Process optimisation

An empirical study of process optimisation in Finland

Master Thesis in Business Administration

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Abstract:

The objective of this master’s thesis is to determine methods for improving a company’s business processes without investing in new technology and whether a relatively small company can benefit from investing in technology.

This study determines the meaning of process optimisation and how it should be conducted. Using existing theory and the case of a logistics company operating in Finland, this research attempts to identify hindrances and find opportunities for the company to develop their processes through process optimisation without technology.

Different public bodies in Finland (such as the Finnish government and Statistics Finland) have stated that Finnish logistics requires development and have recommended new technology as a solution to the issue. However, the lack of information on the Finnish logistics business sector makes such statements by public bodies difficult to analyse.

Process optimisation has been revealed to be more complex than expected. Many theories available today examine and recommend different technological solutions to execute companies’ work processes. However, a theory is needed on how process optimisation can be carried out at a company lacking technology.

Process optimisation consists of process modelling and process analysis. Process modelling appears to be the most significant and crucial aspect of process optimisation. Order-to-delivery processes cannot be optimised within a company if the company does not understand the entirety of such processes. Knowledge of the process has been highlighted as being key to understanding a company’s processes at a high level.

The case company in this study showed that process optimisation is possible without implementing new technology; instead, optimisation required additional human capital and a stronger focus on a company’s internal business processes. Technology-based solutions for process optimisation are tempting to implement as doing so may be believed to save time, but no automated solution is able to reveal a company’s critical information if the company does not know what it is looking for and cannot identify its problem areas.

This research includes a single case study. The results indicate that whether a relatively small company could benefit from investing in technology is unclear, and the lack of research on process optimisation at Finnish companies resulted in limited findings and analysis. Several different scientific articles presented technology implementation successes and failures, but did not reveal information on the steps taken by the companies.

Keywords: Process Modelling, Process Analysis, Process Knowledge, Process Optimisation.
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1. Introduction

This master’s thesis is divided into four sections. The first section provides an overview of the study. The first chapter introduces background information for the study and the problem and purpose of this master’s thesis, which are key to understanding why the research focuses on business process optimisation in the Finnish logistics market.

1.1 Background

Globalisation has increased competition in domestic and international markets. Development of logistical services has enhanced the growth of international business conducted between different countries. Finland is a relatively long and small country in size, compared with other European countries. In relation to the on-going growth of logistical services and international business, Finland’s location in terms of sea and railway connections is challenging compared other countries in Europe. In 2005, the Finnish government and the Ministry of Transport and Communication stated that the Finnish logistical business sector requires development to capitalise on globalisation and to compete with the economic growth of the Russian Federation and fiercer players in the Baltic Sea region (Suomen liikenne- ja viestintäministeriö, 2005).

This statement expressed the desire of the Finnish government and the Ministry of Transport and Communication for Finnish logistics companies to develop their business processes, which meant creating greater added value for customers by investing additional capital into supply chain development (Suomen liikenne- ja viestintäministeriö, 2005).

According to a research made in 2010 by Suomen Tilastokeskus (Statistics Finland), only 45 percent of Finnish transport and warehousing companies used more developed electronic working tools in their supply chain business processes (Suomen Tilastokeskus, 2010).
1.2 Problem

After the statement by the Finnish government in 2005 and the 2010 study by Suomen Tilastokeskus, Logistiikkaritysten Liitto Ry (Union of logistics companies in Finland) made a statement in September 2011. This public entity stated only 40 percent of Finnish logistical companies’ logistics processes used electronic working tools and more developed supply chains, compared with 90–95 percent within other Nordic countries (Logistrikayhdistyksen liitto ry, 2011).

Electronic working tools have developed during recent years and create the potential for business process development. Previous studies showed that companies that invested capital and implemented electronic working tools in their supply chain increased profitability and customer satisfaction in every business process of the chain (Logistra Management Consultants. 2006). Zairi (1997) stated that numerous approaches exist today for different business sectors to adopt to solve the various supply chain problems.

The issue is whether to invest capital to automate every business process by using electronic working tools, as the different public bodies in Finland proposed. Alternatively, should a company optimise its business processes in another way, one that best suits the company? Finland is generally known as an IT country, making it interesting that public bodies recommended that companies in the logistics sector upgrade to electronic working tools and proposed that electronic working tools are the only solution to improving the logistics position of Finland may be premature. What is the current logistical position of Finland compared with other European countries from a cost perspective? Perhaps public bodies in Finland are aware of the current level of electronic working tools, which is why they are pushing intensely for this upgrade. However, is such a push the best solution? Do all companies in the logistics sector understand their processes thoroughly enough to enable process optimisation with electronic tools to be easily implemented? Although all of these questions are valid, they cannot all be investigated in a single study. They simply enhance the reader’s perspective and help the audience understand this study’s core idea and problem statement.

This study focuses on the following issue: should a company in Finland, including a small company, improve their business processes only by investing in electronic working tools? Alternatively, is there another method for optimising business processes?

Thus, this study asks the following questions.

- How can the business processes within the company be improved without upgrading electronic working tools?
- Would a relatively small company benefit from investing/upgrading in electronic working tools?
1.3 Purpose

Investing significant capital into technology and electronic tools is not always the only key to success; such capital must be used correctly. The optimisation of business processes is a combination of technology and people, in other words, it is about finding the practices that best suit a company and the market in which the company does business (Mansar & Reijers, 2005).

A previous study presented the opposite result from the studies presented in the subsequent chapter. A study by Technical University of Helsinki Finland stated that technology could get in the way of a good and tight customer relationship. “It can slow down the development of order-to-delivery process with a major customer and prevent that relationship to become more open, transparent and effective.” (Småros, 2005, p. 18)

Empirical research conducted in a study of managers at different logistics companies in Finland showed that the managers did not even mention technology while discussing the possibilities for developing business processes related to their order-to-delivery process (Småros, 2005).

All companies want to maximise profits, make their internal processes more efficient and become more customer oriented. When complexity and competition are constantly increasing, a company cannot be managed by constantly reorganising processes or by introducing new strategies from scratch (Laamanen & Tinnilä, 2009).

As can be seen on a map, Finland is located in the upper right corner of Europe. The country is known as a leading IT player on the continent, and the successes and failures of Nokia and the vision of Finland as a technology-focused country are well known (Suomen työministeriö, 2001; Suomen liikenne- ja viestintäministeriö, 2005).

Purpose: The purpose of this study is to determine methods for improving a company’s business processes without investing in new technology, and then to apply that theory to a single company through a case study, in addition to find the specific opportunities for the company to develop their processes without new technology.

Together the theoretical and the empirical frameworks help to fulfil the purpose of this study which then gives possibility to answer to the research questions.
1.4 Perspective and Limitations of the Study

A supply chain is a network of different companies working together; in other words, the companies in the supply chain create an extended entity that works across company borders. This structure allows supply chains and supply chain management to be examined and reviewed from different perspectives (Sakki, 2009).

According to Zairi (1997), a rich variation in different process re-engineering and development approaches exists today. The article stated that many different approaches and theories exist that focus on re-engineering and developing business processes by following a specific approach meant for a specific problem. Some are development approaches for the entire supply chain while others are development and re-engineering approaches for a single company within a supply chain (Zairi, 1997).

This thesis examines the supply chain from a focal company perspective, which is why the name order-to-delivery process is used. The order-to-delivery process entails more than receiving, stocking and transporting goods; it also has a non-logistical purpose within a company. Half of the work done in different parts of the order-to-delivery process is mostly management and office related. Briefly, the order-to-delivery process has two aspects, namely controlling and planning the flow of goods, information and money. The active side of the process entails the handling, storage, packing and transport of goods, and includes billing and payment of the costs created by these activities (Laamanen & Tinnilä, 2009).

This study examines how a company could develop and implement an order-to-delivery process without investing in a software program that does the relevant modelling and optimisation, although many articles support optimising processes using technology. For example, Casati et al. (2004) presented IT-based solutions, business process management systems (BPMSs) and business process intelligence (BPI) used for analysing, monitoring and optimising business processes. Another example is Zakarian (2001), who presented many different solutions for process development and optimisation: “Computer integrated manufacturing – open systems architecture (CIM-OSA) methodology, object-oriented modelling methodology for manufacturing, and Petri nets.” (p.444)

Zakarian (2001, p. 444) also provided examples of companies and countries, including (ARIS (Germany), FirstStep (Canada), PrimeObjects (Italy) and TEMAS (Switzerland), which have developed different modelling tools influenced by the methodologies just presented. Despite these examples, the author also criticised the complexity of these methodologies and stated that the Integrated DEFinition 3 (IDEF3) methodology is the easiest and clearest for qualitative process modelling. For situations requiring quantitative process modelling and analysis, Zakarian (2001) presented a fuzzy logic approach based on mathematical reasoning.
These articles present an optimistic view of technology that saves costs and creates better business processes for a company; in contrast, Mansar and Reijers (2005) stated that these different authors were simply developing business improvement manuals even though the intent was to impress a specific audience. Mansar and Reijers (2005) clarified that statement by noting that the methodologies and techniques presented were not manuscripts on process optimisation or re-engineering; rather, they presented opinions on what should be done at a more general level but the methods actually lacked deeper direction (Mansar & Reijers, 2005).

Limiting this study to a single case company and process optimisation also limits the number of scientific theories. Different authors of scientific articles have different views about how a company should be analysed and used for development, re-engineering or optimisation. Two good examples of completely different views and ideas are express in articles by Zairi (1997) and Mansar and Reijers (2005) that discuss a company’s point of view in process development. Zairi (1997) took a more conceptual approach to a company and concentrated on the ex post aspects of process development and optimisation, while at the same time presented a broad view and evaluated how these processes improve a company’s business culture. Mansar and Reijers (2005) took a more down-to-earth starting point and stated that a company’s processes should be examined and thoroughly understood before undertaking any changes or optimisation work.

This study adopts a business perspective and limits itself to a company’s process optimisation functions. In general, the thesis is more closely related to the notion presented by Mansar and Reijers (2005) on how a company should be examined before undertaking process optimisation or re-engineering. Process optimisation is a challenging procedure that requires different steps and phases along the way. Majeed et al. (2008) stated that process development is more reflected in a qualitative examination of business processes whereas business process optimisation is more related to performance measurement and enhancing results through performance.

This study is limited to the Finnish logistics business sector and does not address logistics sectors in Europe or other parts of the world. Although previous studies, the Finnish Ministry of Transport and Communication and other public bodies encourage Finnish companies to become more IT-oriented, this study does not focus on seeking the best technological solutions or testing different technology programs or mathematical approaches for the case study or in developing a theory.

A small country such as Finland has numerous relatively small logistics companies that only operate within its borders. Suomen Tilastokeskus (Finnish Statistics) classified small companies as those with turnover under 50 million Euros and with fewer than 250 employees (Logistiikkayhdistyksen liitto Ry, 2011; Päivittäistavarakauppa Ry, 2007).

Such relatively small companies that operate only in the Finnish market have only one or two customers with whom they work very closely. In most cases, these major
customers are the companies’ largest source of capital (Päivittäistavarakauppa Ry, 2007).

This study empirically analyses only one relatively small Finnish logistics company to comply with the wishes of the case company and to gain more in-depth results. The results from a single case study also indicate whether broader research on more than one company would be relevant, given the lack of such research on Finnish companies in this field.

Casati et al. (2004) stated that very little research has been conducted in the fields of process analysis and process optimisation. The article also noted that most of the relevant research highlighted that companies should create completely new processes or simply implement automation techniques (Casati et al., 2004, p. 321). In contrast, this thesis takes the stance that process optimisation should begin with existing processes. To clarify, business process redesign does not begin from scratch. When current processes are the objective of development work and the focus of the “redesign” effort, companies may find visualising processes a challenge, especially when attempting to find errors and problems in existing processes. “Business process modelling does not add much value without further inspection and analysis of the business process model. Likewise, process analysis has little value, unless it helps in improving or optimising a business process.” (Majeed et al., 2008, p. 8)

This study starts from the perspective that companies do not always recognise business process problems and errors even though they seek to further develop and optimise their businesses.
2. Methodology

The main objective of the second chapter on methodology is to provide a general idea of the study’s perspectives. The second chapter contains different scientific perspectives and approaches that contributed to the development of the thesis and the collection and analysis of the information.

2.1 Methodological Perspective

Payne and New (1995) noted the difficulties of logistical research and Bolumole, Frankel and Näslund (2005) discussed such difficulties but formed a different perspective. Bolumole et al. (2005) studied the approaches to and types of research that logistical researchers and authors typical follow.

Payne and New (1995) focused more on the difficulties of finding the right path. Logistics as a research topic is a challenging field because of the density of the business side and the strategic aspects of the entire logistics sector. Payne and New (1995) also stated that defining a problem statement that validates the problem is difficult in the field of logistics. Bolumole et al. (2005) stated that in the field of logistics, many different perspectives are used to conduct research, resulting in research being analysed from different angles. Some researchers primarily use positivist perspectives while others take an interpretative perspective. Payne and New (1995) discussed at length how a problem leads to a certain research approach, for example, whether the research should evaluate the business side of a problem or the performance behind a problem, or whether it should evaluate the environmental and practical issues of the problem.

