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Change Management in the Internal Supply Chain

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<p>Change management is a relatively new concept in today's business life. As the needs of customers change constantly, companies must be able to change their business processes and tools in a highly flexible way in order to meet those needs. Changes in the supply chain are always reflected in the different departments of the company.</p> <p>The case company arranged an internal development event in October 2011. Employees from different departments participated in the event, with the aim of investigating by a questionnaire the main obstacles undermining the performance of an efficient, effective internal supply chain. Based on the results obtained with the internal development event, the need for a deeper investigation emerged.</p> <p>The aim of the research was to study the internal supply chain of the case company and to find a solution how to make their processes more effective and efficient. There are three main objectives of the study: The first objective is to identify and clarify the external and internal factors causing changes in the internal supply chain. The second objective is to investigate how those changes could be managed in the supply chain. The third objective is to find ways to make the core processes more effective and efficient by utilizing the existing ERP system. Based on the research results, some rather common factors were found to cause changes in the internal supply chain, and thus the research results were no surprise to the author or to the case company. Developmental task was to draw process charts from the point of view of change management for use by the case company. The charts are intended for global use within the case company.</p>	
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<p>Muutoksen hallinta on kohtuullisen uusi käsite tämän päivän työelämässä. Asiakkaiden tarpeet saattavat kuitenkin muuttua nopeallakin temmolla. Jotta asiakkaan tarpeet saadaan tyydytetyiksi, pitää yrityksellä olla oikeat työkalut muutoksen hallintaan. Muutoksen esiintyminen heijastuu aina useisiin osastoihin ja sen takia tässä opinnäytetyössä on keskitytty valmistavan yrityksen neljään pääasialliseen osastoon, jotka ovat tilauksen käsittely, ostot, tuotanto ja lähettäminen.</p> <p>Tarve opinnäytetyön tekemiseen syntyi, kun yritys järjesti kehityspäivät 2011. Työntekijät eri osastoilta ottivat osaa tutkimukseen, jossa kartoitettiin pääasiallisia esteitä sisäisen toimitusketjun tehokkaaseen toimintaan. Tutkimustulosten pohjalta yritys halusi tutkia lisää sisäisiä ja ulkoisia muutoksia, joilla on vaikutusta sisäisen toimitusketjun toimintaan.</p> <p>Opinnäytetyön tutkimuksen tavoitteena oli kartoittaa sisäisten ja ulkoisten muutosten ilmenemistä sisäisessä toimitusketjussa sekä löytää uusia keinoja toimitusketjun toimintojen tehostamiseksi. Tutkimuksella oli kolme päämäärää: tunnistaa ja selvittää sisäisessä toimitusketjussa ilmeneviä ulkoisia ja sisäisiä muutoksia, tutkia miten muutokset olisi paremmin hallittavissa ja ennalta ehkäistävissä sekä etsiä uusia tapoja nykyisen toiminnanohjausjärjestelmän hyödyntämiseen. Tutkimuksessa ilmeni hyvin tavallisia asioita, jotka aiheuttavat muutoksia toimitusketjussa, joten tulos ei yllättänyt tutkijaa eikä yrityksen henkilöstöä. Kehityksellinen työ oli piirtää tutkimustulosten pohjalta prosessikuvaukset muutoksen hallinnasta yrityksen globaaliin käyttöön.</p>	
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PREFACE

This thesis was commissioned by a local unit of an international company. The company provided me with an opportunity to complete my practical training as well as to work there while finalizing my studies. I would like to thank the company for the opportunity to conduct such concrete and challenging final year thesis project. The company also provided an opportunity to apply theory into practice during the thesis work with an interesting and challenging topic: change management in the internal supply chain.

I want to give special thanks to my supervisors Sami Hakkarainen and Ari J. Karjalainen for their support, for providing me with an excellent learning platform throughout my training, and for their guidance during the thesis process. I would also like to thank my supervisor Anas Al Natsheh for supporting and guiding me through the thesis process.

Finally, my deepest gratitude belongs to my husband – your patience and support, not only during the last half and three years but also throughout my everyday life, has been the most important driver for me.

LIST OF ABBREVIATIONS

AASIA	Asia-Pacific, Australia, Zealand
AMERICA	USA, South- America (Brazil, Chile, Colombia, Uruguay, Argentina, Peru), and Canada
B to B	Business to Business
CO	Customer Order
CBM	Computer Based Methods
CRM	Customer Relationship Management
e- IPO	Electronic Internal Purchase Order
EMEA	Europe, Russia, Norway, Middle-East, Africa
ERP	Enterprise Resource Planning
FAT	Factory Acceptance Test
HR	Human Resource
IHS	In-House Service
ISCM	Internal Supply Chain Management
ISC	Internal Supply Chain
JIT	Just In Time
PDM	Product Data Management
PO	Purchase Order
R&D	Research and Development
SOPs	Standard Operating Procedures
SCM	Supply Chain Management
SRM	Supplier Relationship Management
VCM	Value Chain Management

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1 INTRODUCTION

The case company is a local unit of a global corporation in the field of sustainable technology and services. It has approximately 110 full-time employees working in the development, manufacturing, sales and service of various measurement devices for the paper and pulp industry all over the world. Basically the case company makes day-to-day or project based business. In this thesis the case company refers to the local unit, not the whole corporation (Hakkarainen. 2011).

Change management is a relatively new concept in today's business life. In the modern fast-paced business world, however, situations vary constantly, and customer needs may change rapidly. In order to meet these needs, companies must be able to replace their business processes and tools in a highly flexible way. Changes in the supply chain are always reflected in different departments of the company.

Change management in the supply chain is even more challenging. The term 'supply chain' covers all the different parties involved, directly or indirectly, in fulfilling customer needs. The supply chain includes manufacturers, suppliers, transporters, warehouses, retailers, and the customers themselves (Chopra & Meindl 2007, 3.)

The aim of the research is to study the internal supply chain of the case company and to find a solution how to make their processes more effective and efficient. There are three main objectives of the study: The first objective is to identify and clarify the external and internal factors causing changes in the internal supply chain. The second objective is to investigate how those changes could be managed in the supply chain. The third objective is to find ways to make the core processes more effective and efficient by utilizing the existing enterprise resource planning (ERP) system.

