finland, but similar to Finland, all the interviewees in other countries reported that they had been relying on Microsoft Office tools, such as Excel and Word. Interviewee LO3 summarized the issues of the old way of working by stating that because there was no information system in use, they had to *"invent the wheel again for every single project."* Interviewee LO1 reported that the lack of any logistics management system made the revision control difficult. As there was no software in use that would have helped keep up with the changes and revisions, the revision control was quite purely based on each employee's personal diligence. Human mistakes were not rare, as it was easy to forget to correct the mistake in some of the documents or accidentally use a wrong revision of the document. As there were often many revisions of the documents, it was not easy to find what has been changed and know which revision is the correct one.

Many interviewees pointed out that it had been confusing that all entities had used their own templates for the shipping documents even though there had been harmonized document templates available. As the case company may deliver to the same customers and the same sites from several different entities, it can be confusing to receive documents with different layouts from every entity of the case company from the customer's viewpoint. The case company had sometimes received negative feedback from their customers because of the confusing shipping documents. Some interviewees even said that the old way of working felt so unprofessional that it was even a bit embarrassing how bad it looked like in the customers' eyes. In some cases, the fact that each entity had its own templates could have also been confusing for the suppliers, as some of the case company's suppliers had contracts with several entities and all entities asked them to fill a different kind of excel document to supply the packing information.

Interviewees' satisfaction with the old way of working varied a little bit. Finland-based interviewees commented that without having an alternative, the Excel-based packing list generator was helpful as it made it possible to create multiple documents at once. Outside Finland, interviewees LO1 and LO3 were not satisfied at all with the previous practices. Interviewee LO2 was rather satisfied because of the easiness and flexibility of the old way. However, LO2 recognized that the old way of working was confusing. Overall, it can still be said that before the implementation of the new logistics management system, the case company had managed its project logistics operations almost totally manually. Most of the interviewees stated that the old way of working was not efficient at all. Interviewee LO3 stated that it was not causing extra work only for logistics employees but also for package engineers who are responsible for approving the packing information according to the company guidelines.

5.1.2 Drivers for change in the case company

The need to modernize project logistics working methods at the case had been identified already in the early 2010s. However, this need had not previously been raised on the company's priority list so that concrete implementation of any logistics management system would have been started. Planning for the implementation of this system finally began concretely in 2018. The main reasons for acquiring the software are shown in Figure 8. The first of the reasons was to keep up with the development. It was well-known that the company's working methods needed to be modernized and digitalized to have project operation logistics aligned with the company's IT and digital strategy. Project logistics management at the case company was previously handled with deficient tools, which led to additional costs and delays, mainly because manual work methods expose to errors. Different offices also had different working methods and document templates in use, even though there had been globally harmonized project logistics processes, guidelines and templates created. The case company's customers could have been confused when they received shipping documents with a different layout from different entities. The case company also had sometimes received negative feedback from the customers because of the varying document templates and errors in the documents.

Figure 8. Main reasons for acquiring the new software for project logistics management.

Also, interviewees both in Finland and outside Finland recognized that the old way of working was somewhat old-fashioned and inefficient. All interviewees also had at least rather positive expectations for the new system. All of them had recognized the need to modernize the work methods in project logistics and have some kind of information system in place.

5.1.3 Barriers for change in the case company

According to the SM, the company prepared for the resistance to change mostly by determining the most important entities where it was most critical to complete the implementation successfully and commit the users to use the system. It was also perceived as a challenge that end users did not work under a single supervisor. On the other hand, due to the project logistics organization's relatively small size, the deployment team knew all the end-users quite well. It was thus possible to anticipate how different people are likely to react to change. If necessary, special support could be targeted for users who need more support during the change process.

The end-users' main concerns related to the implementation of the new system are presented in Figure 9. The majority of the concerns were related to the company's upcoming merger with another company. There were several different concerns mentioned related to this theme. First was how it would affect the implementation. Interviewee LF3, who had been chosen to participate in the pilot, had worried if the pilot would be canceled because of the merger. Several interviewees said their major concern was that a new system would be introduced after the merger. Many interviewees thought that maybe it is not worth it to learn to use a new system at that point as the system could be changed soon again.

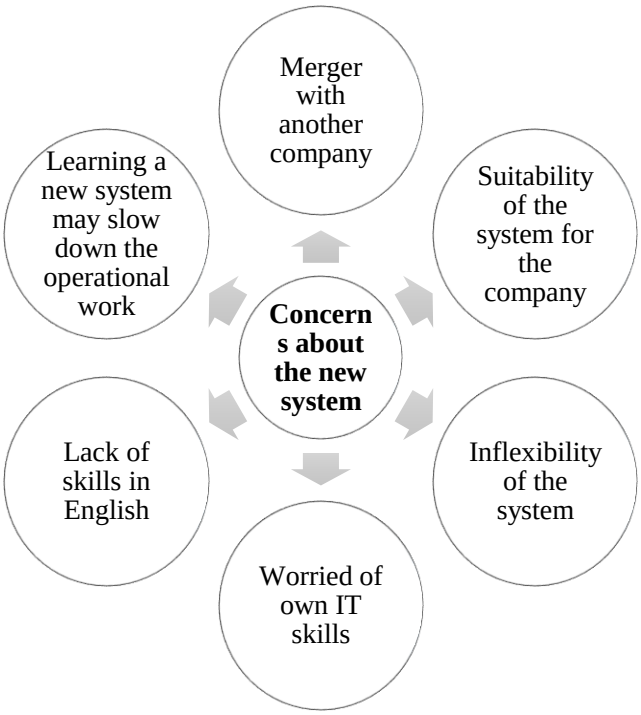

Figure 9. Interviewees' main concerns about the new logistics management system and the implementation process.

Interviewees' concerns related to the suitability of the company's system were related both to its suitability for the company's business in general and the functionalities of the system. Interviewee LF2 thought about whether it would be possible to create shipping documents with the system that will be accepted in those destination countries with strict customs requirements. Interviewee LF4 had wondered if the system would be planned and designed by someone who does not understand the company's business and the system would not, therefore, work for the company.

As the previous way of managing project logistics operations at the company had been very flexible, the interviewees also had concerns about the new system being too inflexible. Related to this theme, interviewee LO1 also mentioned a concern about making mistakes and how difficult it would be to correct those mistakes in the system. Interviewee LO3 was also worried about her personal capabilities to learn to use a new system. Interviewee LO2 pointed out that all end-users at the case company might not have sufficient English skills to understand the manual completely.

Interviewee LF3 pointed out the concern of how much time and effort will be needed to learn to use a new system aside from the operational work. LF3 also thought that the learning phase would probably slow down the operational work. This interviewee also pointed out that there are always bugs in new programs. Thereby, it is very likely that at the beginning, it will make the operational work more difficult as the logistics employees will have to learn the new system at the same time when keeping the operational work going.