Arbnor and Bjerke (2009) noted three methodological views, which were analytical, actors and systems. They also discussed the same issues as those found in Payne and New (1995) and Bolumole et al. (2005), but more clearly described the three methodological views using examples and provided a broader and clearer view of the scientific research (Arbnor & Bjerke, 2009).

The analytical view is about descriptive knowledge (positivism); this approach maintains reality as an objective throughout the research. When reality is the truth, explaining the truth can be difficult because it is reality; in other words, there might not be any facts (Arbnor & Bjerke, 2009).

Arbnor and Bjerke (2009) defined positivism as, “A philosophical/scientific branch presuming that classic natural sciences are the path to true knowledge.” (p. 424) They also noted that the second methodological view, the actors view, takes a more social approach to research. The actors view is about understanding/meaning for the subjects.
Arbnor and Bjerke (2009) define hermeneutics as, “The main emphasis in hermeneutics is on understanding and communication. It aims to arrive through language at a common understanding or shared vision.” (p. 403)

The last view, the systems view, is a combination of the two previous views. “In its broadest sense the systems view is a framework by which a creator of knowledge can analyse and/or describe any group of objects that work in concert to produce some result.” (Arbnor & Bjerke, 2009, p. 102)

Given these classifications of different scientific methodologies for research, this master’s thesis follows the last view presented, the systems view, and suggests a combination of advanced process optimisation methods using this view. The systems view as a scientific approach supports the two approaches taken by this study of observing a situation in a case company and, at the same time, relating existing theory to the topic. The findings from this thesis may be of interest to managers in different logistics firms in Finland.

### 2.2 Scientific Approach

This master’s thesis follows the abductive approach to its research. The inductive approach starts with observations and continues on to developing a theory. The deductive approach starts with a theory that needs to be verified through observations in relation to the proposed theory. The abductive approach is a combination of the inductive and the deductive approach. “It can be seen that induction and deduction are alternative research strategies, while abduction is more of a research tactic.” (Arbnor & Bjerke, 2009, p. 92)

Arbnor and Bjerke (2009) defined the abductive approach as follows: “to place a single case from the study area in a hypothetical pattern to be confirmed by theoretical rules and/or new observations; a kind of combination of induction and deduction; associated with the analytical view.” (p. 417)

The idea for this research arose from the statements of the different public bodies in Finland and the persuasive signals that these bodies sent to firms in the logistics sector. After deciding to focus the research on Finland, a more in-depth study of the Finnish logistics sector was conducted as background for the empirical section of this study. The case company was found through the author’s old connections. The research topic became increasingly interesting after the first meeting with the case company and initials observations were made. The research issue evolved through observations of and findings on the company, together with findings on the Finnish logistics sector.
The interesting aspect of this research problems is determining whether the case company in Finland is in fact ready for optimisation of its logistics processes using technology or whether the company’s business processes could be optimised without using technology and through application of the theories confirmed in this study. The theoretical framework for this thesis attempts to answer these questions. Another interesting point of view is that of employees and whether they believe that upgrading of electronic working tools is the next step in improving the supply chain.

The theoretical part of this study provides scientific background to the last section of the empirical study, which is the case study. The empirical study utilises a questionnaire for managers and employees at the case company and in the end attempts to determine whether the statements made by the public bodies are accurate and can be implemented.

This study was initiated through observation of a phenomenon and then attempts to clarify and analyse the situation; thus, it takes an abductive approach to the research. In the end, this study combines the theoretical and empirical frameworks in an attempt to answer the research questions.

2.3 Research Methods and Design

“Research methods refer to the technique used to collect data. The type and quality of empirical research are influenced by the research design.” (Ghauri & Grönhaug, 2010, p. 54)

Logistics is a challenging field for a researcher because it is about management, but from a different point of view than the norm. Payne and New (1995) noted the challenges to clarifying logistics research methods. Moreover, logistics research consists of various sub-fields of management. Payne and New (1995) also noted the best practices for conducting research in the field of logistics. There is no best method for exploring logistics from a scientific perspective, and most of the methods need to be combined and explored in greater depth to determine the best approach to exploring logistics to reveal the optimal results (Payne & New, 1995).

Given the nature of the logistics field with respect to research, this study used qualitative data research (Ghauri & Grönhaug, 2010). Moreover, qualitative data research was selected because it creates a clearer picture of the specific field of study and provides more in-depth results of the studied matter, together with a suitable theory (Ghauri & Grönhaug, 2010).

Ghauri and Grönhaug (2010) stated that case-based research has on one of three designs: exploratory, descriptive or causal. According to Ghauri and Grönhaug (2010), the research design describes the manner in which the flow of the study is maintained and how the different aspects of the research, such as theoretical and
empirical, remain connected to the research problem to the end. The research design forms the foundation for data collection and data analysis (Ghauri & Grönhaug, 2010).

Exploratory research is about starting with a problem that has not been clearly defined but becomes clearer as the research progresses. Exploratory research can change direction or take a few steps backwards before it determines the optimal way to complete the study (Ghauri & Grönhaug, 2010). Descriptive research takes an opposite to exploratory research. In descriptive research, the study begins with a clear vision of the problem, as the problem is well defined and limited (Ghauri & Grönhaug, 2010). The last research design is causal. With causal research, the problem is defined but has no a clear path; it is usually viewed from two different angles, “cause and effect”. According to Ghauri and Grönhaug (2010), the responsibilities of causal research are “to isolate the causes, and tell whether and to what extent the causes results in effects.” (p. 57)

This research primarily follows a causal research design because it attempts to answer questions with both “cause-and-effect” aspects. Moreover, the empirical section of this study must address the problem to ensure that it is well understood and enables an analysis of and answering of the research questions.

As previously noted, this study is case-based research, where the case consists of a single case company in the empirical framework. Two different types of single case designs exist for case-based research: holistic and embedded (Rowley, 2002). “Holistic single case design is about analysing a single unit and embedded single case design is about analysing multiple units.” (Rowley, 2002, p. 22) Holistic single case design takes an overall view and can result in shallow research on the single unit. Embedded single case design explores and observes a number of sub-units within the single case (Rowley, 2002). Moreover, Rowley (2002) noted that a single case study is suitable for studies such as this one that focus on a specific phenomenon or that attempt to reveal something special from the case.

This research primarily follows the embedded single case design as it separately explores and observes of the case company’s departments, which may be viewed as sub-units as described by Rowley (2002). According to Dubois and Gadde (2002), the single case study is an accepted choice for research “when the problem is directed towards analysis of a number of interdependent variables in a complex structure.” (p. 558) Dubois and Gadde (2002) also highlighted that a single case study enables a more in-depth study than when analysing a number of cases.
2.4 Selection of Respondents

As noted in Section 1.3, this study attempts to reveal whether process optimisation is possible without technology by examining the case of a single logistics company in Finland. The empirical framework should provide crucial information to the case company, as it can reveal hindrances in the company’s continuous development, thus enabling possibilities for the development of the company’s order-to-delivery process.

The logistics company is a relatively small entity located in Vantaa, Finland, and works in the food industry. It is a subsidiary of a large international organisation. The company operates a distribution centre and transports orders to customers. The employees selected as respondents were from different positions within the company and had a variety of backgrounds, and were selected from each department in the company. Two rounds of interviews were conducted, and the same employees (see Appendix 3) were interviewed during both rounds to gain more in-depth and relevant information.

2.5 Data Collection

The case study was divided into two interview rounds. The first visit included making observations at each department and conducting the first interview round (see Appendix 1). The intent of the first visit was to gain background information on and a better understanding of the company’s current order-to-delivery process and each employee’s role, and enabled the collection of secondary data. The second interview round was conducted two months after the first visit and the questionnaire (see Appendix 2) used was developed on the basis of the results of the first visit, enabling more relevant information to be collected. The intent of the second interview was to collect crucial information, or primary data, on the order-to-delivery process to model the process and to identify associated hindrances and improvements.

The second part of data collection at the case company was conducted after completion of more in-depth theoretical learning about the problems and methods related to process optimisation and process development. This learning occurred by reviewing previous research and scientific articles found through Google Scholar.

The second questionnaire was developed based on the results of the first questionnaire and the theory being developed. It included open-ended questions to clarify the process model for the current order-to-delivery process, determine any related hindrances and learn about the development ideas that employees had for optimising their processes. The intent of the second interview round was to provide a clear picture of the possible pros, cons and gaps related to the order-to-delivery process at the case company.
The second questionnaire (Appendix 2) was presented to the same employees that participated in the first interview round. Thirteen employees were engaged in a face-to-face interview in the more general first interview round, whereas the second questionnaire was distributed differently. The form (Appendix 2) was sent through email to the same thirteen employees a few days before the on-site visit, which lasted three working days. During the second visit, face-to-face meetings were held to allow respondents to ask clarifying questions of the questionnaire (see Appendix 2). The face-to-face meetings took approximately 20 to 30 minutes, after which the participants were given four days to complete the form. Only 10 out of the 13 employees responded and sent their completed forms through email.

Figure 1 presents the employees, along with their titles, interviewed during both sessions. The ten employees in Figure 1 returned the second questionnaire, and the three employees persons who failed to return the form are not noted in Figure 1 because the information that they provided on the first questionnaire was insufficient to use in the empirical analysis.

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People interviewed in HAVI Logistics

Name: Title:
Mikael Tuompo CEO
Janne Tiainen Transport manager
Miina Jyrkänne Manager – Finance, HR and Process development
Antti Peltonen Purchaser
Marko Heikkilä Warehouse supervisor
Ilmari Jantunen Transport Planner
Miika Muhonen Warehouse Manager
Susanna Bärlund Purchaser
Lotta Gyasi-Mensah Customer Service Assistant
Piia Vesaniemi Deputy Customer Service Manager
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Figure 1: Persons and their titles who were interviewed in the case company.
2.5.1 Secondary Data

Ghauri and Grønhaug (2010) discussed the importance of collecting secondary data, which provides the researcher with general knowledge about a problem and a topic. Secondary data used for this study included information from books, the case company’s internal materials, different statistical sources, and on-line sources. Books on the field of logistics and, in particular, on process management, provided a broader view of process optimisation and the challenges that exist in logistics. A lack of research exists in the field of logistics in Finland, prompting the use of different on-line sources and statistics to clarify the current logistical environment in Finland and to explore the possibilities for future developments.

The secondary data collected helped describe the problem and develop a clear and well-structured theoretical framework for this study. The secondary data used in this study were collected from several sources to gain background information on the topic and the case company. Secondary data were crucial to this study, as it also enabled an analysis of the primary data.

To clarify, the first visit consisted of interviews (see Appendix 1), general observations on each department at the company and a review of a large amount of internal data and statistics to gain a general understanding of the existing order-to-delivery process. The first visit took place over four working days, from 9:00 a.m. to 3:00 p.m. on each day. The first face-to-face interview was conducted on the first day with the employees selected by the CEO, and took place at the company. The interviews varied in length, from 30 minutes to one hour. During the three other days, observations were made on the daily work within each department. The customer service and finance departments were observed during a single day given their smaller size. The warehouse, transport and procurement departments were observed over the remaining two days because of the complexity of the processes within each department.

The secondary data for this study were analysed and used in conjunction with the primary data that were collected. The secondary data were re-evaluated during the collection of primary data and assisted in finding solutions to the primary problems of the study.
2.5.2 Primary Data

“When secondary data cannot answer our research questions, we must collect the data that are relevant ourselves.” (Ghauri & Grönhaug, 2010, p. 99)

Primary data collected for this thesis came from previous studies, scientific articles on process optimisation and process development and the case company during the second visit.

The second interview round, viewed as being more critical in relation to the empirical framework of this thesis, provided the information needed to develop a model of the company’s order-to-delivery processes.

The use of open-ended questions has its benefits and drawbacks. Open-ended questions are easier to ask. Moreover, for this study, in which the subject was new to the author, open-ended questions allowed for clarification of the subject. The disadvantage to using open-ended questions is that respondents may have their own interpretations of the questions, implying that study results may suffer. The open-ended questions resulted in answers that created limitations to this study because of its specific limits, but they also create a good starting point for a subsequent and more in-depth study. The business environment and corporate language used in the company results from many years of work, and the author of this thesis visited the premises just twice, which can lead to misunderstandings about the company. The interviews were conducted in Finnish.
2.6 Analysis Method

Kale and Näslund (2010) discussed various methods to analyse findings and clearly describe all aspects of the flow of the analysis. These methods enable readers to determine whether the results are in line with the research conducted to uncover the information analysed. Kale and Näslund (2010) also highlighted that the analysis needs to be in relation to the relevant theory used in the research to ensure that all parts of the research process are integrated.