The approach is based on real business life examples collected from interviews. This thesis analyzes the impact of changes on the internal supply chain (ISC) processes, with the objective of writing a process description for future use in the case company. The process description specifies the roles of employees in the various functions of the internal supply chain, based on task definitions. Our focus is also on evaluating the internal communication as it affects considerably the efficiency of the internal supply chain. Time, the large scope of the subject, and the size of the sample are restrictive factors of the thesis.

2 RESEARCH METHODOLOGY

Research methods are different techniques that take on a specific meaning according to the methodology used to gather data. The selection between different research methods is therefore very important, as the chosen method will have an effect on the results of the research question, analysis, data generation and the final goal of the research (Turpeinen 2009.) Empirical research is an impressive observational type of research in which real life data is analyzed to identify the nature of a phenomenon. In this thesis research is conducted by qualitative research methods.

2.1 Qualitative Research

According to Patrice and Robinson (2011) qualitative research is based on information gathered by observing or interviewing a targeted population. Traditionally, the interviewer makes own notes while watching or listening, and those notes are purely subjective as they are the researcher's own opinions based on what one hears or sees. Thus it is not too much to say that qualitative research has a more difficult task when trying to establish the reliability and validity of the data. (Patrice & Robinson. 2011)

Based on Marshall et al. (1999) the qualitative research method generates rich and valid data that will provide a deeper insight into the studied phenomena. Traditionally, in qualitative data analysis the information is used to describe a phenomenon and to present what it means in order to understand it (Marshall et al. 1999, 1-2.)

Qualitative research relies extensively on in-depth interviews. In-depth interviews are traditionally seen as "a conversation with a purpose". Interviews are categorized into three general types: informal conversational interview, the general interview guide approach, and standardized open-ended interviews (Marshall & Rossman. 1999, 108).

2.2 Reliability and Validity of Data

Based on the article *Understanding Reliability & Validity in Qualitative Research* (2011), reliability of research data refers to the degree to which an assessment consistently measures whatever it is measuring. The key word here is consistent. When a researcher is doing an interview, one has to have specific questions that the participants are required to answer; if the researcher is using field notes, he has to ensure that he is making specific observations. According to Ratcliff (1995), high reliability may suggest a systematic bias in the data, and this is why many qualitative researchers put more emphasis on validity than reliability.

According to Patrice & Robinson (2011) the “validity of data in research refers to whether or not a topic or ability is actually measured by the instrument used to assess it.” In qualitative research validity means whether or not a researcher gets a true picture of the process or behavior being studied. It is therefore essential to ask questions such as “am I measuring what I think I am measuring” during a research process to ensure that the data collected is valid. Referring to Ratcliff (1995), a researcher can find validity from qualitative research for example by using other research data, such as recorded interviews, and reexamining those later on. Another way is to go back to the interviewees and ask them whether the researcher is accurate or needs correction. This is the point where the researcher can work together in the planning, conducting and analysis of results.

2.3 Data Collection

In this thesis, qualitative data is collected through “elite” interviews, a specialized form of the in-depth interview. According to Marshal et al. (1999, 113) “elite” interviewing is a specialized case of interviewing that focuses on a particular type of interviewee. In the current thesis the “Elite” interviewees are a selected group of managers who are influential, prominent, and well-informed people with several years' working experience in the case company. In addition, interviews were conducted with a group of people from each department based on their working position and working experience.

The total number of participants in the “elite” interviews is eleven, as the data collection is by nature a time consuming process. Interviews were conducted in the case company and another local unit to collect the necessary data. This method was chosen as it offers several

advantages, for example the elite interviewees' ability to provide an overall view of the organization, and even more importantly, their ability to illuminate the policies, past histories, and future plans of the organization (Marshal et al. 1999, 113.) This method also provides a better opportunity for both parties to discuss the topics in more detail. In addition, the method gives the opportunity to clarify possibly unclear issues and to ask follow-up questions when needed. Elite interviews were conducted by recording the discussion with the interviewees and thereafter decrypting material from the interviews for the thesis.