5.2 Transition

This section discusses how the transition phase of the implementation succeeded in the case accompany. This chapter will focus especially on how training and communication of the change process had been managed at the case company. The new information system chosen for project logistics management is a cloud-based logistics management system. Inside the case company, the system has been called Supply & Material Management (SMM) system. The software is designed especially for project logistics management, e.g., managing logistics in large-scale plants or building sites. In the system, there are functions available for managing logistics all the way from manufacturing to material management at the site. The system is also integrable with other software such as the ERP systems or different kinds of invoicing tools. At the case company, the system will also work as an official archive for the project logistics documents.

In the new system, an Excel document called the "Packaging list mailer" template is sent for suppliers to fill in the packing information. This excel is prepared with macros, and it has to be filled in correctly so that the information can then be directly uploaded to the system. If the template is filled incorrectly, the system will notify which cells are missing information or have been filled incorrectly. The excel has extensive instructions included, but almost no supplier has managed to fill the template perfectly at first try without further instructions.

Training and communication during the implementation phase

As previously mentioned, Klaus et al. (2015) have stated that effective communication is a key strategy to manage user resistance in IT-enabled changes. Thereby, this theme was also discussed with the interviewees. According to SM, communication on the change was mainly targeted at those working in project logistics, and communication to other departments was limited. The main communication channels for the change were Teams-channel and bi-monthly organized global logistics community calls. SM states that it was a conscious choice that there was not much communication for internal stakeholders at the case company or to the suppliers. It was considered that any issues would be handled by the operational project logistics person together with the supplier when those come up.

A timeline of the implementation can be seen in Figure 10. Primary system testing and a pilot were organized during quarters two and three in 2019. The first training for the end-users was held in December 2019, and it was targeted for the biggest and most significant market areas, including Finland. In contrast, the second training was held in February 2020, mainly targeted at logistics users located in smaller market areas.

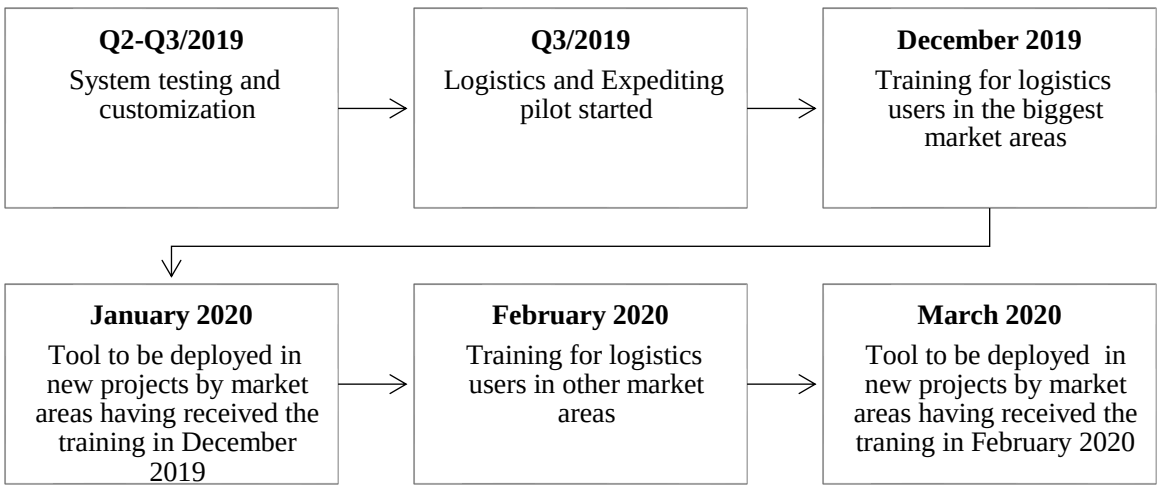

Figure 10. Timeline of the implementation for logistics users at the case company.

It was discussed with all the interviewees what they thought about the communication before and during the implementation and did they think they had received enough information. The opinions of the interviewed end-users on the success of the communication varied. Interviewee LF1 reported that everyone themselves had to seek information, and there was not much communication about the change process. LF1 would have preferred clearer communication during the implementation. Interviewee LF2 commented as well that there was not much communication, just an announcement that this kind of tool will be coming.

Interviewee LF3 had participated in the pilot phase, and he/she was happy with the communication inside the pilot group. Interviewee LF4 had also been part of the pilot but stated that the communication could have been handled better. LF4 mentioned that he/she had personally learned a lot by asking for help from others, so it would have been great to gather everyone in one place, also employees working in other countries. It was not an efficient way to have a call with the market area users and tell them to use the new system whenever they have a new project starting. Interviewees located outside Finland were less critical, and all of them were rather satisfied with the amount of information they had received. LO3 commented that MS Teams had been a great platform for communication.

The interviewees' experiences of the training clearly varied. Interviewee LF1 had participated in the arranged training session but felt that the training has still been mostly based on self-learning. LF1 commented that he/she did not really learn anything during the training session but learned to use the software by reading the manual and practicing herself. Interviewee LF2 could not remember anything about the training session and was not sure if he/she has participated or not. Interviewee LF3 neither did remember properly what kind of training he had received, if any. He thought that learning had been mostly on everyone's own responsibility, but this was not a problem for him personally. Interviewee LF4 thought that there might have been a common training session at the beginning of the pilot project in which he/she had participated. The learning had still been mostly based on reading the manual and testing the tool in a training environment. LF4 had been otherwise satisfied with the training, but he/she did not have enough time for self-learning aside from the operational work. Outside Finland, only interviewee LO1 had participated in the training. However, LO1

did not feel confident after the training and had had to do much self-learning. Personally, LO1 was comfortable with the amount of self-learning as a way of learning to use the system. LO2 and LO3 had not participated in the training, and both had received personal help from the key or super users.

At the time of the interviews, all the interviewees also stated that they did not feel that they would need any more training for the system's basic use. Interviewees LF3 and LO2 commented that they do not need more training for their daily tasks, but they would like to learn to use the system in a more advanced way. If someone organized training to teach the more advanced functionalities of the system, they would be happy to participate. Interviewee LF1 commented that further training would only be needed if some bigger changes would be made in the system. Interviewee LF2 instead mentioned few functionalities in the system, which he/she did not know when those functionalities should be used and how those should be used in practice.

In addition to the training sessions, the end-users were also given a manual for the new system. The manual was written in English, and it had extensive instructions with screenshots of how to use the system. For instance, version 1.1. of the manual published in April 2020 was 129 pages long. Some of the interviewees commented that the manual is too heavy, and it is written in too complicated English. The sentences are long, and the vocabulary used is unnecessarily difficult. Thereby, finding the correct instructions and understanding the text takes a lot of time. Some interviewees mentioned that they had needed to use a dictionary to read the manual. Interviewees LO1 and LO2 commented that they had solved the issue by writing a shortened version of the manual in their local languages themselves.