Many different methods exist to analyse research findings. For a case study, the framework for the analysis needs to support the flow of the research and allow for an analysis of the practical findings with the theory (Kale & Näslund, 2010).

Kale and Näslund (2010) presented pattern matching as a suitable analysis method for a case study: “Pattern Matching is a form of empirical validation for qualitative data.” (Kale & Näslund, 2010, p. 337)

An exploration of the different analysis methods for case studies showed that most of the methods are used for quantitative studies. Pattern matching analysis is one of a select few analysis methods suitable for qualitative studies.

Yin (2009) clearly presented the pattern matching method, stating that pattern matching is a technique used to compare two or more different studies or theories. “For case study analysis; one of the most desirable techniques is to use a pattern-matching logic.” (p. 136) Pattern matching compares the empirical analysis with one or more theories (Yin, 2009).

This study used different methods and theories to clarify the ideas behind process optimisation. These results were analysed using the case company’s current order-to-delivery process.
2.7 Reliability and Validity

Ghauri and Grönhaug (2010) present three types of validity: construct validity, internal validity, and external validity. Construct validity, critical to the findings of the research, is about the facts obtained and the findings made. It is the key to “meaningful and interpretable research findings.” (Ghauri & Grönhaug, 2010, p. 81) Internal validity supports the notion that “we have to be confident that casual variation among variables our study is suggesting is true.” (Ghauri & Grönhaug, 2010, p. 63) External validity is about the overall perspective and addresses whether the study results are valid to many people and whether the findings from the study can be generalised (Ghauri & Grönhaug, 2010).

Reliability and validity are important when researching a field as challenging as logistics. Payne and New (1995) discuss the validity of information that comes from interviews: “getting reliable data about what actually happens in terms of practice and performance is much harder than simply asking.” (p. 75) They also noted that employee responses to interviews can lead a researcher on the wrong path and can create inaccurate results for a case study in relation to the stated problem (Payne & New, 1995).

In innovative markets, the validity of information is always relative. Companies use information as long as it believes that such information is necessary and useful for the business. The reliability of this study is important to the company, and its results are useful to the case company and other logistics companies in Finland at the same stage of development. Because of the relatively small number of interviews, the reliability of the results might be questionable; however, all of the interviewees have been working for the company for a long time. Most importantly, all of the departments involved with the order-to-delivery process were interviewed, allowing all aspects of the process to be included.
3. Theoretical Framework

The second part of the study starts with the third chapter and it presents a review of the literature and the theories used in this research. The fourth chapter provides general information and background on the vision of public bodies in Finland to improve Finland’s logistical position in the European market. The fourth chapter also provides a general overview of the logistics business sector in Finland. The fifth chapter focuses on clarifying how process optimisation could be implemented and the steps to take to ensure that that rewarding results are achieved. The fifth chapter presents three different theories that are valid on the path to optimisation. The last chapter in this theoretical framework integrates the different theories found in this section of the research.

3.1 Literature introduction

Significant literature and theories exist on process management, change management and business process improvement. Different books recommend a variety of approaches, mostly concentrating on one or two strategies. Articles on business process optimisation combine theories and approaches from different authors and take them to the next level. Each company’s business process optimisation strategy is unique, and different solutions are applied to different business fields. Conducting a study on process optimisation requires definition of process optimisation and its requirements. Moreover, a thorough study on process optimisation and the logistics sector in Finland requires an understanding of process optimisation from an overall perspective and a general theory to explain logistics in Finland, which will enable the reader to follow the study and understand the results. The literature review in this paper was provided to create a clear context around process optimisation, allowing the research to take one step further and seek alternative methods for optimising processes in relation to the Finnish logistics market and the case company.

As noted in previous chapters, this thesis limits its scope to the Finnish logistics sector, and Finland’s position is presented through the Ministry of Transport and Communication’s study on a development program for the sector. That development program is the starting point to this master’s thesis. Several studies and statistics were used to provide an overview of the Finnish logistics sector; among these were Okkonen and Lukka (2004), who described logistics providers in Finland, and the Finnish Ministry of Transport and Communication (2005), which wrote on the current logistics situation in Finland. The author found few prior studies on this business field in Finland; therefore, different process optimisation articles from different business sectors and several academic texts were referenced to determine the best practices for logistics process optimisation.
A process as a concept means that all the inputs are changed into outputs in a way that is relevant to the specific process or the manner in which the organisation is willing to use the information available. A process can be a unique, one-time project created only to develop the company in a specific way. A process can also be a constant activity within the company. “Every process consists of a number of activities.” (Laamanen & Tinnilä, 2009, p. 121)

Together, numerous processes create a chain of activities that are executed each day within a company. A company can have development without processes, but this is ineffective and does not save money or create value.

Processes can be examined from two different perspectives: how the information develops during a process or the importance of the connection between information and process. The theoretical point of view considers how well a process is managed and what is its output. The connection between the information used as input and the performance of a process is very important, as this determines the output (Laamanen & Tinnilä, 2009).

This thesis uses three different theories as the main structure for the theoretical and empirical sections. In general, business process optimisation includes many activities and steps that can help a company utilise its resources. Many companies may believe that the easiest way to implement process optimisation is to invest in a computer program to execute the appropriate tasks, which is called process modelling. However, even with a computer program, if the input is incorrect, then the attempt at process optimisation will fail. Understanding the entire process is key to making optimisation possible; otherwise, the incorrect processes are utilised.

Each company wants to be more efficient and achieve maximum benefit and efficiency from its processes. Therefore, process optimisation is often implemented when a process spans different departments in the company or even crosses over a company’s boundaries and is done in co-operation with another company (Alagse Articles, 2011).

Given these facts, this study presents processes from a static modelling perspective and uses the diagrammatic modelling technique from Phalp and Shepperd (2000). These choices were made because of the limitations of this thesis, which lacks a technical and mathematical view.

This study, in using the diagrammatic modelling technique, presents the business process analysis approach from Kusiak and Zakarian (2001) in relation to static modelling.

After modelling and analysing theories on business processes, this study attempts to capture the essentials of business process optimisation, although previous studies state that this field lacks theories and research. The final theory used by this paper is the business processes optimisation theory presented in Orlowaska and Sadiq (2000).
The different theories presented in this literature introduction are discussed in more detail in the theoretical section of this study and are used in the case study section to present the existing business processes and the process optimisation possibilities that exclude technology and mathematical solutions.
4. Logistics in Finland

Logistics is an old term that was first used in the 1950s in the United States. The Council of Logistics Management from the US defined the term as follows: “Logistics is a part of Supply Chain, where flow of goods and all the warehousing, services and information is controlled as efficiently as possible from the manufacturer to the end customer, so that the end customer’s needs are satisfied.” (Sakki, 2009, p. 16)

Reinikainen et al. (1997) stated that logistics were connected to business life in the 1960s. During the 1970s, logistics in Finland were still narrow in scope, and included only transportation and warehousing. Logistics were considered only part of material management and were examined only from the perspective of improving warehousing and transportation costs. In the 1980s, the logistics concept attracted more focus in Finland and was viewed from a broader and different perspective (Mäkelä, Mäntynen & Vanhatalo, 2005).

4.1 Developing the Logistics Position of Finland

Finland is located approximately two or three days further than its competitors from the main markets in central Europe. Distance is partly why logistics costs are higher in Finland; on the other hand, Finland’s logistics position in markets in the Russian Federation is more attractive in relation to its competitors, and should be used as a competitive advantage. Finland needs to reduce its costs and increase its access to international transportation networks; the development of infrastructure or more customised service solutions may be one answer to address its logistics position and high logistics costs (Suomen liikenne- ja viestintäministeriö, 2005).

The Ministry of Transport and Communication’s 2005 development plan for Finland’s logistics position stated that the electronic business processes found in the domestic market need to be developed for the transportation sector. The Ministry of Transport and Communication highlighted that the technology available must be used for development. New technology creates new opportunities. In most cases, old processes can be made by effectively implementing electronic working tools, but just one company making such changes will not help the entire industry. This is why the ministry’s study highlighted the need for development of the entire logistics industry in Finland. Logistics business processes need to be optimised at each company. After re-evaluation of its processes, a company may find unnecessary processes or duplicate processes in its supply chain; both are ineffective and do not result in cost savings. The previous study also recommended that each company stay updated on new technology possibilities and optimise its business processes at suitable intervals, and that it should hold internal workshops or development groups to support development (Suomen liikenne- ja viestintäministeriö, 2005).
Such workshops and development groups can already be seen in companies’ strategies. According to Laamanen and Tinnilä (2009), a popular development strategy in organisations and companies today is to hold workshops and development programs, but these are mostly concentrated on developing leadership skills and management approaches. The workshops are often formed because new ways of thinking and doing are desired, but leaders do not have ready solutions (Laamanen & Tinnilä, 2009).

The level of ICT and different technology tools is good and are available to businesses in Finland. However, benefitting from these tools and approaches in transportation and other logistics services is challenging. International companies with subsidiaries in Finland often decide on new technology tools at headquarters before deploying them to the subsidiaries (Suomen liikenne- ja viestintäministeriö, 2005).
5. Business Process Analysis and Optimisation

Over the years, different authors and studies have presented many business process modelling approaches and techniques. Each study had its own focus and took its own direction for examining and classifying business process modelling techniques (Majeed et al., 2008).

A good example is the research done by Cantrell, Davenport and Harris (2004). They conducted a survey of 163 organisations and in-depth interviews with 28 other organisations on an enterprise resource planning (ERP) system popular in the 1990s. The article provided examples of how an ERP system was implemented at companies. Some companies began using the system without first analysing its processes and, thus, failed to achieve its goal of improving optimisation processes. The companies that had successful ERP implementations first analysed the system and its capabilities and how it could be modified to fit the needs of the business. Successful companies also explored the type of data needed and how the system could be used to enhance company resources (Cantrell et al. 2004).

Each author has his or her own perspective in mind and promises many development possibilities. However, Vergidis, Tiwari and Majeed (2008) noted that results are presented only from the perspective of the ex ante business model and the ex post version. In other words, previous approaches and techniques were too narrow in scope (Majeed et al., 2008).

Mansar and Reijers (2005) also criticised different methodologies and approaches presented as manuscripts to develop wanted processes. As previously noted, this study examines findings from a company’s point of view and focuses on the business side effects of process optimisation. Zairi (1997) recommends that companies create their own business process management (BPM) culture with the goal of solving reoccurring problems in a process or enhancing the quality of a process. A BPM culture should ensure that everyone in the company is aware of the corporate goals and should motivate employees to add more value to the core product and customers (Zairi, 1997).

Mansar and Reijers (2005) took an alternative point of view, sought increased accuracy, and looked at the operational level, in contrast with articles and approaches they criticised. They recommended that companies first create what they called the work-centred analysis framework (WCA) (Mansar & Reijers, 2005, p. 292).

The WCA framework consists of customers (external and internal) and products and business processes (participants, information and technology). “A framework is not a model of a business process. It is rather an explicit set of ideas that helps in thinking about the business process in the context of reengineering.” (Mansar & Reijers, 2005, p. 284) Although they presented the WCA framework, they still argued for the need
for technology in that framework, which is an interesting point of view in relation to this master’s thesis. After reading the article, something seemed missing, and perhaps Majeed et al. (2008) were correct in stating that many approaches promised a great deal but failed to go deeper or provide specific guidance for a company seeking to optimise its processes to reduce costs and increase efficiency and profits.

Several previous approaches and techniques continued to analyse and refine process models after the initial modelling, and took process development to next level of quantitative analysis. However, according to Majeed et al. (2008), only few such approaches resulted in improvements. The primary data research revealed surprisingly little information on process optimisation as a theory and what process optimisation is really about.

Numerous articles were found on process optimisation, but these mostly scientific approaches used only one theory for a specific type of optimisation, for example, performance measurement, assignment optimisation or workflow optimisation. None of the scientific articles explained process optimisation and the type of information and effort needed to initiate the optimisation process. Instead, most of these articles adopted a problem that was studied from the beginning, did not write about who those problems were found.

Majeed et al. (2008) stated their opinion that process optimisation has received very little attention from researchers and that most current studies on methodologies talked about reengineering but not actual structured process optimisation; they also stated that no methodology exists that could be adopted by companies. The article by Majeed et al. (2008) was the only article to discuss process optimisation from a general point of view without focusing on specific cases related to process optimisation; it simply explained the processes that exist and how these processes can be modelled, analysed and optimised. Using the Majeed et al. (2008) article, other scientific articles were found, enabling an easier understanding of the theory of process optimisation. This resulted in easier access to and an understanding of different theories for modelling, analysing and optimisation of business processes.

Business process modelling and analysis play a crucial role in understanding processes from a broad perspective and help companies create the process thinking in the business environment. Different business process modelling techniques and analysis approaches concentrate on different process frameworks, and these existing techniques enable an examination of different aspects of processes (Majeed et al. 2008).