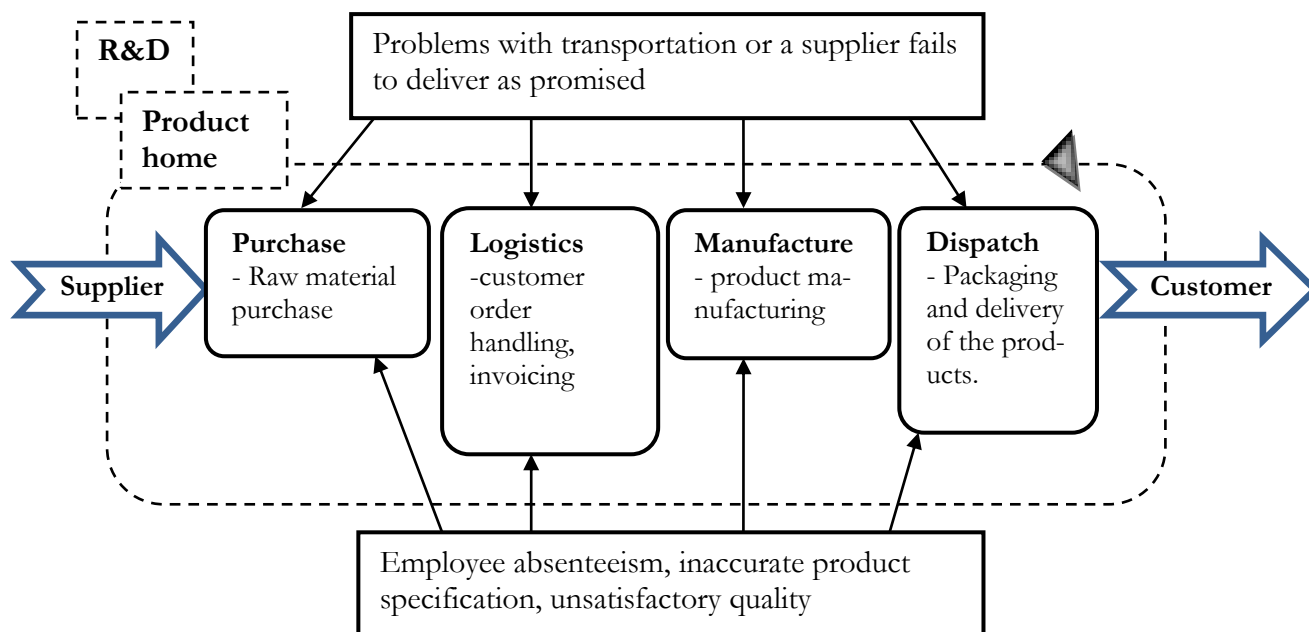
2.4 Research Problems

The main problem is to solve how the case company could improve the efficiency and effectiveness of its internal supply chain. The research sub-problems stem from the case company's need to reach a deeper understanding of the performance of the internal supply chain in order to improve their operations. Research into the internal supply chain therefore concentrates on the four main departments of the case company, but it also touches the company's suppliers. The research sub-problems are:

1. What kind of external and internal changes occur?
2. How and where do these changes occur?
3. What are the issues affecting the number of changes occurring after an order is placed, and how could these changes be prevented?
4. How possible changes could be prevented from occurring after an order is entered?
5. How to rearrange operations after the change has occurred?
6. How to get the processes more valid right from the beginning?
7. How to improve the internal information flow between the four sections and to reduce distortions in the flow of internal information?
8. How can co-operation within the internal supply chain be improved?

The conceptual framework illustrates the internal supply chain of the case company. The focus is on what kind of changes appear and how these influence operations in the internal supply chain.

EXAMPLE OF AN EXTERNAL FACTOR CAUSING CHANGES



EXAMPLE OF AN INTERNAL FACTOR CAUSING CHANGES

.....→ Information flow → effect of change

Figure 1: The impact of a change in the internal supply chain of the case company

Figure 1 shows the body of the framework in a basic level. An effective information flow between the departments and with suppliers and customers is crucial for success. Generally, the logistics department receives a customer order (CO) by email, and after entering the CO to the ERP system the purchase department places an order to the suppliers if needed. The next step is the manufacturing process, and after that the products are transferred to the dispatching department which is responsible for packaging and delivering the products to the customers. The order of the processes fluctuates depending on the situation. In figure 1, an example of an external factor affecting the internal supply chain is shown above the main body of the workflow, an example of an internal factor is shown below it. Basically, any external or internal changes have some effect on the work of each department. For example, if a supplier fails to deliver goods to the purchase department according to the promised schedule, this has an effect also on the logistics, manufacturing, and dispatch departments. Therefore, our focus is on how to manage changes, and ensure that changes appearing in the process will not change the delivery time promised to the customer, or change it only slightly.

As figure 1 illustrates, there are also two external parts in the internal supply chain that must be taken into account: R&D and Product home. Effective communication and feedback between these two and the internal supply chain ensures customer satisfaction. However, in this thesis those two factors shall not be dealt with.

2.5 Grounds for Choosing the Current Topic for Research

As mentioned in the previous chapter, change management in the supply chain is an important and challenging part of today's business life. It is, therefore; crucial for the case company to have a better understanding of the changes occurring in the supply chain. They also need appropriate tools and improved internal communication to be able to manage those changes.

The case company arranged an internal development event in October 2011. Employees from the different departments participated in the event, with the aim of investigating the main obstacles undermining the performance of an efficient, effective internal supply chain. The employees were asked to answer a questionnaire with questions related to the actions of the purchase, in house service, manufacturing and logistics departments, as well as workplace welfare. Based on the results obtained with the questionnaire, the need for a deeper investigation emerged. Achieving a better understanding of change management in the internal supply chain was found especially necessary in order to make future operations more effective and efficient.

The supply chain consists of several parts that are linked to each other, and there are several points within the supply chain process where sudden changes may appear. The company, therefore, has to be capable of responding to these changes and to their consequences. According to an online dictionary (2011), a change is something that usually happens unexpectedly or the possibility for the appearance of the change is uncertain. For example, the change can be a situation where a team worker comes down with an illness and the case company has no time or possibility to anticipate it. Procedures for dealing with such situations are especially necessary in the case company. Possible changes occurring in the internal supply chain might cause a loss of time, money, customer satisfaction and, in the long run, even losing the reputation of the company.

2.6 Central Idea and Research Task / Development Task

The central idea of the thesis is to identify and anticipate external and internal changes. In addition, the research attempts to find out about how and where changes appear and how those changes could be properly managed. The research also attempts to find ways how the company can reduce the number of changes occurring after an order is entered in the Enterprise Resource Planning (ERP) system.

The development task is to figure out how internal communication in the case company could be improved by using the current ERP system. The case company is not planning to change their current ERP system in the near future, and thus our focus is not on different ERP systems but instead on improving the efficiency and effectiveness of the case company's performance by using the current ERP system. The development task, therefore, includes written procedures and process descriptions to be used the case company.

3 SUPPLY CHAIN

Supply chains exist in both service and manufacturing organizations, but the complexity of the chain may vary significantly from industry to industry and firm to firm. Depending on the type of product or service, a supply chain may be categorized as a pipeline structure, late customization structure, divergent structure or convergent structure. As mentioned above, the case company is a manufacturing company and its supply chain is therefore a mix of the divergent and convergent structures. In the divergent structure, customization starts in the early production phase and a wide variety of finished products are produced with the limited resources of raw materials and components; whereas in a converging structure a series of assembly operations are carried out in order to obtain the final product (Biswass.2000.)

According to Fawcett et al. (2007, 9) a supply chain consists of series of linked value chains. Basically, there are three macro processes in a firm's supply chain. The main purpose of each macro process is to manage the flow of information, product, and funds required to generate the overall value and to fulfill the customer's request. These three processes are related to customer relationship management (CRM), the firm's internal supply chain management (ISCM), and to supplier relationship management (SRM). A supply chain is dynamic and involves a constant flow of information, products, and funds between and inside the different stages. The success of a supply chain is relative to the design and management of the supply chain flows, and the integration of the three macro processes is crucial for successful supply chain management. The supply chain is different within organizations depending on the type of a business, but the supply chain is always involved in receiving and filling customer requests. (Chopra & Meindl. 2007, 3-4, 15.)