The theme of user rights and each interviewee's satisfaction with user rights was also discussed with the interviewees. The reason for this was to find out if the user rights and amount of key and super users are on the correct level and enough support has been offered for the users. In SMM, the default format for the documents is PDF. However, the users can

export the documents to other formats as well, of which the xlsx Excel format is the most used one. If the user wants to make a modification on the document, which cannot be done in the system, or there is no suitable template available, the user can then export the document to Excel format and make the change in Excel. Sometimes the users have also had to use this option when there is no key user available at the given moment to allow the use of a different template in the system, and there is an urgent need to finish the shipping documents. Interviewee LF1 mentioned that he/she has not always received support on time. LF1 also expressed disappointment that the users must justify their requests to the key user even though the changes would be mandatory to be able to proceed with the project. LF1 also mentioned that he/she understands that not all access rights can be given to user rights, but LF1 did not know why all the users cannot open projects or make changes to the project's addresses. LF2 stated that working would be much easier if the users could modify the addresses by themselves, but LF2 had otherwise been satisfied with the user rights. The rest of the interviewees were satisfied with their user rights and did not report any issues.

Many interviewees commented that they would have preferred to have more joint meetings or workshops at the beginning of the implementation project to share information and tricks on using the system faster and more efficiently. Several interviews also stated that they had learned some tricks by discussing with colleagues, but it would have been great to share this information with everyone. Interviewee LF3 also pointed out that the case company has employees from a wide range of backgrounds, and it not that easy for everyone to learn to use new systems. Joint meetings might have been great, especially for those who were not so easy to learn to use the new system. If there had been some joint meetings after the training session, they might not have felt that they have been left alone in the learning process.

5.3 Outcome of the implementation

Two interviewees, LF1 and LF3, commented that they had experienced poor ERP deployments in the past in their previous workplaces. Both of them compared this implementation to their previous experiences. According to them, this implementation of the logistics system went pretty smoothly compared to what can happen in a worst-case scenario

in a software implementation. Despite all the issues at the beginning of the implementation, at the time of the interviews in June 2020, all the interviewees informed them that they were mostly able to perform their daily tasks with the new system. Interviewees LF1 and LF2 stated that they needed to export documents to excel format quite often as they could not make all the changes in the system. According to the interviewer's interpretation, this was primarily due to the system's limitations and not so that they would not have been able to use the system correctly.

It was also discussed with the interviewees how has the implementation of the new software affected project logistics performance in the case company. As shown in Figure 11, the responses of the interviewees in this question vary considerably. The difference is not explained by whether the interviewee was working in Finland or working in other countries. Two of the interviewees stated that as of June 2020, the new system still slowed down the operational work in project logistics. Interviewee LF4 commented that it is because they were still learning how to use the system and because of the issues with the suppliers. LF4 could see much potential to improve performance both by developing the tool and learning to use it more efficiently. Interviewee LO2 also thought that even though using the new system was still taking more time than the old way of working, and it had so many benefits that overcame the disadvantages. Those interviewees who reported improvement in the project logistics performance commented that the improvement was mainly due to the possibility of making large amounts of documents at once. However, none of the interviewees wanted a return to the old ways of working. Thus, all interviewees had accepted the use of the new software as part of their normal work tasks.

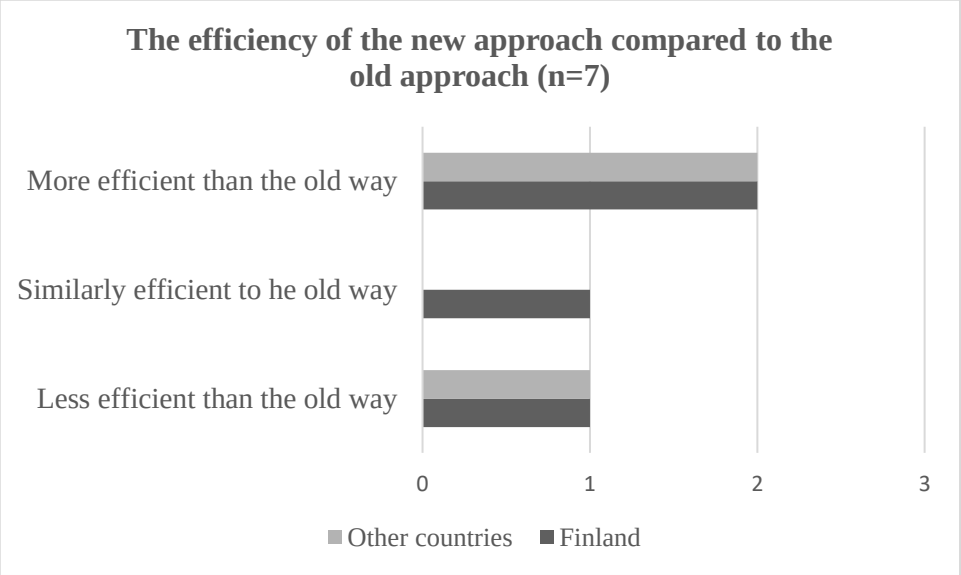

Figure 11. The efficiency of the new approach compared to the old approach.

5.3.1 Challenges and bottlenecks of the implementation

According to SM, it was expected that the major challenges in the implementation would be supplier cooperation, the workload of the end-users, and motivation of logistics users to learn to use a system that does would not work perfectly at the beginning of the project. It was known that the system would not be free of deficiencies initially, but it would then be further developed and customized during the first months of the implementation, also based on the feedback received from the users. However, the end-users either had not received the information that the system would not be completely ready or had not fully understood it. Interviewees LF1 and LF2 commented that before the implementation phase started, they had expected the system to be ready to use and well tested. Their expectations had been based on the communication received from the deployment team and the fact that there had been a pilot phase in place. Both expressed that they had been disappointed and frustrated at the beginning of the implementation when it turned out that the system still had many bugs and errors.

A summary of the main challenges and bottlenecks experienced by the interviewees can be seen in Figure 12. There had been many different kinds of challenges during the implementation, most of them being related either to the workload, dissatisfaction with the training, communication, and co-operation both with the internal stakeholders and the company's suppliers. Interviewee LF2 stated that the implementation should have been done in co-operation with project procurement. For instance, LF2 had experienced that in some cases, the procurement employees had sent the old packing list template to the suppliers as an attachment to the purchase order, or they had otherwise given wrong instructions to the suppliers related to supplying the packing information. The suppliers have sometimes been resistant to fill the new template as they thought it had not been part of the scope agreed in the purchase order.