Zakarian (2001) discussed different modelling tools and methods for analysing processes and highlighted the importance of having a thorough understanding of all of the processes before attempting to model and analyse the inputs and outputs, as many other authors also discussed in their articles. Zakarian (2001) stated that all data, functions and resources should be known before beginning to model the processes. (p. 444) Majeed et al. (2008) discussed the importance of having general knowledge of
the process activities and stated, “real-life business processes should be classified according to their structural characteristics and their capabilities for analysis and optimisation.” (p. 2)

Conceptually, process optimisation sounds easy, and companies might find it easy to implement at a surface level; however, they often fail to take process analysis far enough to achieve a level of optimisation. Companies often create a process model and analyse processes from just one angle. To optimise processes within a company, they must first be modelled. Previous research cannot add further value to the modelling process or to the optimisation phase if the steps are not done correctly and in the correct order (Majeed et al., 2008).

Majeed et al. (2008) defined three different categories of business processes based on the features of the process. Figure 2 illustrates three different modelling techniques.

3 BP Modeling Sets

![Diagram of BP Modeling Sets]

Figure 2: Classification of business process modelling techniques by Majeed et al. (2008, p. 2)

The diagrammatic modelling technique is used when business processes need to be visualised. Mathematical modelling is a modelling technique for business processes that consist of mathematical groundwork. The business process language (BPL) technique is a software tool that supports the execution of processes (Majeed et al., 2008).

Majeed et al. (2008) also categorised different approaches to analyse business processes in the three categories previously noted. Figure 3 shows the analysis approaches for the three modelling sets.
Figure 3 shows that diagrammatic models can be analysed using observational analysis techniques. BPL process models can be analysed using performance evaluation algorithms. Mathematical business models can be analysed using performance evaluation, validation and verification methods. Simulation is used when different business processes exist that contain more than one of these modelling sets; in this case, a combination of different analysis methods is needed (Majeed et al. 2008).

5.1 Business Process (BP) Modelling – Static Modelling

Many articles found on primary data research recommended different software programs to model business processes and then continue on to analysis after modelling. How should a company attempt to optimise its business process using software if it lacks adequate knowledge about its business processes? Before using software to model business processes, the processes in focus need to be analysed; otherwise, no software can assist in modelling if the user does not understand the activities and the relevant information needed related to the processes (Hlupic & Robinson, 1998).

Static modelling is diagrammatic modelling of business processes, as shown in Figure 3 above. Absent software, static diagrammatic modelling is similar to the flowcharts used before technology. Static diagrammatic modelling enables visualisation of the chosen process or processes using the information that flows between processes (Majeed et al., 2008).
Process modelling should be done simply and clearly to allow for further analysis and optimisation. Sadiq and Orlowska (2000) presented the objects that should be used when modelling the process map. Figure 4 shows simple, clear and easy-to-use objects that can be understood by others when examining a process map. Two types of objects exists, node and transition, where the node object is divided into two, as shown in Figure 4 (Sadiq & Orlowska, 2000).

Figure 4: Process modelling objects and task types (Sadiq & Orlowska, 2000, p. 2)
Although each technique has advantages and disadvantages, static modelling remains popular, with over 80 percent of companies wanting to learn the technique to visualise their processes (Gladwin & Tumay, 1994; Hlupic & Robinson, 1998). The advantage to using static modelling (Figure 5) is that it assists a company in more thoroughly understanding its processes and the core idea of each activity in the process flow. The disadvantage is that the technique fails to provide a clear view of the outcome and the outputs of the process visualised (Hlupic & Robinson, 1998).

Figure 5: Static Process model example (Patel and Hlupic, 2001, p. 56)
5.2 Role Activity Diagram (RAD)

Role activity diagram (RAD) is a diagrammatic business process modelling technique. The RAD allows for visualisation of business process activities and enables the quantitative analysis of the processes in focus (Phalp & Shepperd, 2000).

In process analysis, RAD can be used in two different ways, and it facilitates two different types of analysis: performance analysis and observational analysis. Ould (1995) stated that RAD could be used as software as well as a simple visualisation technique to clarify an understanding of process activities and to allow for a discussion of further phases in process development. This simple technique enables an in-depth understanding and analysis of behaviours and interactions related to the business process (Phalp & Shepperd, 2000).


Miers (1994) stated that RAD is a good method for visualising information and performance flows within a process. Miers (1994) highlighted that RAD also demonstrates the power given to workers; in other words, RAD clarifies how much workers can do without communicating with the manager at every stage in the process (Phalp & Shepperd, 2000). RAD enables a company to reduce double activities, save money and increase productivity and efficiency. For example, different roles and their activities in the process can be calculated using different algorithms (Phalp and Shepperd, 2000). Figure 6 provides an example of a role activity diagram (RAD).

Role Activity Diagram example

Figure 6: Example of Role Activity Diagram (RAD) (Phalp & Shepperd, 2000, p. 107)
5.3 Business Process (BP) Optimisation

Zhou and Chen (2003) stated that business process optimisation is about reducing lead time and costs, improving quality and enhancing customer and employee satisfaction; in short, it contributes to maintaining or strengthening the competitive advantage of an organisation. Majeed et al. (2008) presented general business process optimisation theories, but also criticised because of a lack of existing theory in this field of business. They also noted that diagrammatic business processes cannot be optimised because optimisation requires quantitative measures of process performance that cannot be evaluated or applied to diagrammatic process models (Majeed et al., 2008). Figure 7, which presents different process optimisation approaches in relation to the three modelling sets presented earlier, shows that there are no business process optimisation approaches for process language models (Majeed et al., 2008).

<table>
<thead>
<tr>
<th>MODEL of business process</th>
<th>modelling SET(S)</th>
<th>TYPES of business process optimisation</th>
<th>APPROACHES to business process optimisation</th>
</tr>
</thead>
<tbody>
<tr>
<td>-Petri-nets (and workflows)</td>
<td>-Diagrammatic models -Mathematical/formal models</td>
<td>-Graph reduction techniques</td>
<td>- (Sadiq and Orlowska, 2000) - (van der Aalst et al., 2002) - (Lin et al., 2002)</td>
</tr>
<tr>
<td>-Mathematical models</td>
<td>-Mathematical/formal models</td>
<td>-Algorithmic approaches</td>
<td>- (Han, 2003) - (Gutjahr et al., 2000) - (Jaege et al., 1995) - (Hofacker and Vetschera, 2001) - (Soliman, 1998) - (Tiwari et al., 2006) - (Vergidis et al., 2006) - (Volkner and Werners, 2000) - (Zhou and Chen, 2003a) - (Zhou and Chen, 2002) - (Zhou and Chen, 2003b)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>-Activity/Task consolidation</td>
<td>- (Dewan et al., 1998) - (Rummel et al., 2005)</td>
</tr>
</tbody>
</table>

Figure 7: Optimization Approaches for Formal Business Process Models, collected and created by Majeed et al., 2008, p. 11
Despite the criticisms of diagrammatic modelling techniques, they are still used by many companies (Majeed et al., 2008). Diagrammatic modelling techniques are simple and more visual than formal process modelling techniques that have increased in use in recent years; however, they lack the potential for performance analysis or business process optimisation (Majeed et al., 2008). Surprisingly, after considering these firm statements, this study conducted further examinations and found that process optimisation is possible for diagrammatic business process models using qualitative improvement approaches such as, for example, graph reduction techniques (Majeed et al., 2008).

5.4 Graph Reduction Technique

A company cannot optimise its internal supply chain processes without having an understanding of such processes. As noted previously, existing business processes need to be modelled before an analysis of the processes is feasible.

Optimisation is only possible if an honest and detailed process model diagram exists. For a specific process under development that has been modelled using a diagrammatic modelling technique, the graph reduction technique (GRT) is easier to adopt. Figure 7 above shows that process optimisation is possible through diagrammatic business models, and the GRT is the only process optimisation technique for diagrammatic and mathematical business models (Majeed et al., 2008).

The GRT can help uncover unnecessary or unproductive activities within processes. Each process requires a beginning and an end. Each activity in the process requires an output and a value to ensure that, in the end, the output and value are optimal for the end customer (Majeed et al., 2008).

GRT is based on the same modelling technique presented earlier in Section 5.1. It only concentrates on the activities in a process or on employee performance for an activity. With the graph reduction technique, optimisation is possible for “data flow, temporal constraints, execution, roles, and task classification.” (Sadiq & Orlowska, 2000, p. 4)

According to Sadiq & Orlowska (2000) and their graph reduction technique as a process optimisation theory, the optimization process consists of three different phases:

- Process Modelling Structure
- Structural conflicts (deadlock and lack of synchronisation)
- Verification of structural conflicts (reduction)
5.4.1 Process Modelling Structure

The structure and language of process modelling is important to make optimisation possible with the graph reduction technique. All tasks and flows need to be understandable. The shapes and ways of presenting process models have been described in previous chapters should follow the example in Figure 8. This sequence structure is presented in Figure 8, which is the most used and most basic modelling structure. Figure 8 presents the simplest way of depicting a task with a beginning and an end, and the tasks in between (Sadiq & Orlowska, 2000).

Process Modeling Structure

Figure 8: Process modelling structure (Sadiq & Orlowska, 2000, p. 3)

5.4.2 Structural Conflicts

Sadiq and Orlowska (2000) presented two different structural conflicts in business process modelling during process optimisation. These conflicts are a deadlock and lack of synchronisation. Figure 9 presents an example of a deadlock structural conflict. A deadlock structural conflict is defined as, “A deadlock at a synchroniser structure blocks the continuation of a workflow path since one or more of the preceding transitions of the synchroniser are not triggered.” (Sadiq & Orlowska, 2000, p. 5) A deadlock can occur because of incorrect process modelling or because the process itself does not work and workers engaged in the task(s) do not see the problem or error (Sadiq & Orlowska, 2000).
Example of a process model with deadlock structural conflict

![Diagram of process model with deadlock structural conflict](image)

Figure 9: Example of deadlock structural conflict in process model (Sadiq & Orlowska, 2000, p. 4)

The other possible conflict related to the graph reduction technique of Sadiq and Orlowska (2000) occurs when a task is done twice or when a process consists of double tasks at the same time, known as lack of synchronisation. Figure 10 illustrates this conflict with an example in the last of the three windows. At the end of the modelled process, the same tasks are done twice, resulting in a process that does not get to its end because of a lack of synchronisation (Sadiq & Orlowska, 2000).
Lack of Synchronization – Structural conflict

Figure 10: Example of lack of synchronisation conflict (Sadiq & Orlowska, 2000, p. 5)

5.4.3 Verification of Structural Conflicts

To uncover the structural conflicts presented previously is a challenging task, and presents the primary reason for companies not succeeding in process optimisation – they have not advanced their work to the extent where conflicts and problems have been identified. A verification approach is required to find conflicts and eliminate or minimise them, and removes the definitive correct tasks from the graph. The notion is that if a process has no conflicts, then all of its tasks are removed from the graph, but if conflicts exist then the reduction process does not successfully complete and tasks remain in the graph. Two methods exist for identifying and reducing conflicts from the process map: an algorithm reduction process and counting sub-graphs. The algorithm reduction process has five different reduction rules (terminal, sequential, adjacent, closed and overlap) and each needs to be tested to determine the right reduction rule (Sadiq & Orlowska, 2000).

The second reduction method involves counting the sub-graphs. The core idea of counting the sub-graphs is to determine all possible ways of doing a process. Counting the sub-graphs also reveals how those tasks should be executed in each version of a sub-graph. According to Sadiq and Orlowska (2000), “the visual approach for identifying structural conflicts is useful, intuitive and natural.” (p. 17)
5.5 Summary of Theoretical Part

This research presented different types of processes and how they can be analysed and optimised. The theoretical framework was engaged using different scientific theories that discuss process optimisation without technology. Section 5 highlighted the point that numerous different theories and approaches exist but recommend only one process optimisation approach. Most often, a theory included a technological solution that is assumed to execute all of the work for the company. The research related to the theoretical framework revealed that process modelling is one of the most crucial aspects on the path to optimising processes. Processes need to be modelled first before optimisation can be possible.

On the basis of these facts, this study selected the diagrammatic modelling technique, which is used when different processes need to be visualised. To make this research easier to follow, this study continued with diagrammatic modelling and analysed and optimised theories from that scientific field (see Figure 7). This decision was made to show that process optimisation can be accomplished without technology. In reference to the limits of this study in Section 1.5, the research begins from the point at which problems in the order-to-delivery process are unknown, thus first requiring visualisation of the order-to-delivery process.

Static modelling is one of the simplest and easiest ways to visualise processes. In static modelling, simple figures are used to present information and performance flows in the process. Figure 4 shows examples of the different shapes used in the static modelling for this study. Section 5.2 presented the role activity diagram (RAD), a modelling technique in the field of diagrammatic modelling. RAD modelling enables quantitative analysis of business processes and an examination of different activity roles in the company. RAD can be used when a general corporate process map is needed, as well as in situations in which more specific process modelling is required, such as to examine processes in a single department.