In a B to B business, the basic model of the supply chain is seen as a link between supplier/raw material supplier, manufacturer and customer. According to Chopra et al. (2007, 3-4) the objective of each supply chain is to maximize the core value for the customer and the overall value generated. The overall value generated can be measured as the difference between the worth of the final products to the customer and the costs that the supply chain incurs in filling the customer's request. This is also seen as the profitability or surplus of the supply chain. Figure 2 below illustrates the basic model of the supply chain.

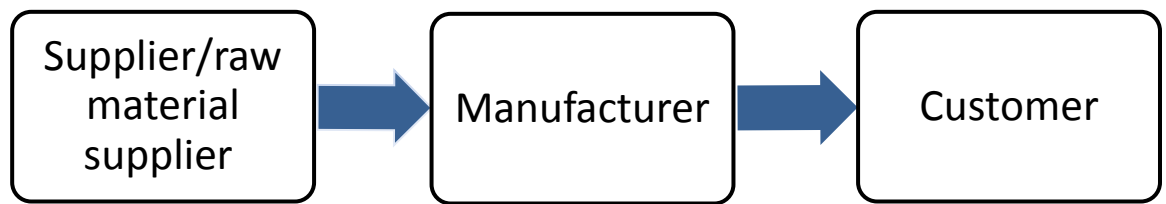


Figure 2: The basic model of the supply chain in a manufacturing company (Chopra & Meindl. 2007, 3-4)

3.1 Supply Chain Management

As Fawcett, Ellram and Ogden stated in the book *Supply Chain Management from vision to Implementation* (2007, 8), supply chain management is defined as

“the design and management of seamless, value-added processes across organizational boundaries to meet the real needs of the end customer.”

Therefore, the SCM comprises a wide range of actions both within the organization and outside it, from supplier’s supplier to the customer’s customer. However, before the entire supply chain process can be managed effectively through the actions in the supply chain, the internal value chain has to be managed well. Within a company there are several functions that are related to each other, and decision making within one function always has consequences in the other functions. Thus SCM does not discuss only the internal information flow but also the material flow within the organizations (Fawcett et al. 2007, 8-9).

3.2 Internal Value Chain

There is a difference between a supply chain and a value chain. The supply chain is unidirectional and focused more on how to improve the efficiency of the flow of goods from manufacturing to the consumer; whereas value chain management (VCM) is bidirectional and has a broader scope, covering the entire product life cycle, services, and goods. (Craig. 2000.)

A company’s internal value chain consists of the different functions of the organization. Based on the book *Supply Chain Management from vision to implementation* (2007, 8-10),

these functions are defined as research and development (R&D), supply management, operations, logistics, marketing, human resources (HR), accounting, finance, information technology, and executive management. To be able to analyze the internal supply chain of the case company it is crucial to focus on the following functions of the internal value chain:

First of all, focus is on the supply management function that coordinates the upstream supply base and is responsible for finding the most suitable suppliers for the products and for building the relationships with them. The second important function is logistics (here: dispatch) responsible for packaging and transporting materials and products to the end customers when needed. The third function of the internal value chain that we shall focus on is HR that has to be able to hire and train employees and to develop their skills so that they are familiar with the information technology (IT) systems used in the company's supply chain. The fourth function is related to accounting that maintains and provides the needed information to control operations. The last function of the internal value chain is IT, one of the most significant functions in today's business life. Nowadays the core communication within organizations and between a company and its clients is based on IT; therefore it is essential to design the IT so that it is able to respond to the needs of the company. The relationships between these functions determine how well the entire supply chain performs. (Fawcett et al. 2007, 8-9.)

3.3 Management of the Customer-Supplier Relationship

According to Chopra et al. (2007, 15), customer relationship management (CRM) is one of the macro processes and its aim is to generate customer demand and facilitate the placement and tracking of orders. CRM is defined as a set of business activities (marketing, pricing, sales, order management, and call center management) supported by technologies and processes that are directed by the company's strategy and designed to improve business performance in an area of customer management (Richards & Jones. 2006.) According to the article Customer relationship management: Finding value drivers (2006), well implemented CRM generates several benefits to the company, such as the improved ability to target profitable customers, integrated offering across channels, customized products and services, and improved customer service efficiency and effectiveness. Especially the last benefit is one of the targeted objectives in the case company.

While CRM focuses on the internal supply chain activities, supplier relationship management (SRM) is a macro process aiming to establish and manage supply sources for the various goods and services. Based on Chopra et al. (2007,15) the supply sources include the evaluation and selection of suppliers, negotiation of supply terms, as well as communication with suppliers regarding new products and orders with suppliers. Open communication between a supplier and a company is essential for successful co-operation (Goffin, Lemke & Szwejcowski. 2005.)

As Chopra et al. stated (2007, 15) the integration of these three macro processes is frequently managed separately within companies. An organization may be structured in such a way that marketing is in charge of the CRM, manufacturing is in charge of the ISCM, and purchasing is in charge of the SRM macro processes. Problems arise when the three functions are not integrated. This problem is also found within the case company, even if it mainly exists between the ISCM and SRM. The two processes should be integrated better in order to improve the effectiveness and efficiency of the company's internal supply chain.

3.4 Process Views of the Supply Chain

There are two prevailing views of the processes performed in the supply chain: the cycle view and the push-pull view. The cycle view includes four different processes that cover the customer orders, replenishment, manufacturing, and procurement cycles. It is not necessary to process each cycle separately, and the cycle view is very useful when a company has to determine its operational processes because it clearly defines the roles of each member in the supply chain and the desired outcomes of each process. The push-pull view describes the processes in a supply chain based on whether these are initiated in response to a customer order (pull) or in anticipation of a customer order (push). Figure 3 below describes the push-pull process in a manufacturing company. (Chopra et al. 2007, 10, 12.)