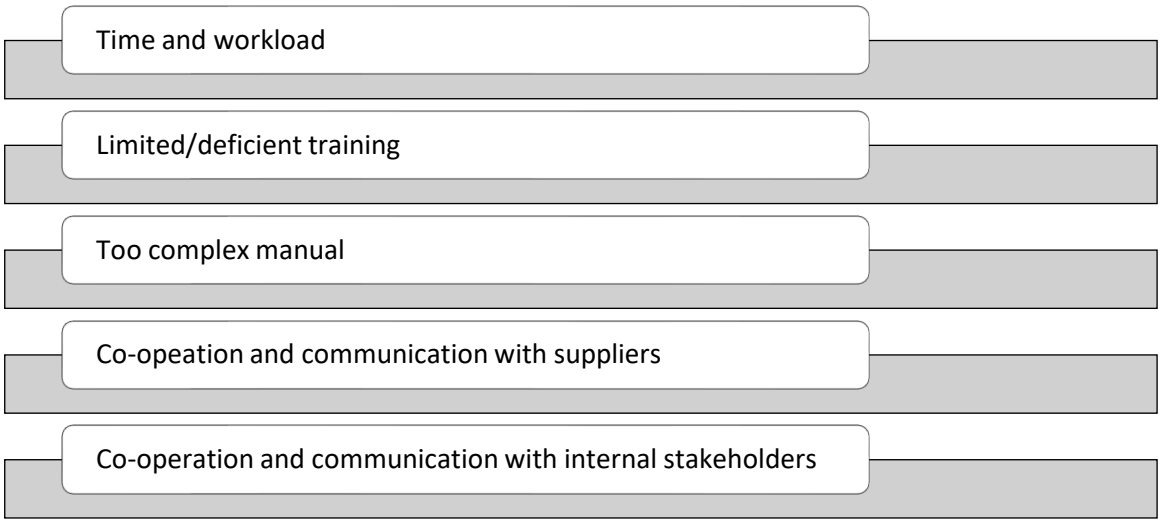

Figure 12. Bottlenecks and challenges of the logistics management software implementation according to the interviewees.

The interviewees also commented that getting more out of the system would require especially better co-operation with the suppliers. As long as the suppliers are not filling the requested packing information template so that it could be uploaded directly to the system, much manual work is still needed. Overall, the issues with suppliers came up in many

interviews. Many interviewees mentioned that it had been difficult to get suppliers to fill the template. Interviewee LF1 mentioned that in the beginning, it was difficult to give instructions for the suppliers on how to fill the packaging list mailer template as the logistics users themselves did not know how it actually works. Interviewee LF4, in turn, stated that the biggest issue is that Excel is still needed, for instance, for creating the logistics plan. Thereby, it still not possible to perform all operational logistics tasks within the SMM system.

Many interviewees felt that they had been left alone in the supplier communication during the change process, and they had needed to “fight” with the suppliers. The issues with suppliers were not just technical or practical challenges but also affected the employees' motivation to adopt the new way of working and their commitment to the change. The interviewees commented that this issue could have been avoided if the operational employees would have been better supported in supplier communication. Interviewees LF1, LF2, and LF4 stated that an official letter should have been prepared for the suppliers. The letter should have notified of the new system and what the change requires from the suppliers. Interviewee LF1 pointed out that it would have been great also to have ready-made instructions for the suppliers. At the beginning of the implementation, it was difficult for the logistics users to instruct the suppliers as they did not know any better how the template works. LF1 also gave an example that one supplier had received five different instructions from different logistics employees, and the supplier was thereby quite confused about what is expected from them.

A few interviewees also mentioned technical issues they had faced during the implementation as a challenge or a bottleneck. At least once, a failed system update had prevented the packing list mailer template upload to the system. Interviewee LF3 reported that this failure caused many hours of additional manual work to fix the issues in a project he/she had worked on. They had just received a packing list mailer template that included hundreds of rows of information, and they needed to copy and paste all the information manually to fix the issue. According to the interviewed end-users, they did not know about the upcoming software update beforehand, and therefore, they could not have prepared for

it, for instance, by preparing the documents for the most critical shipments before the update. Luckily, there were no major consequences reported this time due to this failed update at the beginning of the implementation. Interviewee LO3 had instead experienced some technical issues with the system that remained unsolved; for instance, at least information had just disappeared from the system. However, these kinds of technical issues had been quite rare during the implementation, and most of the interviewees did not report any major technical issues.

Some interviewees also came up with ideas on how the pilot phase would have been better implemented. Of course, there will be no more zero-level deployment for this program in this company. Still, comments like this are mostly general by nature, and the case company could use this kind of feedback in other change projects or if there would be significant changes to this system that would require establishing a pilot group again to test the functionalities. If this kind of pilot were organized again, it would be more efficient to divide the tasks between the people participating in the testing process. Thereby, the functionalities could have been tested in a more organized way, and it could have been secured that all functionalities will be covered. Having common workshops would also have been great during the pilot phase to enable better communication between the participants.

5.3.2 Benefits of the change

It was also discussed with the interviewees what benefits they could see in the change. All interviewed users of the software could find at least some benefits of the implementation, even though they would have argued that using the new system would be less efficient than the old way of working. The benefits experienced by the interviewees of implementing the new system are summarized in Table 9. The identified benefits were categorized into five categories; benefits related to a reduction in manual work, better access to information and logistics documents, harmonization of work methods, modernization of work methods, and efficiency/ease of the operations. From here, it can be seen that the implementation of the new software has achieved the goals set by the case company in these respects. End-users find that their work has become more pleasant in many ways, mainly due to reduced manual

work and easier working methods. They also appreciate the harmonization of working methods and the more modern way of working, which were also among the implementation objectives.

Table 9. The benefits of implementing the new system according to the end-users.

Reduction in manual work	**Better access to information and logistics documents**	**Harmonization of work methods**	**Modernization of work methods**	**Efficiency/ease of the operations**
No need to rely on Excel that much anymore	Getting rid of the network drives	Harmonized and organized processes at all entities	A more modern way of managing logistics	Easier to create documents
Less manual work	Access to projects can be given by the local key users	Harmonized document templates	More professional way of managing logistics operations	Easier to manage changes and revisions
Less human errors	One place to archive logistics information and documents	An organized and standardized way to get information from the suppliers		Better control and follow up of the logistics operations
		Facilitates better communication between different entities		A faster way of working

6 DISCUSSION AND CONCLUSIONS

In this chapter, the empirical results of this study are discussed against the theory part of this study, and answers are provided to the research questions. Practical recommendations are given to the case company based on the research results. Recommendations are given to those areas that proved to be the biggest challenges during the first implementation phase. Besides, the reliability and validity of this study are discussed. Then finally, the limitations of this study are presented, and ideas for further research are introduced.