After process modelling has been completed, process optimisation can continue to the next step. According to Zhou and Chen (2003), process optimisation means optimising the performances in the process; it should reduce lead time and costs and should increase the company’s competitive advantage.

Section 5.4 presented the graph reduction technique. Although numerous techniques exist to analyse processes that have been modelled, GRD can be used in process maps modelled using diagrammatic modelling techniques. According to Figure 7, few optimisation theories exist for processes that are visualised and analysed using static modelling. GRD allows for examination of the process map, and structural conflicts and deadlocks in information flow are explored. The last phase in GRD reduces or eliminates invalid or unprofitable phases or tasks in the process being optimised, and optimisation is executed in quite a different way than was expected. During reduction,
the most crucial and wanted tasks/activities are removed, leaving the invalid and unprofitable activities that add no value to the output of the process.

In the next chapter, this theoretical framework is put to use at the case company. The case company does not have a general process map for its order-to-delivery process. This study has pointed out that process modelling is required as an initial step in honest and reliable process optimisation. Therefore, the case company’s order-to-delivery process is first visualised using the static modelling technique. In Section 7.4, the current process map of the case company is presented and Sections 8.1 and 8.2 presents the new order-to-delivery process maps. The first process map shown in Section 8.1, Figure 17 was developed on the basis of the second interview round with employees at the company. The second process map in Section 8.2, Figure 18 was developed on the basis of observations of the company made by this author. The attributes used to analyse the process map are based on static modelling, and an attempt is made to identify possible errors and structural conflicts from the general order-to-delivery process map. Identifying interesting observations on the map in relation to the answers received during in the second interview round contributed to an analysis of the process map.

Because this study is publicly available, process optimisation is presented only at a general level. Specific departmental and company-related issues that require additional attention and development are presented at the end of this study.
6. Empirical Framework

Chapter six starts the third part of the study, the empirical part of the study and presents the Finnish logistics sector and its challenges in the market. Chapter seven presents the case company and its core business idea, and discusses the process model/map that the company used before this research was conducted. Chapter eight presents the vision of the company’s employees related to their order-to-delivery process and the author’s vision of the company’s order-to-delivery process. The process map was created based on the questionnaire provided during the second interview round at the case company’s premises in Finland.

6.1 A Challenging Country - FINLAND

Finland’s location in the “corner” of the north side of Europe is challenging from a logistics point of view. The size of the country (population of five million) and the Finnish markets enhance this “corner” effect. The country is further from different parts in Europe in relation to other European countries. Its location in the north side of Europe creates a more difficult starting point when planning to provide logistical services to a broader customer sector than is currently serviced. In general, Finland’s logistics service sector is small and the capital required is significant because of the high transport and warehousing costs. Therefore, Finland has yet to become an attractive country for international companies to locate their logistics centres given its location and high logistics costs (Okkonen & Lukka, 2004).

An international company locating to Finland will find selecting a location for its logistics centre quite challenging. Finland is sparsely populated and all delivery distances in the Finnish market are long. According to a previous study, the factors noted above are challenges to Finland improving its position in the logistics business sector. The study also stated that these challenges should provide incentives to logistics business providers in Finland to improve and optimise their processes to enable basic logistics services to create greater added value to customers (Okkonen & Lukka, 2004).

Efficient logistics are important in relation to competitiveness and employment, and it directly affects logistics costs and levels of customer service. The importance of logistics costs and customer service levels increase when the business world changes. Cost efficiency, accuracy and pace of transportation rely on the quality and development of roads in domestic markets. The pressure from co-operation in international markets is a popular topic of conversation. The development of international co-operation, domestic transportation roads and networks is valuable given Finland’s location. In the future, the importance of efficient logistics and
transportation networks will increase, and they will become even more critical to Finland’s logistics competitiveness in the business world. Efficient and effective logistics operations increase countries’ competitiveness, economic growth, employment and well being (Suomen liikenne- ja viestintäministeriö, 2005).

According to a previous study made in 2008, industry and trade logistics costs in Finland were approximately 14.2 percent of companies’ turnover and were approximately 11.9 percent in 2009. Generally, in 2002 industry and trade logistics costs in Europe were 13.3 percent of GDP, whereas in middle Europe such costs were approximately 10–17 percent of GDP. The same costs were approximately 17 percent of Finland’s GDP (Suomen liikenne – ja viestintäministeriö, 2010).

Logistiikkaselvitys 2010 stated that no rules or models exist on accounting for industry and trade logistics costs, implying that accounting for logistics costs depend on a particular country’s own metrics and values. Results also depend on the comparison metric, as some countries compare costs to gross domestic product (GDP), whereas others use company turnover (Suomen liikenne – ja viestintäministeriö, 2010).

The logistics sector is an important employer in Finland. In 2005, the sector employed approximately 100,000 people. To keep the country as competitive as possible, the logistics service sector needs to be under continuous development and focus should be placed on decreasing logistics costs and increasing efficiency (Suomen liikenne- ja viestintäministeriö, 2005).

A study from 2010 on logistics costs in Finland showed different results from a similar study done in 2005. The previous research found that managers do not believe that high logistics costs are a negative on the balance sheet, but instead view them as reflecting good customer service. Logistics costs are a statement of a company’s competitiveness. Industry and trade logistics costs in Finland have decreased, especially transportation costs (Suomen liikenne – ja viestintäministeriö, 2010).

In international markets, the range of logistics service providers is wide and they provide numerous variations in services. In the domestic market of Finland, the variations in logistics services are not as numerous as those found in international markets. A small country such as Finland, located in the “corner” of Europe, does not require as many service variations. Warehousing services, transportation services and a combination of these two have increased in Finland, but not all services provided in international markets have been adopted because they are not necessary and no large entities operate in the country to utilize such services. One reason for an increase in the extension of different logistics approaches is the numerous companies expanding into international or global markets. According Okkonen and Lukka (2004), Finnish logistics services had not yet been commercialised, although transport services were heading in that direction. Okkonen and Lukka (2004) also stated that there were no 4PL Finnish logistics providers in the market in 2004; instead, different 3PL providers combined and customised their services.
According to the Ministry of Transport and Communication, Finland’s logistics position has some permanent and variable elements. Permanent elements include the country’s location and distance to the main market. In logistics, long distances are disadvantages as they create higher costs and increase transport times. Finland’s location is slightly beneficial in that it protects the domestic market and domestic logistics providers from outside competitors. The Ministry of Transport and Communication believes that Finland can increase the rate and effectiveness of each company’s order-to-delivery process activity to effectively decrease distances. The best development targets are different terminal stops and faces in the order-to-delivery process supply chain (Suomen liikenne- ja viestintäministeriö, 2005).
7. History and present – HAVI Logistics Finland

7.1 HAVI Logistics Finland

HAVI Logistics Finland is a wholly owned subsidiary of Global Logistics GmbH and is headquartered in Duisburg, Germany. HAVI Logistics has three different business divisions: HAVI Logistics (logistics), The Marketing Store (campaign planning) and HAVI Global Solutions (packaging consultation). In its own words, the company is an international family business. HAVI Logistics also operates in 41 countries and turnover in Europe for 2010 was 3.6 billion Euros (HAVI Logistics. 2010).

HAVI Logistics Finland has facilities and a distribution centre (DC) in Vantaa, Finland. Appendix 4 presents the organisational hierarchy of HAVI Logistics Finland. HAVI Logistics has been a green company for 29 years and received a World Wide Fund for Nature (WWF) green office certification in 2009 (HAVI Logistics Finland. 2011).

HAVI Logistics Finland, specialising in the food industry, delivers groceries. The company provides demanding food and restaurant logistics services. Its trucks are divided into three different temperature zones to allow for frozen, chilled and dry goods to be transported. In addition, the company rents warehouse and office space (HAVI Logistics Finland. 2011).

HAVI Logistics Finland operates only in Finnish market and has several transportation customers, as well as a one major customer, an international franchising restaurant brand. The co-operation between HAVI Logistics Finland and the franchising restaurant brand began in 1989. The company operates a DC/logistics centre for this customer and handles its entire order-to-delivery process. Figure 11 shows HAVI Logistics Finland’s customer-based supply chain (HAVI Logistics Finland, 2011).
7.2 Global Lead Logistics Provider

“Third-party logistics (3PL) are activities carried out by a logistics service provider on behalf of a shipper and consisting of at least transportation.” (Evangelista & Sweeney, 2005, p. 9). Fourth-party logistics (4PL) is taken even further, and a 4PL provider is a company that only books and makes contracts with third-party logistics providers. “Fourth-party logistics (4PL) providers are considered to have no own logistics resources. 4PL companies employ sophisticated IT systems in order to integrate services from 3PL companies.” (Gehrke, Herzog, Hribernik, Schuldt & Thoben, 2011, p. 7)

HAVI Logistics calls itself a global lead logistics provider. A lead logistics provider is a company that takes the service level further than 3PL and 4PL providers. HAVI Logistics Finland combines different tasks for customers, and each customer receives customised services if needed; in other words, HAVI Logistics Finland is prepared to change its supply chain process to meet customer demands. Customer relationship responsibilities have been made clear, minimising misunderstandings. According to HAVI Logistics, internal resources responsibilities are divided between the customer and the company, as described below (HAVI Logistics, 2011).
Customers’ responsibilities:

- Selection of Suppliers
- Selection of Assortment
- Negotiation of prices with Suppliers
- Negotiation of other terms with Suppliers

HAVI’s responsibilities:

- Calculation of product prices
- Procurement to HAVI Warehouse
- Pre-freight – from Supplier to HAVI Logistics DC
- Warehousing
- Payment of Supplier
- Receive orders from Restaurants/Stores
- Distribution (One Stop Shopping, all temperature zones)
- Customer Service
- Back Office Functions

7.3 Value Added Services

A lead logistics provider adds value to a customer more than any other provider in the market. Customers are at the core of HAVI Logistics; therefore, all customer relationships are very important to the company. HAVI Logistics wants to be the best in providing different services to their customer, which is why information flow, goods flow and value flow need to be under its control. Each process needs to be well planned by the company to enable their customers to receive the added value that they are promised. HAVI Logistics is willing to customise its services for customers as needed (HAVI Logistics Finland OY, 2011).
The value added services that bring more value to the customer are:

1. Internal Control
2. Recycling (plastic and cardboard)
3. Procurement
4. Restaurant’s internal logistic solutions e.g.
5. Shelving service
6. Administration – accounting and salary administration
7. Electronic and remote temperature controlling as a part of customer’s own Inspection System
8. More added services what the relationship needs?

7.4 Current Process Map in the Company

Figures 12 and 13 present HAVI Logistics’ order-to-delivery process. As can be seen, the relationships among the different flows (information, goods and value) are not presented clearly, making it difficult for the case company to initiate process optimisation based on these guidelines. This “process map” was found in the internal materials of HAVI Logistics and is related to and describes the state-of-the-art and robust ERP system called ILOS (International Logistics and Operations System). Hence, the process map is the starting point for the company’s process optimisation of its order-to-delivery process (HAVI Logistics Finland OY, 2010).
Goods are going out...

Figure 12: HAVI Logistics Finland goods are going out processes (HAVI Logistics Finland OY (2010). Internal material, Vantaa Finland: HAVI Logistics OY)

Goods are coming in...

Figure 13: HAVI Logistics goods are coming in processes (HAVI Logistics Finland OY (2010). Internal material, Vantaa Finland: HAVI Logistics OY)
7.5 Results of the Second Empirical Interview

In the second interview round, 13 persons from the case company were asked to fill out the questionnaire, and 10 of those 13 responded. Figure 14 presents the results of questions 1–4 and 6 from the second interview questionnaire. Questions 1–4 and 6 in the questionnaire (Appendix 2) were open-ended questions but could be answered with a “yes” or “no”. Most of the employees answering the questionnaire always provided examples and described why they answered “yes” or “no”. Figures 15 and 16 show these comments and recommendations.

Table of answers form the second interview round

<table>
<thead>
<tr>
<th>Question number</th>
<th>NO</th>
<th>YES</th>
<th>IN SOME LEVELS</th>
<th>EMPTY ANSWER</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>8</td>
<td>2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td>6</td>
<td>4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td>8</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>4.</td>
<td>4</td>
<td>2</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>6.</td>
<td>5</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Figure 14: Table of answers from the second interview round

To aid in understanding this section of the study, the figures are opened up for the reader. The flow and the meaning of this section are crucial to the findings and conclusion of this study. The actual questions for each question number are shown under or above the figure, making viewing the figure easier in terms of understanding. Each question number in Figures 14–16 corresponds exactly to the questionnaire form (Appendix 2).

1. Have you heard that Ministry of Transport and Communication together with other public authorities in Finland wants companies to develop their processes?
2. Do you think that your process/processes has/gets enough technology support in everyday work?