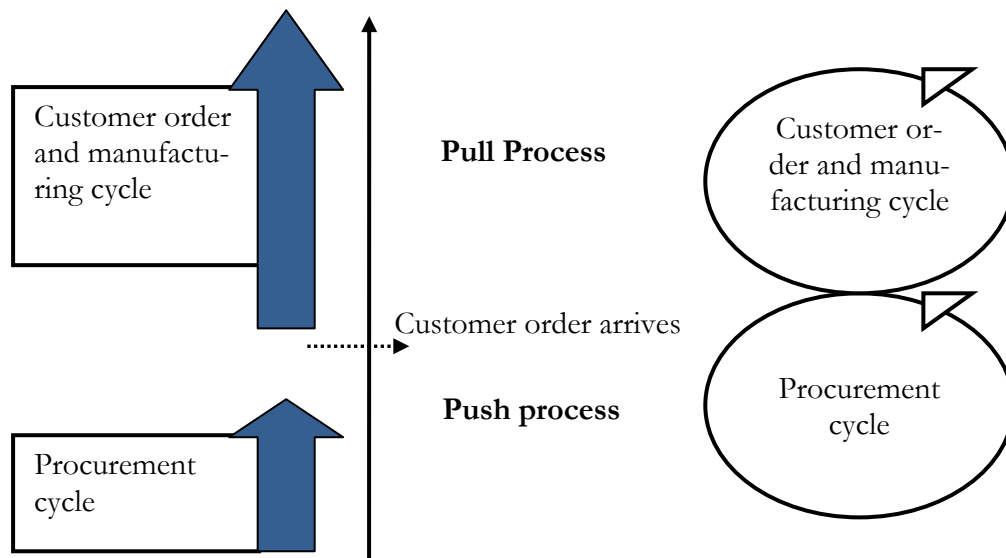


Figure 3: The push-pull process in a manufacturing company (Chopra et al. 2007, 14)

An important technique used when planning the supply chain processes in a manufacturing company is called the just-in-time (JIT) principle. The idea behind it is that no activity takes place in a system until there is demand for it. Certainly is not always possible to act as described and occasionally some components have to be ordered based on anticipation or assumption. As Christopher describes (1992, 153) the JIT is a “pull” concept where demand for the products creates a demand for components. As figure 3 above shows the order of activities in a manufacturing company is determined by whether the process is based on response to, or anticipation of, the customer order.

In the ERP of the case company there are two main ways in which spare part demand is created. Demand is based on the classification of items: an item may be controlled by a lot-for-lot profile (mainly products) or by a warehouse profile (mainly spare parts). If the item is classified as a lot-for-lot item, demand is created when a customer order is received; thus a lot-for-lot based item creates demand in the same way as in the pull-process described above. In the case of warehouse profile controlled items, demand is created automatically based on alarm limits specified for each item in the stock system of the ERP (Karjalainen. 2012).

3.5 Lean Operations

The amount of wastage occurring within the internal supply chain is known to cause enormous loss of time, money and resources for the company. One technique used to decrease the wastage is called "lean operation". According to Fawcett et al. (2007, 147) the goal of lean operation is to identify and eliminate waste whenever it is found.

The basic 5S principles (see figure 4) provides a comprehensive methodology for cleaning, organizing, and sustaining a productive work environment and efficient waste elimination. The 5S principles were developed in Toyota's car manufacture in 1945 (Qualitas Fennica Oy. 2012). The basic 5S principles include steps that guide a company towards the implementation of lean operation.

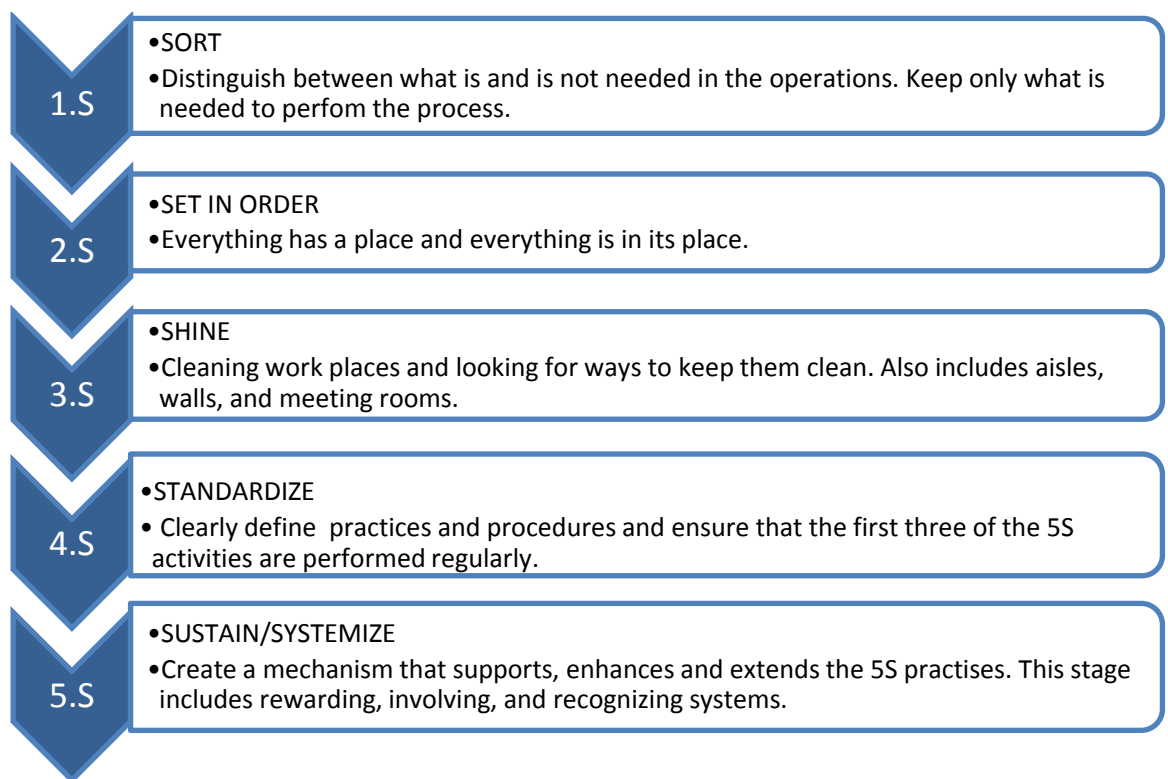


Figure 4: The basic 5S principles (Moisio.2008), (Fawcett et al.2007, 147)

As mentioned above, organizations have many processes that cause wastage and thus decrease the efficiency and effectiveness of the organization. According to Fawcett et al. (2007, 147) several adaptations of the operating environment are required for success. Inventory reduction refers to waste elimination and is ranked as the greatest opportunity for eliminating waste. Workforce participation includes training, responsibility, and integration of the

employees in the processes. However, it is not enough that employees take responsibility for their work but also managers must take the role of teachers, team facilitators and motivators. Line workers usually are in the best position to improve processes, and therefore they must receive sufficient statistical training and be empowered to make decisions.