The main research question this study seeks to answer is:

How can change be managed successfully in implementing a logistics management system (LMS) as part of project logistics' digitalization?

This qualitative case study has examined change management in the digitalization of a case company's project logistics and, particularly, in implementing a new logistics software. This research aimed to determine the factors that either promote or inhibit the success of the logistics management system implementation at the case company. As mentioned in the introduction, this study's best outcome would be finding general principles by which a software implementation project's success can be promoted. Some of the findings of this study are only applicable to this specific implementation at the case company, for instance, the need for better supplier communication due to the complex package mailer template. However, there are also confluences between this study's empirical results and the earlier literature of change management in IT-enabled changes. Based on this thesis's results, the most important themes in the implementation of logistics software from the perspective of change management are communication both within the company and externally and arranging practical training for the users of the software. The need for efficient communication during the change process and have comprehensive training in software implementation projects have been recurring themes in the previous literature as well.

In order to study the topic at a more detailed level, three sub-questions were also established, which are presented below.

a) What are the factors that promote or inhibit software implementation and logistics digitalization?

The change in the case company was promoted particularly by the clear need for new logistics software and the need to digitalize and harmonize the working methods in project logistics to be similar at all of the case company's entities. All the interviewed end-users also identified the need for a logistics system implementation. Factors that slowed or inhibited the change at the case company were the logistics employees' workload, limited and deficient system training, too complex manual, co-operation and communication issues both with the suppliers and with the internal stakeholders. To remedy these challenges, practical development recommendations were given to the case company in the discussion section of this study based on the results of this study. Recommendations were given especially related to arranging more efficient training, simplifying the manual, and improving both the internal communication and the communication with the suppliers.

b) What are the benefits of logistics management system implementation and digitalization of logistics management?

Another objective of this thesis was to study what benefits can be achieved through logistics management system implementation and digitalization of project logistics operations. Based on this study's empirical contribution, five different benefits were found that the case company achieved through the LMS implementation and digitalization of project logistics' working methods. Those benefits include reduced manual work, better access to information and logistics documents, harmonization of work methods, modernization of work methods, and efficiency/ease of operations. The benefits that came true at the case company are presented in Figure 13. It can also be seen that, that these benefits pretty much comply with the case company's own objectives for the new system. The company can now better keep with the development of the world with the modernized way of working. Also, the work

methods in project logistics have now been harmonized in all locations where the system has been implemented.

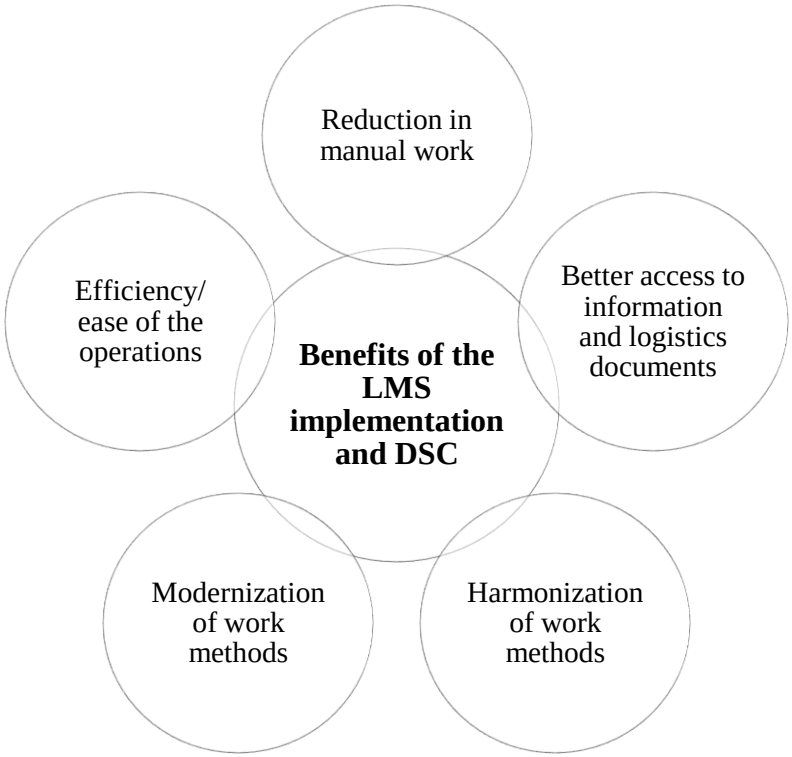

Figure 13. Benefits of logistics management system implementation and digitalization of logistics management at the case company.

c) What can be learned from the first phase of a logistics system implementation considering possible wider implementation in the future?

One of the objectives of this thesis was to investigate what the case company could learn from the first phase implementation in a case that the system would be implemented more widely after the merger. During the process of this thesis, the case company decided to continue using this software in project logistics after the merger and also, to expand the implementation to project logistics employees who joined the company due to the merger. Thereby, it can be considered that this thesis can bring practical benefits to the case company. This thesis's preliminary results were shared with the case company's project logistics

department management already in November 2020 to allow the use of this thesis's results in planning the second phase implementation starting in early 2021.

6.1 Theoretical implications

This thesis's theoretical framework was divided into two parts: the first part covering logistics management and digitalization of logistics, and the second part focused on the concept of change management. The first part of the theory covered the concepts of logistics management, project logistics management, logistics management systems, and digitalization of logistics. Whereas the second part discussed some of the most-cited change models and typical change reactions, as well as the connection between the concepts of change management and logistics management system implementations. A broad theoretical basis was needed to define the concepts behind the confluence of change management and logistics management system implementation as part of project logistics digitalization.

Change management is often described through different linear phase models, such as Lewin's (1947a, 1947b) three-stage model of change or Kotter's eight-step change management model. The stages of change in the case company largely followed Lewin's model and organizational goals progressed as Klein (1996, 36) presented in his study. In the first phase, the organization prepared for change, and a pilot phase was organized. During the second phase, the actual change process started. The process and the system itself were adjusted based on experience from the pilot phase, although many users considered the pilot to be deficient, mainly due to lack of time to test the system enough. In the final stage of change, the change became reinforced and institutionalized. When the interviews were conducted, the case company was at Lewin's change model's last phase. Using this software had become a normal part of employees' daily tasks, and it is no more exceptional. According to Klein (1996, 37), organizational activities typically include expanding the change to other business areas at this stage. It is exactly what happened in the case company too. As of February 2021, training sessions are planned to be arranged for new users.