3. In general do you believe that process development can be done only by using technology?

4. Would you prefer that process development in your department would be done with investing to new technology? What could it be? Please give ideas/examples

5. How can you effect to the process development in your work?

6. Do you believe that you can develop your process/processes without new technology?

Figure 15 presents the most comments and recommendations from employees who answered the questionnaire. Figure 15 shows the comments and recommendations from questions 2 to 5.

<table>
<thead>
<tr>
<th>Question number</th>
<th>Comment</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.</td>
<td>Lack of application implementation training (ERP), For basic business ok support from technology</td>
<td>More flexibility for each subsidiary company in technology issues, More training with ERP, Logistic operation software</td>
</tr>
<tr>
<td>3.</td>
<td>Humans need to use the technology, Process knowledge needs to be high</td>
<td>Process modelling</td>
</tr>
<tr>
<td>4.</td>
<td>Examine the capability of old technology software first (Catella, ERP, ILOS)</td>
<td>More process knowledge, Warehouse management system, Functional EDI connection</td>
</tr>
<tr>
<td>5.</td>
<td>Suggestions, Discussions, Examples outside (Benchmarking), Brainstorming</td>
<td>Process descriptions, how each department can support the closest department more</td>
</tr>
</tbody>
</table>

Figure 15: Most usual comments and recommendations from employees (questions 2-5)
Figure 16 presents the results from questions 7, 9 and 10, and the actual questions can be seen under the figure. The results of questions 10–13 from the second questionnaire (Appendix 2) are used in the process map presented in Section 8.1.

<table>
<thead>
<tr>
<th>Question number</th>
<th>Comment</th>
<th>Recommendation</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.</td>
<td>Getting the orders form restaurants on time, Optimization of processes, Internal reporting</td>
<td>Information channels, Communication with departments and suppliers, Total management of processes</td>
</tr>
<tr>
<td>9.</td>
<td>Seeing the whole as a chain of processes, Understand the whole process, Knowing the chain reaction of product and information flow</td>
<td>Training, Explaining the whole order-to-delivery process to everybody</td>
</tr>
<tr>
<td>10.</td>
<td>Lack of information sharing between departments, Good information sharing among own department</td>
<td>Training, Explaining the whole order-to-delivery process to everybody</td>
</tr>
</tbody>
</table>

Figure 16: Most usual comments and recommendations from employees (questions 7, 9 and 10)

7. If you answered YES to the question 6, answer to this question. What would you want to develop? What are the “problems” in your process?

9. Do you know what “process thinking” is? What does that mean to you?

10. Do you think that you can share your process vision and process thinking to your employees? How can this be done?
8. Case Company’s Processes After Process Modelling

This section of the study presents the case company’s order-to-delivery process by following the theoretical section of this thesis. The first visit to HAVI Logistics revealed that it lacked a clear process map that visualised the entire order-to-delivery process within the company. Analysis and optimisation of processes would be impossible to begin using this obsolete order-to-delivery map. As mentioned in the theoretical framework, process optimisation always begins by visualising the processes; therefore, the questions in the second interview were designed to enable visualisation of the order-to-delivery process and to uncover the possible pros, cons and gaps in the process. The information used in this process modelling to create a new order-to-delivery map was collected from the second interview round.

The observations made during the first and the second visit found gaps between the departments and how the order-to-delivery process was understood throughout the company. The author wanted to determine whether the employees saw these same gaps given the existence of two different process models, one based on the employee view and the other based on the views of this thesis. The process maps were created on the basis of business process modelling theory. The order-to-delivery process was presented as a simple diagrammatic model.

8.1 Employee View

Figure 17 presents the employees’ view of order-to-delivery processes at HAVI Logistics and was developed based on the answers to questions 10–13 during the second interview round. The first process starts when an order comes into the company and the last process occurs when the order arrives at the customer’s premises. Each employee who participated in the second interview round had the opportunity to answer the open-ended questions as they saw fit, and did not see the answers of other respondents. Employees working in the same department agreed on the processes within their department, but their opinions differed in terms of work tasks executed within the process.
This process map illustrates the order-to-delivery process flows for a major customer, the franchising restaurant. The logistics relationship with the franchising restaurant included all of the franchised restaurants in Finland. To clarify, the customer noted in yellow consists of all of the franchising restaurants and their orders throughout Finland.

In Figure 17, the grey boxes denote departments involved with HAVI Logistics’ order-to-delivery process. Each department is engaged in different processes in the process. The blue peal in the left upper corner of Figure 17 represents the order part of the entire process, the green peal denotes the processes that occur between ordering and delivery and the last peal (red/orange) consists of the delivery processes. The figure, including the peals above it and the processes below it, present the company’s order-to-delivery process for each department. Figure 17 shows the links between departments while the flow moves towards delivery to the customer.

Each process that belongs to each department can be seen in the departments flow box drawn to right of the department box. All of the processes belonging to each department can be seen at the right of the department. The blue process boxes represent the processes executed when an order comes into the company, the green processes prepare customer deliveries entail all processes engaged in that preparation. The orange/red process boxes represent the activities that occur during the delivery
process within the company and outside the company as the truck drives towards the customer. To facilitate its understanding, this clarification follows the colours of the order-to-delivery process map. Figure 17 opens the order-to-delivery process by following the red peals, although these peals cross different company departments during almost every movement of the process.

The order-to-delivery process begins when the customer (in yellow) sends a sales order to the company. Customer Service (CS) receives orders on a specific day of each week, and checks and approves the sales orders. As part of order control, CS checks whether all restaurants sent their sales orders and contacts a restaurant if it has not. This process adds value to a customer while ensuring that all orders were received. When a sales order comes in, information on total order amounts (in kg) is sent to the transport department through the company’s ERP system. This enables the transportation department to select the suitable trucks and vehicles to deliver the goods. The transportation department also determines which orders go into the same truck and which customers are the first and last in the delivery process.

Capacity planning in the transportation department consists of order capacity control. The department counts the weight (in kg) of each order and selects the trucks to be used. The transport department also develops a plan that includes the route and the driver for each truck. The plan consists of the number of restaurants to which the truck can deliver, and the route and truck capacity information are used to determine the optimal most profitable plan.

After the CS department approves orders, the approval information goes to the procurement department and the warehouse department. The warehouse holds dry goods, chilled goods and frozen goods. A procurement department order is sent to the warehouse to communicate the goods (chilled, dry and frozen) required. As part of order control, CS orders the specified quantity of fresh goods from the warehouse after each order is received, as such goods cannot be stored in the warehouse for long periods. The procurement department informs the finance department about order totals, and the finance department manages accounts payable with goods suppliers.

The warehouse receives the ordered goods and places them into the freezer, the fridge and the dry goods storage area using the FIFO (first in first out) procedure. FIFO is very important in the food business because each food item has a best before date. Goods with the most recent dates should go to the back of the line and goods expiring the soonest should be delivered to the customer first. After all received goods are placed into their areas, the warehouse starts filling the orders onto pallets using the order information received through the Catellae picking device (Traceability System). When the entire order for a restaurant has been selected, the pallet is packed, making it safer to transport. Packing is done based on temperature, so the pallets in the fridge are packed and remain there. This process is followed for each pallet at each temperature in the warehouse (fridge, freezer, dry).
The order in place process consists of the warehouse having picked each order onto pallets for each restaurant that should receive a delivery that day.

The load and transport process is as follows. When a truck driver arrives at the distribution centre in Vantaa, she/he receives a list of all of the pallets ready for loading. The driver selects the pallets from the three different temperature areas using the tracking device (Catellae) and loads them onto the truck in a sequence that facilitates unloading from the truck for each restaurant on the route. After the truck has been loaded, the driver starts on its route for the day.

Delivery to the customer (yellow) occurs when the truck arrives at the customer’s premises and the driver unloads the order. After the order has been delivered and unloaded at the restaurant, the finance department receives information on the delivered goods to enable accuracy in accounts receivables.

Possible claims are addressed after the restaurant has received its order. The claims information flow is drawn with green peals in the figure, enabling easy viewing of the information flow from the customer. Claims could be for almost anything: driver, time of delivery, goods, quality of goods, missing goods, etc. The claims are received by CS and then handled there or, if related to goods (waste or quality of goods), the procurement department addresses them.

8.2 Thesis View

Continuing with Figure 18, the same clarifications for each department and process remain valid. The information under Figure 18 presents this author’s vision and opinion of how the order-to-delivery process appears to the company. Figure 17 was developed based on the second interview round (Appendix 2) and Figure 18 was developed based on observations that this author made during visits to each department at the company. The notion behind Figure 18 is to identify any differences between employee explanations and observations made about the company by this author. This analysis can have an interesting effect on the empirical part of this study and its findings, as it determines whether employees provided accurate descriptions of the process in which they are involved or whether they simply answered questions (Appendix 2) in a hurry and without adequate thought.
As can be seen, Figures 17 and 18 show little differences. The buffer stock task (light green) in the procurement department and the back-haulage process task (light green) in the transport department are the processes that differ. Some information flow (orange/red peals) differences are shown but not as many as the author had expected.
9. Findings and Analysis of Theoretical and Empirical Sections

The last and the fourth section of this study consists of analysis of and conclusions to the research. The ninth chapter in this fourth section of this thesis begins by analysing the theoretical and empirical findings, and divides the analytical section into three different parts comprising the general analysis and the research questions of this study. The tenth and last chapter provides a conclusion, including conclusions related to the research questions and to the case study. The conclusion also presents suggestions for future research and reviews possible criticisms of this study.

9.1 General Findings and Analysis

This research began by presenting the development plan for the Finnish logistics business sector that was created in 2005 by the Finnish Ministry of Transport and Communication. Finland has a challenging logistical position by being located in the corner of Europe, which became clear from the findings of the theoretical and empirical frameworks of this research. The references to Finland’s logistical position and the pushing of development ideas showed that something needs to be done in Finland. If sources insisted that technology is the right solution, to that point this study presents opinions that differ from those sources. Finland is an IT country but IT is not always the right solution. As shown in Figure 14, the second interview round at the case company showed that eight of the respondents did not know about the development plan for the Finnish logistical sector. The development plan was created in 2005 and very little research was found on the matter after that date. Only some public bodies, such as Logistiikayhdistysten Liitto (union), made statements on the development that should be implemented at logistics firms in Finland and on the IT software combination that companies should invest in. The theoretical framework of this research pointed out that a need exists for further research on this matter in Finland at a general level and at the company level. Finland needs to decrease its logistical costs and enhance its position as a good connection to the Russian Federation and the Baltic States.

The purpose of this study was to determine the theories for business process optimisation without technology and the theoretical framework made clear the challenging and multi-functional nature of process optimisation. At the beginning of this research, the concept of process optimisation was completely different and was found to be easy and more clearly structured. However, process optimisation turned into an on-going task that requires numerous different activities and processes on the path to enhancing business processes.
The theoretical framework also pointed out that process optimisation and process development is possible to conduct without technology. Process optimisation cannot be done by following only one theory or approach, the problem needs to be first investigated, and then suitable theories for that problem can be used. The finding on the complexity of process optimisation received support from the case company.

After finding the theories for process optimisation the purpose of the empirical part was to apply that theory to a single company through a case study. The idea was to test the theories and see if those theories are usable in real life and if process optimisation really is possible to conduct without technology as the theories that were found claimed. Sometimes theories can look good in paper but do not work in real case. Also the meaning of the empirical part was also to attempt to identify hindrances and/or find opportunities for the company to develop their processes without technology. The empirical part of the study took the theories that was found in to action and tested the methods through a case. At the same time the empirical part attempted to find support to whether a relatively small company can benefit from investing in technology.

After presenting the theories that are possible to apply in process optimization without investing in new technology, this study applied those theories in the case company. As the theoretical framework noted, this study selected the diagrammatic modelling technique, which is used when different processes needed to be visualised. This study continued with diagrammatic modelling and analysed and optimised theories from that scientific field (see Figure 7). In reference to the limits of this study in Section 1.5, the research began from the point at which problems in the order-to-delivery process were unknown. This study first examined the current situation at the case company and found some hindrances already during the first visit. The most interesting finding during the first visit was that the case company did not have any general process map and yet optimisation and development was wanted. When the work at the case company began form the point where problems were not known, the lack of general process map became the first finding and problem in the order-to-delivery process at the company.

This study modelled the order-to-delivery process at the case company by using the static modelling technique from the field of diagrammatic process models. The process map developed in this thesis was based on the second interview round. The process map resulted from answers from 10 respondents, which provided a general picture of the level of knowledge of the current order-to-delivery process at the company. Thirteen employees were invited to answer the questionnaire and only 10 responded. Because three employees failed to respond, the process map was not as factual as it could have been, and a general view of the company’s order-to-delivery process was not achieved. Moreover, the author sensed that the employees did not put their best efforts into answering the questions, perhaps because they did not find the research important at the time, or because of a hectic day at work. Some of the
respondents even commented about the questions or failed to answer some of the questions.