3.5.1 Standardization of Work

Standardization, also called Seiketsu, is the fourth step in the 5S principles and the only step this thesis focuses on. The purpose of 5S Seiketsu is to standardize what employees have done within the first three steps of 5S, but it is a much wider concept than is usually understood. The actual purpose of 5S is not so much housekeeping but in achieving a standard level of work: ensuring that the most efficient and least wasteful ways of doing things are performed in a repeatable manner. This can be ensured either by giving no other options or through documented work instructions or standard operating procedures (SOPs.) According to a Lean Manufacturing Tools web site, without standardized working methods employees will never be able to continuously improve their processes or even trace where errors are occurring (lean manufacturing tools.2012).

Standardization allows groups to easily communicate through the set guidelines in order to maintain focus. By standardization a company clearly defines the desired practices and procedures for its employees, but before standardization can be implemented the company has to ensure that the first three of the 5S activities are performed regularly. The method is made to facilitate the processes and tasks, and this is why it is in close connection with lean manufacturing (lean manufacturing tools.2012).

Standardization can be divided into three groups:

- *De facto* standards which means they are followed by informal convention or dominant usage.
- *De jure* standards which are part of legally binding contracts, laws or regulations.
- *Voluntary* standards which are published and available for people to consider for use

3.6 Drivers of Supply Chain Performance

As Zaklad, McKnight, and Kosansky & Piermarini (2004, 10) stated in the article of the social side of the supply chain, sustainable supply chain excellence requires getting three things right: the business process, the human system, and integrating the two with the right enabling technology. Drivers for the supply chain are factors that influence the core efficiency and effectiveness of the supply chain. These factors are linked with each other and with the flow of information.

According to Chopra et al. (2007, 44-46) there are six drivers for the supply chain. These include facilities (physical locations), and inventory that encompasses all raw materials, finished goods and work in processes. The third driver is transportation that consists of moving inventory from point A to point B in the supply chain. Information is one of the most critical drivers of the supply chain, consisting of data analysis concerning facilities, inventory, transportations, cost prices and customers through the supply chain. Sourcing is a driver where the manager has to decide who is in charge of performing which activity in the supply chain. Sourcing also refers to the situation where a manager has to make strategic decisions concerning whether the company is going to perform specific functions or externalize some of them. Pricing is the last driver in the supply chain performance. Pricing determines for example how much a firm charge for the goods or services that it makes available in the supply chain.

3.7 Supply Chain Planning System

The supply chain planning system in a manufacturing firm is very complex and has to be able to deal with the inside management system, including production, sales, purchase and logistics planning. It also has to communicate with the outside supply chain system.

An optimized supply chain planning process is divided into two sections: outside supply chain system and inside management systems. Efficient information flow within the outside supply chain system ensures that a sufficient amount of market information is distributed between customers, manufacturers, and suppliers. The information flow starts from the customer and continues to the manufacturer and finally to the supplier, while material flows from the supplier to manufacturer and then to the customer. In the firm's inside manage-

ment system logistics planning is integrated in the planning of sales, production and purchasing. Information from the three departments is transferred to the customers and suppliers via logistics planning. Based on the book Supply Chain Management (2007, 4-5) a typical supply chain involves five to seven stages: customer, retailers, wholesalers/distributors, manufacturers, and component/raw material suppliers.

Figure 5 below is based on the article by Ruilin & Tang published in the international Journal of Business Management (2008), and shows an optimized supply chain planning system for a manufacturing firm.