Poor planning and lack of communication both inside the company and with the other parties involved in the supply chain are typical challenges often associated with DSC implementation in the organizations (Xu 2014, 13; Büyüközkan & Göçer 2018, 167.) Inadequate communication both within the company and with its suppliers also emerged in this thesis's empirical results. The study's empirical results also revealed that the project logistics organization's fragmented organizational structure at the case company complicated the implementation project, as the leaders of the implementation did not work in the same organization with all the end-users. This issue has also been identified in previous literature in the field of change management in software implementations. Li et al. (2017) found that having a clear organizational structure helps companies minimize user resistance in the ERP implementation projects.

So, one of the objectives of this thesis was to study how user engagement could be promoted and user resistance avoided as much as possible during the change process. The case company had prepared for the possible change resistance by determining the most important entities where it was most critical to complete the implementation. Most resources were invested in these locations to ensure the success of the implementation.

Readiness for change can be assessed at the individual, team, or organizational level (Rafferty et al. 2013, 110). According to Joshi (1991, 229), employees are more likely to accept the change when they find the change itself necessary. This case had a good starting point in the sense that all interviewed end-users had recognized the need for the change. Also, all of them had rather positive or purely positive expectations for the software implementation; none of them directly opposed the change. According to Kotter and Schlesinger (1979, 107-109), people are often resistant to change if they feel that they lack the ability to learn the new skills the change requires. In this case, some users had pre-existing fears concerning, for example, their own IT skills or proficiency in English. There were also concerns related to the change's permanence because of the upcoming merger with the other company. Some users had concerns about the software's suitability for the case company. However, these fears or problems had not become unbearable, at least for anyone interviewed.

According to Klaus et al. (2015, 65), change resistance in IT-enabled changes can be minimized by utilizing a comprehensive strategy to manage the resistance behavior. A comparison of Klaus' management strategy framework to minimize user resistance and communication strategies used at the case company can be seen in Table 10. From the table, we can see that the case company's communication strategy during the implementation does not comply directly with any of Klaus's management strategies. Instead, parts of different communication management strategies have been utilized.

Table 10. Comparison of Klaus' (2015) management strategy framework to minimize user resistance in the IT-enabled changes and communication modes used at the case company.

Management strategy	Construct	Definition	Utilization at the case company
Effective communication	Top-down communication	Top management or implementation team communicates to users.	Partly utilized at the case company.
	Listen to feedback	Management listens and responds to the user input.	Partly utilized, the feedback was collected through the key and super users.
Effective education/support	Provide help/support	Management offers assistance to users.	Implemented through the system of having the key and super users.
	Training	Train the users at an appropriate time so that it suits their needs.	Partly utilized at the case company. Training was arranged, but the users were not satisfied.
	Incentives	Suitable motivators for users to learn and use the system.	Not utilized at the case company.
Effective direction/planning	Clear consistent plan	Straightforward, consistent strategies.	Partly utilized, the chosen strategy has been more to react when issues come up instead of having detailed plans for everything.
	Management expertise	Management understanding of processes and the system.	Utilized at the case company, the leaders of the deployment team understand both the processes and the system.
	System customizations	Customize the system to fit in the existing processes.	Partly utilized at the case company, changes have been made to fit the system in the existing processes.

The first management strategy in Klaus' theory is effective communication, which included the constructs of top-down communication and feedback listening. To start with the top-down communication, the implementation team communicated the change to users at different phases. However, many users would have wanted more information. There also had been misunderstandings between the message sent from the deployment team and how the end-users had understood the message.

The case company also had utilized parts of the effective education and support communication strategy. Support had been organized especially through the system of having the key and super users, and the end-users had been mostly satisfied with the support they had received, only sometimes they had not received support fast enough. Training sessions had been organized as well, but the users had not been satisfied with the training. Incentives instead were not used at the case company.

The last communication strategy in Klaus' theory is effective direction and planning. The first part of this strategy is to have a clear, consistent plan. At the case company, this had not been fully implemented. The case company had decided rather react when issues arose instead of having detailed plans for all scenarios. The next dimension of the effective direction and planning strategy is management expertise, meaning that the implementation leaders understand both the existing processes and the system. This part of the communication strategy had been well utilized at the case company. At this point, it has certainly been helpful that the implementation was done by the company's own employees, many of whom have worked for the case company for a long time. Although the implementation team's resources were limited, no new employees or external consultants could have known the company's existing processes so well and deeply. Finally, system customizations had been done at the case company both before and during the implementation. As all the entities had previously had their own ways of managing project logistics, of course, it had not been possible to customize the system to fit every single process.

6.2 Managerial implications

In this part, recommendations are given for the case company on how they could improve the logistics management system's implementation process. These recommendations are given especially concerning the second phase of the implementation. The recommendations are given based on the results of this study.

First of all, it should be noted that because the implementation process was not in a direct managerial position to the system’s end-users in most cases, it may have made the implementation more challenging. It is because the implementation team did not have direct management power over the employees. Another big challenge in the case company was the relatively small size of the logistics organization in relation to the case company's size. In many companies, such a deployment project would not typically have been part of the sourcing tasks, but in the case company, only a few persons in the logistics organization were not tied in operational tasks. Neither did the company have the opportunity to acquire any additional human resources to support the implementation project, but the whole implementation was handled aside from the normal tasks.

Based on the interview data analysis, three themes were identified that the company should pay special attention to when expanding the software implementation to new users. Those themes are presented in Figure 14. This recommendation is based on the most reported bottlenecks and challenges of the implementation process in the end-user and key-user interviews.

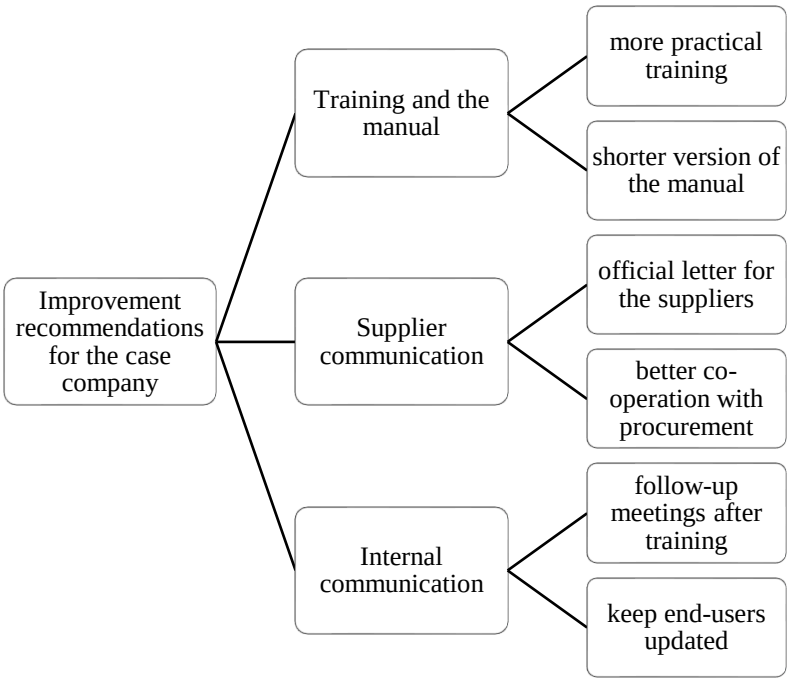

Figure 14. Improvement recommendations for the case company for further expansion of the SMM implementation.