The modelling work and the two interview rounds revealed that there exists a lack of process knowledge inside the company. Different departments did not know about tasks and activities that are done in the other departments, and that can be one of the reasons why there did not exist any general process map of the company’s order-to-delivery process before. Development opportunities were found in the procurement department and in the warehouse department. The author found that the warehouse and procurement departments do not receive sufficient attention and their processes are not as controlled as they should be in a logistics company. Figure 17 shows that the procurement department and the warehouse department do not work together as much as they should. One good example about the lack of co-work between the departments is in the procedures of ordering and receiving goods, more trucks are waiting in the premises of the company than the warehouse can unload.

When process optimisation is planned and development is needed, knowledge of the process must be greater. Process optimisation can be done without technology, by first starting the process, with visualising the processes manually as this study pointed out. The manual visualisation of processes is also a learning process for the employees by which more knowledge of the internal processes is gained within the company. The case company is beginning to focus more on its internal processes and an understanding of its current level of process knowledge is a good starting point.

Finland’s position also creates challenges for the case company, which became clearer after visiting the company’s premises in Vantaa, Finland. The case company receives goods from different parts of Europe, usually by ferry, which means that arrival times cannot easily be controlled as they depend on the timetables of such transport ships. Receiving procedures to handle incoming goods can be improved at the case company. Receipt of goods creates a small problem at the warehouse because all other tasks need to be stopped while the trucks arrive.

9.2 Research Question 1

- How can the business processes within the company be improved without upgrading electronic working tools?

Process improvement without technology begins with learning about the processes that exist to enable accurate modelling, and was revealed to be more complex and challenging than the author expected. The various articles on upgrading electronic working tools in Finland showed that such upgrades are easy. If the general level of electronic working tools is as low as different public bodies claim, this may be the result of their relatively minimal knowledge of companies’ processes. However, if
companies only made investments in electronic working tools without a proper understanding of their own processes, they probably would incur significant costs and experience negative results. The author believes that companies, with low level of electronic working tools and low level of process knowledge, in Finland cannot adequately utilize new electronic working tools until they fully understand their processes.

Although the theoretical framework noted that numerous theories and approaches in the field of process optimisation present or recommend IT software for executing company tasks, the author believes that process optimisation is possible without using software or new IT technology.

The theoretical framework of this study revealed the theories that can be used on process optimisation of internal processes, that is done without technology, and used those theories found in the empirical framework of this study. The result of theoretical framework was that diagrammatic processes can be visualised and analysed manually by using the static modelling technique. Theoretical framework revealed that static modelling is diagrammatic modelling of business processes and static diagrammatic modelling is similar to the flowcharts used before technology. According to the findings of the theoretical framework, the general idea and core meaning of process optimisation is about maintaining or strengthening the competitive advantage of an organisation. Other result of the theoretical frameworks was that when diagrammatic business processes are modelled by following static modelling technique and those business processes can be optimised for example by following the graph reduction technique. As mentioned in the theoretical framework the GRT can help uncover unnecessary or unproductive activities within processes.

The general knowledge level of process optimisation at the case company was lower than expected. The company has begun to focus on its order-to-delivery process and this study provides a good general starting point for managers. Each employee interviewed had a vision of the problems within his or her department and potential solutions. These managers did not see eye to eye on the required changes, as shown in Figure 14 of section 7.5. In other words, each employee had good thinking about his or her own department and some departments worked very well together. A few departments that should have been working together experienced a lack of cooperation and similar thinking on process. This finding indicates potential areas for improvement.

Functions related to administration at the company are working perfectly. Figure 17 shows the relationship between the procurement department and the warehouse, indicating that these two departments share a strong connection in relation to their thinking on process and the relevant inputs and outputs. They share the highest proportion of inputs and outputs, implying that they should increase the coordination of the work between their departments. The current organisational plan that fails to connect procurement with the warehouse department probably resulted from
management’s understanding of the business and a more general view of adding value to the customer. General logistics knowledge and the basics of logistics theory call for a close working relationship between warehousing and procurement to create additional value and savings on warehousing and stocking expenses. Although pressure from customers continually increases, no customer would deny the importance of cooperation between warehousing and procurement. To increase value to the customer, a closer working relationship between warehousing and procurement is needed. If the company seeks to prevent out-of-stock goods or a situation in which a customer fails to receive the goods ordered, it should implement buffer stock levels because it has not adopted the just-in-time (JIT) warehousing strategy. JIT calls for a closer working relationship between procurement and CS and other administrative departments; in companies lacking JIT, the procurement department should work more closely with the warehouse.

The findings from the theoretical and empirical framework of this thesis show that the company can improve and optimise its business processes without using technology but through manual improvements and learning more about its current processes. A model can then be manually created, enabling each department to better understand each process. Visualising each process requires a deep understanding of each department, observation of both workflows and potential duplicative efforts, and significant time. The difficulty in allocating such time is a primary why companies fail to engage in such a process and presents strong incentive for an IT solution. However, when the decision is made to spend the time on this manual learning process, the company experiences positive improvements. A company can improve its business processes by assigning one or two employees to follow each department’s processes and to observe how work flows between departments for a given business process. At first, such an assignment may seem like a never-ending task, which is how this author felt when evaluating each department. However, after completing the work, the broad view became clear and additional, more in-depth research was possible.

The theoretical framework of this study found that process optimisation is possible when processes are first modelled and analysed; after a company has a good understanding of its processes and develops a map of business processes, it can then begin the improvement and optimisation process. A comparison of the old (Figures 12 and 13) and the new (Figures 17 and 18) process maps shows that the new map visualises the entire order-to-delivery process much more accurately than the old map. The new map makes it easier for employees to see which departments their work is connected with or which departments are influenced by the results of their work. Thus, the new process map gave employees at the case company a better understanding of the processes and enabled them to learn something new. In this case, business process optimisation was much easier to initiate with the new process map, which became the starting point for the process optimisation. As the theoretical framework clarified, the general process map needs to be created and analysed first. Although software can be used to develop the process map, the single case conducted
in this study revealed that employees learn more if the map is developed without electronic tools.

9.3 Research Question 2

- Would a relatively small company benefit from investing/upgrading in electronic working tools?

In general, electronic working tools at Finnish logistics companies can be improved, as different previous studies have pointed out. Visits to the case company revealed that its general level of electronic working tools is low, which does not imply that the company is doing something wrong or that its business is not doing well. In fact, the opposite is the case; the company is doing well at a general level with the electronic working tools it currently uses to monitor the business and support its daily administrative tasks, but in the warehouse a lack of supportive electronic working tools was noticeable.

The second interview round revealed that most employees do not believe that their processes could be optimised using IT or that the company needed new technology. This result likely came from the fact that most of the 10 people responding to the second questionnaire worked in the office and not in the warehouse.

This study found minimal observations and results showed that a relatively small company would benefit from investing in electronic working tools. Numerous studies exist that recommend different technical solutions for companies and their supply chains but these studies fail to reveal key material facts or implementation plans for such procedures, thus making an analysis of such issues difficult. Such evaluations are probably conducted at the corporate level and use private and confidential information, prohibiting the publishing of the results.

The general findings of this study showed that a company could save money and add value to their customers by optimising their order-to-delivery processes both using and not using technology. From that point of view, the situation is likely similar for other relatively small logistics companies in Finland. The general finding that a small company can benefit from investing in technology may be valid for other companies, but is difficult to prove.
10. Conclusion

10.1 General Conclusion

The purpose of this study was to examine and determine the different methods for optimising processes without using technology. The section 5 of this study revealed that process optimisation is more complex than expected because of the popularity of different technological programs and mathematical formulations. Technological process modelling, analysis and optimisation software is popular because companies either believe they can save time by investing more capital in technology or do not focus intensely enough on their processes to recognise areas in which optimisation is needed.

As some of the scientific articles pointed out, companies halt their process optimisation projects before collecting or finding crucial information, likely because of a lack of information. Many theories recommended using just one theory or model for optimisation or development; however, this study noted that a single general theory is incapable of optimising the business processes. Process optimisation without technology needs to be done carefully by following certain steps to allow processes that do not improve the output to be reformulated or changed. The theoretical framework revealed that when business process optimisation is done without technology it is a combination of process modelling, process and performance analysis and reduction of unneeded and invaluable processes or activities for the process in focus.

This research fulfilled the purpose by developing a theoretical framework for optimising processes without technology by combining different theoretical frameworks: Business process modelling, business process analysis and, finally, business process optimisation. Business process modelling became a significant part of this thesis as the core and most valid point in process optimisation, an interesting discovery for the author. Process optimisation needs to begin with process modelling; otherwise, a company cannot optimise its processes if it does not understand all of its information and performance flows in the order-to-delivery process.

The purpose of the case study was to apply the found theories in the company to reveal hindrances and/or find opportunities for the company to develop their processes without technology. As mentioned before the visits in the company revealed that company did not have any general process map which could be used in optimisation of the order-to-delivery process.

As the theoretical framework noted, the process modelling revealed to be one of the most important steps in the optimisation process, so according to that finding and the limitations of this study, the purpose of applying the found theories through a case was possible to began after finding the problem in the order-to-delivery process. After
finding the first problem in the order-to-delivery process the procedure of applying the theories was possible – the order-to-delivery process needed to be modelled. The modelling of the order-to-delivery process at the case company revealed hindrances and opportunities. Some departments worked very well together, but in some departments’ development is needed. The departments’ that need the development and optimisation the most are procurement department and warehouse department. After the modelling of the order-to-delivery process and finding the hindrances and opportunities the company has a good opportunity to optimise and develop their processes and departments manually, and then decide if new technology is needed. Although this study could not take the process optimisation to the end at the case company, the purpose of applying the found theories through the case was succeeded.

The work done at the case company helped to understand the general idea of process optimisation. The empirical part of the study supported the findings that were found in the theoretical framework and by that it can be noticed that the purpose of this study is fulfilled. The theories that the theoretical framework found for process optimisation without technology pointed out to be useable in practice. The case study section in this conclusion discusses the opportunities and findings that were found at the case company more thoroughly.

This study noted the apprehension towards the low level of electronic working tools in Finland. No specific reason for the apprehension was found because of scarce research conducted at the corporate level in Finland. A lack of process knowledge, process thinking and a general understanding of the broad view of the company, likely in process performance, may be reasons for such a low level of electronic working tools at Finnish logistics firms.

Although different public bodies recommended that Finnish logistics companies invest in electronic working tools, this study does not make the same recommendation. The results of the case study showed that sufficient valid information does not exist to validate how such electronic working tools can enhance the internal performance of a company. Previous studies only discussed the topic at a more general level and recommended enhancing the country’s logistics position, but no valid information exists on the current situation at each company, which can only be imagined. The theoretical and empirical frameworks showed that Finland’s location might decrease incentives to invest in electronic working tools, which is only a guess by this author. Companies already located in Finland likely understand the challenging position that Finland has in Europe; thus, they concentrate more on finding different solutions for customers by adding more value in other ways to their supply chain.
10.2 Research Questions

- How can the business processes within the company be improved without upgrading electronic working tools?

The conclusions from the theoretical framework made clear that process modelling is very important to gaining additional knowledge on all of the processes that should work together to create the best output for the customer. The purpose of this research was to determine the theory for business process improvement without technology and with the help of theoretical and empirical frameworks to answer to the research questions. The theoretical and empirical frameworks of this study revealed that companies can improve their business processes without upgrading their electronic working tools, but doing so requires more work by humans.

The business process improvement within a company can be done manually by following different steps. To answer to the question how, the steps and recommendations are developed based on the results of the theoretical and empirical frameworks of this study; if the problems are not known but improvement is still sought, the work should begin by modelling the company’s general process map, because process modelling helps companies understand all of their processes and places importance on good communication between different departments. This conclusion is supported by the theoretical and empirical frameworks of this study. The theoretical framework revealed that the first and most important step in the process optimisation is the modelling phase. In the empirical framework it revealed to be as claimed, the process optimisation could not have been started without completing the modelling phase first. Business processes within a company can be modelled without technology by using static modelling as this study pointed out in the section 5.1. In static modelling, simple figures are used to present information and performance flows in the process. The Figure 4 in section 5.1 presented examples of the different shapes used in the static modelling and the figures 17 and 18 are made based on these findings. Section 5.2 presented the role activity diagram (RAD), a modelling technique in the field of diagrammatic modelling. As mentioned in the theoretical framework RAD modelling enables quantitative analysis of business processes and an examination of different activity roles in the company. RAD was used in the empirical part of this study, because RAD can be used when a general corporate process map is needed. These methods were used in the empirical part of the study to point out how business processes within a company can be improved without technology and also to test the theories found in the theoretical framework.

This study applied the theory found in the empirical section in this study. The empirical single case study in this study revealed, that the general knowledge of the processes within the company increases, when processes are modelled manually. This finding supports the fact that a company can improve business processes without technology, by increasing the knowledge of internal processes. When knowledge of
internal processes increases problems can be found easier and development of processes is possible.