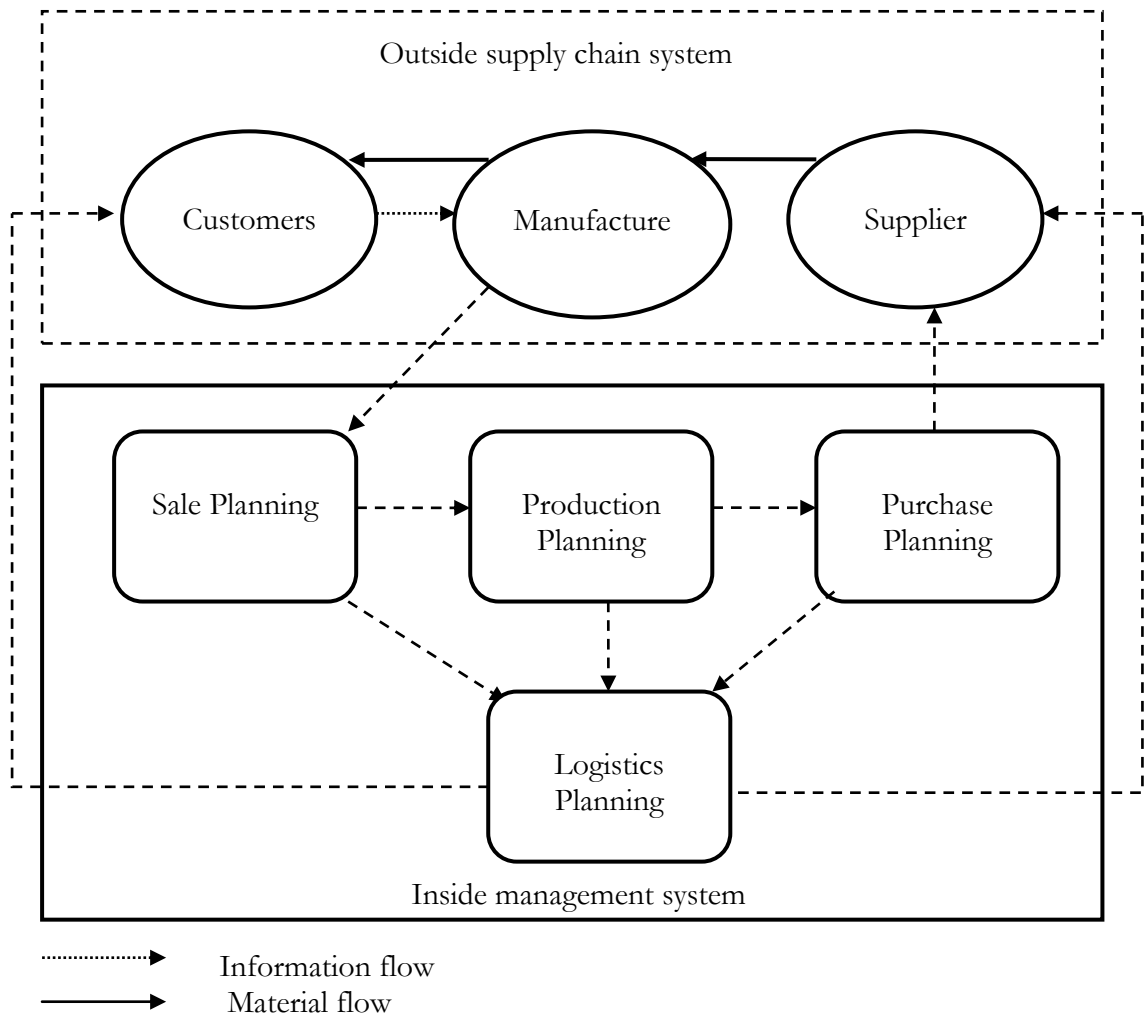


Figure 5: An optimized supply chain planning model (Ruilin et al. 2008. Vol.3)

3.8 Information Flow and Internal Communication

The flow of information is one of the most important drivers in supply chain performance, because information serves as the connection between the various stages of the supply chain (Chopra et al. 2007, 55.)

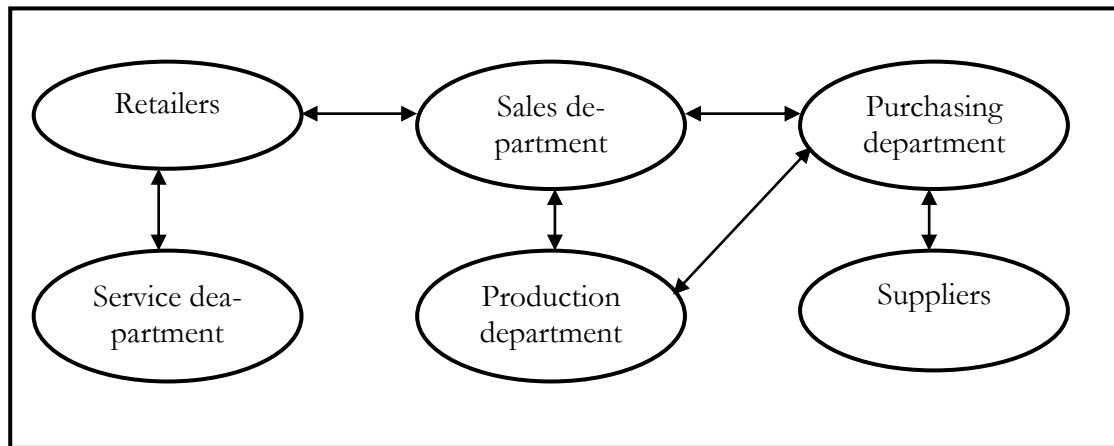


Figure 6: Manufacturer's generic information flow (Jeong, Hastak & Syal 2006, 6)

According to the article by Jeong et al. (2006, 6), figure 6 shows a generic information flow between the different functions within a manufacturer company. Information flow plays a crucial role within the internal supply chain. An effective information flow from the purchasing department to the related suppliers ensures that the right amount of raw material is ordered in the right time. The production department makes their estimation on the delivery time of a final products based on the information gathered from the purchasing department. Mutual information flow between supplier and purchasing department thus secures that the core manufacturing process is able to function efficiently. There is one major problem within the internal supply chain: most of the information is traditionally transferred between departments in paper form, and companies do not take advantage of the available information technology, such as computerized Enterprise Requirement system (ERP). Communication based on the transfer of paper makes it hard to respond in a timely manner to the changing situations and thus causes poor utilization of resources (Jeong et al. 2006, 6.)

There is a similar problem in the case company. The company relies a lot on printers for communication when they could make more efficient use of their ERP system. According to Chopra et al. (2007, 56) the pull system requires that information based on actual demand

must be transmitted extremely quickly throughout the entire supply chain so that the production and distribution of products may accurately reflect the real demand.

Based on Fawcett et al. (2007, 391) information should be shared with the members of the company or with the supply chain partners, but in reality this requires investment in a culture of willingness to share decision-making information. The lack of information sharing between the different stages of the supply chain creates a bullwhip effect (Chopra et al. 2007, 503). This effect arises when members of the supply chain fail to communicate and cooperate. Normally a retailer places a larger order with its distributor based on the future expectations. The distributor places an even larger order with the manufacturer in order to escape running out of inventory. The manufacturer responds similarly by placing an even larger order with its supplier. Finally, the retailer's demand has diminished but upstream suppliers are holding excess inventories, so they reduce their orders. The conclusion is that small changes occurring in the retailer-level demand get magnified, like a bullwhip, when they ripple through the supply chain (Fawcett et al. 2007, 10.)

When a company desires to improve the speed and efficiency of its value chain, the key is to eliminate non-electronic processes. As mentioned in the previous chapters, companies frequently use printers, paper reports, faxes, and telephone calls as their only choice for communication. Instead they should implement online, Web-based access to value chain data for all authorized users in the process. (Craig. 2000.)

As a result, time-to-decision barriers created by non-electronic media are reduced. At the same time the internal processes of a company are externalized to members of the value chain. This empowers employees to make decisions based on timely and accurate information and to wring out costs and inefficiency. (Craig.2000.)

4 INTERNAL CO-OPERATION

As defined in an online business dictionary (2011), an organization is a social unit of people that are systematically structured and managed to meet a need or to pursue collective goals and objectives on a continuing basis. As Ivancevich et al. (2008, 21) state, organization structure is the formal pattern of activities and interrelationships among the various subunits of an organization.