The first development area is training for the end-users and the manual. Based on the interviews, there were many recommendations given by the interviewees as well. It was clear that the training sessions should have been more practical. Firstly, during the first phase of the implementation, the training events included a lot of background information on the implementation. To ensure that the employees attending the training events will learn and remember the essential parts of the training, i.e., how to use the software and from where they can seek help, it would be worth considering keeping the amount of any background information as limited as possible and go straight to the point.

Based on the interviews, it could be identified that there would have been a need for more like a workshop style of training events. The interviewees would have needed step-by-step teaching how to perform different tasks in the system, e.g., how to create different shipping documents such as packing lists or commercial invoices. Employees attending the training event should be able to test the system in practice in a training environment during the training. According to most interviewees, showing just a demo of how the system works was not enough. In addition to instructor-led training, there should also be time left for any

questions and discussion to allow the employees to address any concerns they may have related to the system implementation.

Related to the manual, the case company should consider making a shorter and simpler version of it. The manual's complexity and length could have even threshold employees from starting to use the system earlier. Several interviewees also pointed out that reading the manual takes way too lot of time as they, for instance, need to use a dictionary to understand the instructions. Thereby, it would be essential that the case company create a shorter version of the manual to support the employees, especially at the beginning of the implementation. The shorter version should include simple instructions only for the system's most important functions to ensure that everyone will learn to use the most critical functions as fast as possible. It is also important from the business point of view, as an implementation of a new logistics system should not slow down the logistics operations and affect the delivery times. After learning the basics, the users could then learn more advanced functions of the system either by exploring or reading the full version of the manual at a better time. To ensure that as many as possible employees would be able to understand and utilize the manual, the company should pay attention to writing it in as simple English as possible. It should be checked that sentences are rather short, and any complex vocabulary should be avoided to keep the text as simple as possible.

The second area where development would be needed is supplier communication. The research results showed that one of the things that had caused most issues in the change was supplier communication. It became clear that this was not only a practical issue, but it had also affected the employees' motivation to commit the change and promote the new way of working to external partners. The interviewees would have needed more support in supplier communication from the management. The recommendation to improve supplier communication consists of two things. First, there would have been a need for better co-operation with project procurement. During the first phase of the implementation, project procurement was not well enough informed about the change.

In some cases, the procurement employees had kept sending the old packing list template to the suppliers at the time of the purchase order or otherwise given them misinformation. As a minimum requirement, the change should be communicated with the procurement department so that they would know the new process of getting the packing information at a general level and the new requirements for the suppliers. In addition to this minimum level approach, the case company could also consider closer co-operation with the project procurement or sourcing departments to ensure that the suppliers would also have a contractual requirement to fill the new packing information template. This requirement could be mentioned either in the purchase order conditions or in the frame agreements with the suppliers. This recommendation is based on the fact that sometimes the suppliers had argued that filling the complex packing list template has not been part of the agreed scope.

It also turned out that the supplier communication should have been more structured and organized, especially at the beginning of the software implementation process. Thereby, it would be great to prepare an official letter for the suppliers to inform them about the change and what is expected from them on the new process. First of all, that letter should include a short notice that a new system has been implemented in project logistics. The suppliers could also be explained very shortly why this software has been implemented to understand why it is important for the case company to have the packing list mailer template carefully filled by them. In addition to the news of the system's release, the letter should include instructions on filling the template. During the first phase of the implementation, it has turned out that no supplier was able to fill the template perfectly without further instructions, even though there are instructions included in the template. If the instructions were written in a letter, it would also reduce the project logistics employees' workload. This is because instructing the suppliers had been challenging, especially during the beginning of the implementation. It had been difficult for the end-uses to give instructions for the suppliers when they did not yet know all the tricks of the macro-generated excel template even themselves. In this way, it could also be avoided that the suppliers are given little bit different instructions from different project logistics employees. As the suppliers of the case company are located worldwide, and depending on the supplier, the IT skills and English proficiency of the person responsible for giving the packing information can vary a lot, the instructions should be as simple and easy-to-read as possible. Finally, on top of sending the letter for the official

contacts marked at the company's supplier data management system, the letter should be shared with the project logistics employees to send to their contact persons. Based on practical experience, the supplier letters send to the official supplier contacts are often not forwarded to the correct operational contact persons.

The third area of improvement is internal communication at the case company. In general, it was found that the end-users would have wanted more information to be shared. In some cases, all users may be facing the same issue, but not everyone brings it up. Paying attention to the communication would be especially important in the time of remote work due to the COVID-19 pandemic, but also because even under normal circumstances, the project logistics employees at the case company work in numerous different locations. As earlier mentioned, there may be either one or two project logistics employees per location in the smallest entities at the case company. For this reason, the information does not reach everyone without formal, planned communication. The company might take advantage of the key-users in the information sharing, as they know both the system functionalities and the end-users. Some interviewees also mentioned that they had learned many tricks to use the system faster or perform some tasks more easily and efficiently by the fellow users. Thereby, the end-uses should be encouraged to share this kind of information, e.g., through the Teams channel already at use at the case company.

Based on the end-user interviews, it could be great to arrange some kind of follow-up meeting(s) after the training session, supporting the end-users and following up on the implementation progress. Thereby, it would be possible to follow how the users have dealt with the system and what kind of issues they have possibly faced when using it. It would also be a great way to check if there is a need for further training or sharing more detailed instructions for a specific system function. At the same time, some kind of follow-up data could be shared to show that the implementation process is being followed and to maintain a sense of urgency. This piece of information could be, for example, the number of projects opened for the new users after the training.

Related to the internal communication issues, the case company should keep the end-users updated with any system updates as there is always the risk that something goes wrong in software updates. The case company had experienced one update failure, which, luckily, in that case, did not cause any financial penalties due to delayed shipments. As the case company's largest projects' sales value can be up to several hundreds of millions of euros, the penalties for late deliveries are significant. If the users know the updates beforehand, they could prepare the documents for the most urgent or critical shipments before the update. Interviews also revealed that the end-users did not always know why something was done in a certain way or why there are user restrictions in the system. Thereby, the company could improve communication with the end-users by collecting feedback from the users in an organized way and responding to how the end-users could understand why some kind of customization cannot be done or why the user restrictions have been utilized.