After modelling, general problems should be collected from each department manager and then analysed with information from the financial department’s annual reports and the process map. The financial department maintains crucial knowledge on the costs of each department and that information can be used more productively. A company’s general process map can reveal deadlocks or structural conflicts that may be rearranged at that point. Figures 17 and 18 showed such differences at that point. Developing a department process map is also recommended if efficiency and cost savings are desired results of development. Figures 17 and 18 should be analysed to enable process optimisation to continue at the department level. The department process map provides a better picture to other departments about the work done in that particular department and about crucial times or phases that require additional development to provide improved output to the next department or to the final customer.

As mentioned in the general conclusion in Section 10.1, most of the process development and optimisation work is often stopped during an early phase. It is crucial for a company to take the work to the end to enable problems to be uncovered and for development planning to begin. Business processes can be optimised without technology by following for example graph reduction technique. Business process optimisation is done by analysing the process map and finding the possible double activities or deadlocks within the process which is under focus.

- Would a relatively small company benefit from investing/upgrading in electronic working tools?

The public bodies in Finland may not understand the situation at each company in the country at this moment; they may believe that process knowledge and process thinking is at a high level and that implementation of electronic working tools is the next step. A study of the one single deeper case company in the empirical framework showed this not to be the case; therefore, the level of process knowledge and process thinking in Finnish logistics companies may not yet be at a point where electronic working tools could be implemented, but this is only the author’s opinion of this study.

Because of a lack of research in this field, this study did not find any essential information on how a relatively small company could benefit from upgrading to electronic working tools. Companies may not want to reveal a before and after view of their critical tools and figures, especially if they have succeeded with the upgrade process.
Competition in this global and international business world is intense, and each company is simply attempting to be the best in its industry. Section 5, the theoretical framework, provided a good example of the implementation of electronic working tools from a study by Harris and Davenport (2004). Those authors conducted research on the topic and showed that some companies have succeeded, and some have failed, in implementing an electronic working tool for the supply chain process. Because Harris and Davenport (2004) did not reveal how those procedures were implemented and did not provide a full view of the company’s process, they cannot be copied. Moreover, such information is only valid for certain types of companies and the validity of such information is only for a certain period given an ever-changing business environment.

The author’s opinion is that a company can benefit from upgrading to electronic working tools for the entire supply chain or within certain areas of the company if the company’s process knowledge is high enough. The company’s size does not matter; all companies can benefit from using technology, but it must be used correctly. Particularly with small companies that can more easily realise improvements, the development possibilities that can be accomplished manually should be completed first. All of a company’s processes must be understood and communication between each department must be examined. A small company can examine the existing technology software that it uses, and perhaps use it in a different way. For example, the picking and loading device at the case company could be better utilized, as the device has other working modes. Such issues should be examined first before considering investments in technology solutions.

### 10.2.1 Case Company

The purpose of the empirical part of this study was to apply the theories found to a single company as a case study. This study fulfilled the purpose and applied the theories found to a case company as much it was possible. Real case is always more complex and difficult than imaginary cases. The conclusions of the case company support the conclusions of the theoretical framework. After applying the theories found to the case company and after analysing the result this study is pointing out some conclusions for the case company.

The case company’s departments work very well together, and process optimisation is possible through the findings of this thesis. The company may not have had specific knowledge that process optimisation for its order-to-delivery process could be initiated. HAVI Logistics Finland has decided to focus more on its internal order-to-delivery process, which may be the cause for the current low knowledge level.

The order-to-delivery process modelled (Figures 17 and 18) in this study is a good starting point for the optimisation of this process at the company. The process map
was developed based on the second interview, making it relevant to workers’ responses and reflects how well they answered the questions. The author believes that the case company’s entire order-to-delivery process does not require optimisation. Certain departments at the company need development and optimisation, and such departments’ processes are topics for further investigation. The procurement department and the warehouse department require the most assistance with optimisation. The writer recommends that all of the processes in the procurement department and the warehouse department be modelled separately and then compared with the modelled processes in the overall order-to-delivery process map (Figures 17 and 18). To clarify, process optimisation is required in the warehouse department and in the procurement department.

Although the company’s departments work well together, while visiting the premises and analysing answers to the second questionnaire (Appendix 2) and the process maps (Figures 17 and 18), the author found that the warehouse and procurement departments do not receive adequate attention and their processes are not as controlled as they should be in a logistics company. As written in the general findings (Section 9.1), the author pointed out that the procurement department and the warehouse department do not work as much together as they should. A potential solution is to move the procurement department downstairs and ensure that it works daily with the goods that it purchases; alternatively, the procurement department could work under the warehouse department from a managerial aspect.

The receiving goods procedure can also be modified. Receiving times for goods cannot be changed because the transport ships coming into the harbour of Helsinki, Finland run on timetables. The procurement department could work more closely with the warehouse department to better understand the difficulties with the receiving procedures and subsequently change the methods for ordering goods (smaller amounts more often, enabling FIFO and maintaining the quality of the goods).

Another solution is to appoint a new employee to work with the company’s external suppliers. This employee would coordinate with the warehouse and procurement departments, which may incur additional costs but creates a connection between these departments to enable the most challenging areas of the company to better communicate. The employee would also be responsible for communicating with suppliers and entering into an agreement about incoming goods, perhaps not by changing timetables but just to determine the possibilities that exist and interact with suppliers on the issue. Because the new employee would work with the procurement and warehouse departments, he or she should be able to think along the lines of logistical process and have good general knowledge of procurement and warehousing.

A very good observation made was regarding the relationship between CS and the transport department, as those employees understand the value of the other department, which was expressed during the interviews.
HAVI is a customer to their suppliers and customer can make demands, as HAVI’s customers make demands to them, it is possible for HAVI to re-evaluate its supplier relationships and contracts.

Warehouse workers require more daily management, but the warehouse cannot change its habits if the entire company does not support such changes. The warehouse is the heart of the company and all of its processes should be designed based on its conditions.

During the general interview with warehouse employees, the author got the impression that these workers needed greater management. They did not require additional supervision, but their work schedules can be redesign to make work tasks clearer to employees. For example, the schedule could divide the workday more accurately, as opposed to simply listing the employees working in the different temperature areas of freezer, fridge and dry. The schedule could also be divided into receiving times and picking times, telling workers exactly what they should be doing during the workday. These improvements would also facilitate and enhance the accuracy of daily planning, enabling workers arriving at work to know what they are supposed to do that day and the tasks that had the highest priority. Controlling and forecasting would be facilitated, and different job tasks could be compared with different working days during a year. The warehouse department would become more effective; in particular, the freezer and fridge areas could optimise their capabilities, increasing efficiency and decreasing costs.

This study does not recommend that the case company invest in electronic working tools, as additional work needs to be done at the corporate level before such a strategy could be effective. The case company, HAVI Logistics Finland OY, is a relatively small company and has very good potential to optimise some aspects of their order-to-delivery process, enabling the company to take its services to the next level and become an even better lead logistics provider than it already is.

10.3 Future Research

In general, this study recommends additional research in this field of business in Finland to further develop the logistics position of the country.

Process optimisation is a large project and a very interesting topic. Future research on process optimisation can be conducted at a deeper level, concentrating on optimising a single department’s processes. When the problems are known, process optimisation can be applied at a more operational level and the corresponding results examined.

Moreover, this study was unable to clearly state whether a relatively small company could benefit from investing in electronic working tools, an interesting subject for subsequent research.
Further research on the case company is recommended to optimise its warehouse and procurement department processes. The case company should also develop a role activity diagram (RAD) for the two departments to enable optimisation at a deeper level and a more in-depth study of operational and crucial information. Using the RAD theory, the company may further define the roles of each worker and examine which roles have too many workers and which require more attention.

10.4 Potential Criticism

After every study has concluded, potential criticism may arise. This study did not include many theoretical solutions for process optimisation because their popularity did not allow for an examination of technological solutions.

The theoretical framework of this thesis uses significant material from Majeed et al. (2008), because it was the only theoretical article that addressed the procedures required for process optimisation. Using the findings from Majeed et al. (2008), process optimisation became clearer and different theories for the different aspects of the process optimisation procedure were determined.

This study included a single case company, meaning that making a generalisation of the low level of electronic working tools at every logistics company in Finland was not possible, but could only be surmised. The case company provided no specific process for development; therefore, this study focused more on process modelling and determining the problems in the company’s order-to-delivery process. This thesis has taken a general view of the case company, because it is a publicly available document.
References:


HAVI Logistics Finland OY (2011) Internal Material. Vantaa Finland: HAVI Logistics OY


Appendix 1

1. What is your position in the company?
2. What is your department where you work?
3. What processes do you have in your department?
4. In your own opinion how do you think your process works in the order-to-delivery process?
5. Do you think that your process/processes work well together with other processes in the company?
6. Do you think that your process/processes need development? In which areas?
7. Do you evaluate and examine our process productivity? If you do, how?
Appendix 2

1. Have you heard that the Ministry of Transport and Communication together with other public authorities in Finland wants companies to develop their processes?

2. Do you think that your process/processes has/gets enough technology support in everyday work?

3. In general do you believe that process development can be done only by using technology?

4. Would you prefer that process development in your department would be done with investing to new technology? What could it be? Please give ideas/examples

5. How can you effect to the process development in your work?

6. Do you believe that you can develop your process/processes without new technology?

7. If you answered YES to the question 6, answer to this question. What would you want to develop? What are the “problems” in your process?

8. If you answered NO to question 6, answer to this question. Do you think that technology is the only solution? How would you develop your process/processes with technology?

9. Do you know what “process thinking” is? What does that mean to you?

10. Do you think that you can share your process vision and process thinking to your employees? How can this be done?

11. Where does your process start & end?

12. When your process starts where does it come from? From which department?

13. When your process ends where does it go? To which department?
Appendix 3

The names and titles of the persons interviewed in the first round and second round of the empirical part.

People interviewed in HAVI Logistics

<table>
<thead>
<tr>
<th>Name</th>
<th>Title</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mikael Tuompo</td>
<td>CEO</td>
</tr>
<tr>
<td>Janne Tiainen</td>
<td>Transport manager</td>
</tr>
<tr>
<td>Miina Jyrkänne</td>
<td>Manager – Finance, HR and Process development</td>
</tr>
<tr>
<td>Antti Peltonen</td>
<td>Purchaser</td>
</tr>
<tr>
<td>Marko Heikkilä</td>
<td>Warehouse supervisor</td>
</tr>
<tr>
<td>Ilmari Jantunen</td>
<td>Transport Planner</td>
</tr>
<tr>
<td>Miika Muhonen</td>
<td>Warehouse Manager</td>
</tr>
<tr>
<td>Susanna Bärlund</td>
<td>Purchaser</td>
</tr>
<tr>
<td>Lotta Gyasi-Mensah</td>
<td>Customer Service Assistant</td>
</tr>
<tr>
<td>Piia Vesaniemi</td>
<td>Deputy Customer Service Manager</td>
</tr>
</tbody>
</table>
Appendix 4

HAVI Logistics OY Finland – Organization Hierarchy
Figures:

Figure 1: Persons and their titles who were interviewed in the case company

Figure 2: Classification of business process modelling techniques by Majeed et al. (2008, p 2).

Figure 3: Types of process analysis in relation to the business process modelling sets by Majeed et al. (2008, p 5).

Figure 4: Process modelling objects and task types (Sadiq & Orlowska, 2000, p 2)

Figure 5: Static Process model example (Patel and Hlupic, 2001, p 56)

Figure 6: Example of Role Activity Diagram (RAD) (Phalp & Shepperd, 2000, p 107)

Figure 7: Optimization Approaches for Formal Business Process Models, collected and created by Majeed et al., 2008, p 11

Figure 8: Process modelling structure (Sadiq & Orlowska, 2000, p 3)

Figure 9: Example of deadlock structural conflict in process model (Sadiq & Orlowska, 2000, p 4)

Figure 10: Example of lack of synchronization conflict (Sadiq & Orlowska, 2000, p 5)

Figure 11: HAVI Logistics customer relationship in a supply chain figure (HAVI Logistics Finland OY (2011). Internal material, Vantaa Finland: HAVI Logistics OY)

Figure 12: HAVI Logistics current process map: Goods are going out (HAVI Logistics Finland OY (2011). Internal material, Vantaa Finland: HAVI Logistics OY)

Figure 13: HAVI Logistics current process map: Goods are coming in (HAVI Logistics Finland OY (2011). Internal material, Vantaa Finland: HAVI Logistics OY)

Figure 14: Table of answers from the second interview round

Figure 15: Most usual comments and recommendations from employees (questions 2-5)

Figure 16: Most usual comments and recommendations from employees (questions 7, 9 and 10)

Figure 17: Process map of HAVI Logistics’ order-to-delivery process

Figure 18: Authors vision and opinion about HAVI Logistics current order-to-delivery process