One more thing that reveals that communication could have been better is that the deployment team should have better communicated that the system would not be completely ready for use initially. It came up in the interviews that not all the end-users had not fully understood this. Some of them were, therefore, disappointed and frustrated at the beginning of the deployment. Interviewees commented that the biggest problem was not that the software was not working perfectly, but their false expectations. This situation could have been avoided by better communication. By being honest and direct in the implementation process, this kind of misunderstanding can be at least minimized, and users would have had more realistic expectations.

In summary, although this work highlights many issues during the first phase of implementation, it can still be considered that the LMS implementation at the case company was successful. First, the implementation was completed and did not cause major problems for the case company. Also, all the interviewed end-users had accepted the use of the new software as part of their normal work tasks. Second, the case company is expanding the implementation in the second phase, and the mistakes or poor choices made in the first phase have been analyzed, and correcting measures have been taken to make the next phase of the implementation smoother.

6.3 Reliability and limitations of the study

First of all, it must be noticed that his study did not aim to evaluate the chosen LMS software's functionalities or identity technical issues in the implementation process unless it could be considered that those would have affected the change management during the implementation. So, the aim was to focus precisely on the change management perspective of the implementation. In the theoretical part of the study, literature related to the implementation of the ERP systems has been applied as research concerning the LMS system implementations could not be found. This cannot be considered ideal, as the scope of the ERP and the LMS systems can vary significantly. In any case, the use of these theories as a reference has been evaluated, and limitations of the applicability of the ERP implementation projects to this case have been highlighted.

The research data was collected through semi-structured interviews. There were in total eight interviews, of which seven were the end-users of the software, and one was a manager from the deployment team of the software. This amount can be considered appropriate because the same themes were repeated in many discussions. Thus, individual respondents' views did not rise too much, but similarities were found in many responses.

However, the interviews of this study were conducted during a time that involved many challenges at the case company. The interviews took place just weeks before the merger with another company took place. At that stage, the interviewees had no information about the future organizational structure or possible job description changes. Such a large upcoming change and uncertainty about one’s own employment may have affected the interviewees’ responses. Most of the interviewees had also started continuous remote work only as a result of the COVID-19 pandemic. It is impossible to say with certainty how such a sudden and forced shift from working mostly from the office to remote work has affected the implementation's progress and the interviewees' responses. For these reasons, the results could be very different if the interviews were conducted at different times. The challenging situation may have increased the negativity of the interviewees. On the positive side, because

the interviews were conducted within a short period of time, the conditions were similar for all the interviewees.

Ideally, one or a few test interviews could have been arranged first to test the interview structure and the interview question. In that case, the questions could still have been changed after the test interviews. In the author's experience, the interviewees generally understood the interview questions well, but the order of the questions was not natural. As the conversation flowed, the conversation progressed at a different pace than the interview structure, and it was sometimes difficult for the interviewer to keep up with the fact that all the questions would surely be asked of all the interviewees.

As this study was conducted as a single-case study, this study's results can be generalized only to a limited extent. This study describes the situation and success of the logistics management system implementation at the chosen case company. From the results of this study, it can mainly be deduced only the situation at the time of the interviews in June 2020. However, since most of the previous research on change management software implementation has been done on the implementation of the ERP systems, this study provides a perspective on the implementation of logistics software, especially in capital projects.

6.4 Further research

As a further research idea, by using the longitudinal research method to follow the progress during the software life cycle, the long-term effects of the implementation could be better explored. Also, such system implementation could be studied even more detailed level by interviewing the same persons at the different stages of the implementation. For instance, having the first interviews before the implementation, then the second set of interviews during the implementation, and the third set after the implementation, for example, one year after the start of the process.

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APPENDIX 1. INTERVIEW QUESTIONS FOR THE END-USERS

Theme 1: Initial state of project logistics at x

1. How was project logistics management handled before the new system was implemented?
2. How efficient was the former way of working? How satisfied were you with the previous practice?
3. What were your expectations for the new software and the new way of working?
4. What were your most significant concerns related to the system?

Theme 2: Implementation and change management

5. What is your user role in the system? I.e., are you a basic user or a key-user?
6. How was the communication handled before and during the implementation? Have you received enough information?
7. What kind of training did you get for the software? How satisfied did you were with the training?
8. At what level do you rate your own competence with the software immediately after the training?
9. How did the implementation succeed? Should something have been done differently in the implementation in your opinion?
10. Which factors were the most significant bottlenecks when implementing the system?

Theme 3: Current status

11. How long have you now used the new system? In what kind of and in how many projects have you used it?
12. What are the benefits that can be achieved through the new project logistics software?
13. Can you complete your tasks with the system? If not, what will you do then?
14. Would you need further training for the system? If yes, why and in which matters?
15. What kind of challenges you have faced with the new system?
16. If you face any issues with the system, how do you usually try to solve the issues? From where do you look for support?
17. Have you received help with problems with the new system, and have you been satisfied with the help you have received?
18. How has the implementation of the new software affected project logistics performance?

APPENDIX 2. INTERVIEW QUESTIONS FOR THE KEY-USER

Theme 1: Initial state of project logistics at x

1. How was project logistics management handled before the new system was implemented?
2. How efficient was the former way of working? How satisfied were you with the previous practice?
3. What were your expectations for the new software and the new way of working?
4. What were your most significant concerns related to the system?

Theme 2: Power user role

5. How would you describe the key user role?
6. What kind of training did you get for the software? How satisfied did you were with the training?
7. At what level do you rate your own competence with the software immediately after the training?
8. What kind of support you received in your power user role?
9. What will you do if you receive a request that you are not able to resolve immediately? From where do you seek support?
10. Do you think you are having sufficient access rights to perform your key user role?
11. Do you think the ratio of power users and basic users is on right level?

Theme 3: Implementation and change management

12. How was the communication handled before and during the implementation? Have you received enough information?
13. How did the implementation succeed? Should something have been done differently in the implementation in your opinion?
14. Which factors were the most significant bottlenecks when implementing the system?

Theme 4: Current status

15. What are the benefits that can be achieved through the new project logistics software?
16. What kind of challenges you have faced with the new system?
17. How has the implementation of the new software affected project logistics performance?

APPENDIX 3. INTERVIEW QUESTIONS FOR SOURCING MANAGER, LOGISTICS

1. Why was it felt necessary to digitalize the logistics working methods and implement a new system?
2. What has been the division of roles in the implementation of the new system? Who was involved in planning and implementing the change, and what were their roles?
3. What has been the role of logistics sourcing in change?
4. What was the planned timetable for the implementation?
5. What were the targets of the implementation?
6. How has the change process been communicated?
7. What aspects were seen as the biggest challenges of change?
8. Was it thought in advance how to engage operational staff in change? What means were used to commit?
9. Were you prepared for resistance to change? How?
10. Has the merger with x announced in July 2019 affected the implementation of the change process? How?