Different organizations have different functions, such as logistics, manufacture, H&R, marketing, et cetera. A common feature of all these functions is that they need to co-operate to achieve the required level of performance. Internal co-operation refers to a situation where a group of teams or departments work together to achieve common goals. According to Ivancevich et al. (2008, 259) organizational behavior is more than the logical composite of the behavior of separate individuals, and it determines the core efficiency and effectiveness of a company.

As described previously, there are several patterns that cause problems within the organizations. Thus there is need for internal co-operation and internal integration within organizations. Co-operation involves all employees from the different functions and brings them to work together to achieve common goals. As already mentioned above, communication plays a crucial role when defining a company's internal processes: there must be a mutual flow of information between teams and managers, and even with customers. As Ivancevich et al. (2008, 349) state, "communication assists organizational members to accomplish both individual and organizational goals, implement and respond to organizational change, coordinate organizational activities, and engage in virtually all organizationally relevant behaviors".

4.1 Internal Integration

In today's business world, internal integration is becoming one of the challenges that organizations are facing. And yet, integration on at least some level is needed because a lack of integration leads to poorer organizational performance (Pagell 2004. vol.22). According to Bowersox et.al (2007, 257) the basic level of integration is the internal operation of individual firms. The most important issue in internal integration is to understand the importance of

all participating partners' success in performing as promised. Internal integration requires seamless communication and cooperation between the functions, and it can be achieved either physically or with the help of information technology.

Integration is not a painless process and the members of the functions must all have a shared idea of the end goal or purpose of the integration. As Ruillin states (2008, vol.3), a manufacturing firm is vulnerable to problems arising especially within supply chain management processes. The problems can be for example a conflict between the need for cost reduction and the level of service to a customer. It is therefore crucial that the supply chain management process is able to balance these goals and to achieve a feasible way to integrate the functions of the internal supply chain. Referring to Pagell (2004, vol.22), "integration is a process of interaction and collaboration in which manufacturing, purchasing and logistics work together in a cooperative manner to arrive at mutually acceptable outcomes for their organization".

Internal integration in the case company could refer to a situation in which communication and management of the departments (logistics, purchase, manufacture and dispatch) will be integrated. Integration can be implemented for example through more effective use of ERP. (Bowersox, Closs & Cooper. 2007, 260.)

4.1.1 Internal Integration Barriers

As stated in the book Supply Chain Logistics Management (2007, 258) originally, barriers for internal integration evolve from the traditional functional practices related to the organization, measurement and reward system, knowledge hoarding, inventory level, and information system.

As Pagell (2004, vol.22) observes, one barrier for integration is the lack of knowledge as to how integration between manufacturing, purchasing and logistics could actually be achieved. In addition, Pagell states that "well-designed measures and reward systems seem to be one of the levers for creating integration. And a lack of measurement or systems that put functions in competition with each other certainly harms integration efforts." (Pagell 2004, vol.22.)

4.2 Team Work

Ivancevich et al. (2008, 259) defines teams as “mature groups of people with a degree of member interdependence and motivation to achieve a common goal”. Occasionally teams and groups are seen as one and the same thing, but actually there are several functions that distinguish between teams and groups. The biggest difference between teams and groups is that groups work on common goals whereas teams have a total commitment to common goals. Interdependence means that team members are interdependent on each other, and thus the work and actions of one team member always have an impact on the success of the team core performance. The entire mind of the team members is focused on accomplishing common objectives by developing synergy or special energy to achieve the required level of performance. A team is as strong as its weakest link.

Based on Luthans (2008, 319) teams in the workplace are divided into three categories; these are:

1. Project teams in which a diverse group of professional or/and managerial employees work on projects for a defined but typically extended period of time.
2. Parallel teams in which employees work in problem-solving or quality teams parallel to the regular organizational structure.
3. Permanent work teams in which self-contained work units are responsible for manufacturing products or providing services.

One type of teams is the cross-functional team that consists of individuals from different departments or special functions (Luthans 2008, 321). The case company uses permanent work teams for its operation, but for organizations that are targeting to achieve a high level of internal integration one option is to use cross-functional work teams. Organization has a huge impact on the performance of cross-functional teams, and one way to improve the performance of such teams is to cross-train the team members. According to Luthans (2008, 322) training enables more effective communication, team integration and team performance. Referring to Pagell (2004, vol. 22), informal communication occurring in real time as problems and opportunities present themselves is a key to team performance.

4.3 Training of Employees

Employees are regarded as the most valuable resource of a company (Luke. 2011). Companies are also aware of this, as they are willing to put emphasis on employees training and on ways to engage employees to the company. Based on Ferrando (2001), training lets employees feel more comfortable for example with the use of computer systems and it also reduces mistakes. There are several methods that companies can use in employees training, depending on the situation. Anderson Arnold stated in his article (1999-2012) that by using the most successful methods for employee training, a company can realize the maximum return on investment for its educational efforts.

Bixby D.W. (2012) argues in his article that the right kind of training must be given to the right people, and therefore the philosophy of the training methods does matter. Selecting the most appropriate training method is a crucial question when a company is planning the training of its employees. The age structure of the employees is one issue to consider: it is known that employees in the older age groups do not learn new processes or programs as fast as younger ones. As Bixby (2012) states, adults learn better by doing things instead of just listening or watching the topic of education. Another issue that companies must ensure is that the training has to correspond to the current level of knowledge and the work position of the employees participating in it. The average age of employees in the case company is 46, 5 years in 2012 (Niemi.2012), therefore the age structure has to be considered while planning employee training.

By developing an efficient training program, a company can raise the productivity of its employees and thus also increase its bottom line. Based on Girard (1999-2012) it is crucial that companies investigate different training methods and thoroughly understand the different methods available today. Basically, training can be provided either in-house or by purchasing services from a training provider.

4.3.1 Selection of an Appropriate Training Method

As Liebman and Balli (1995) describe, there is a special approach available that companies can use for the selection of appropriate training methods. The method is called the 3-5-3

approach to creative training methods, and it provides a company with a three-step method to develop a wider variety of training options to choose from.

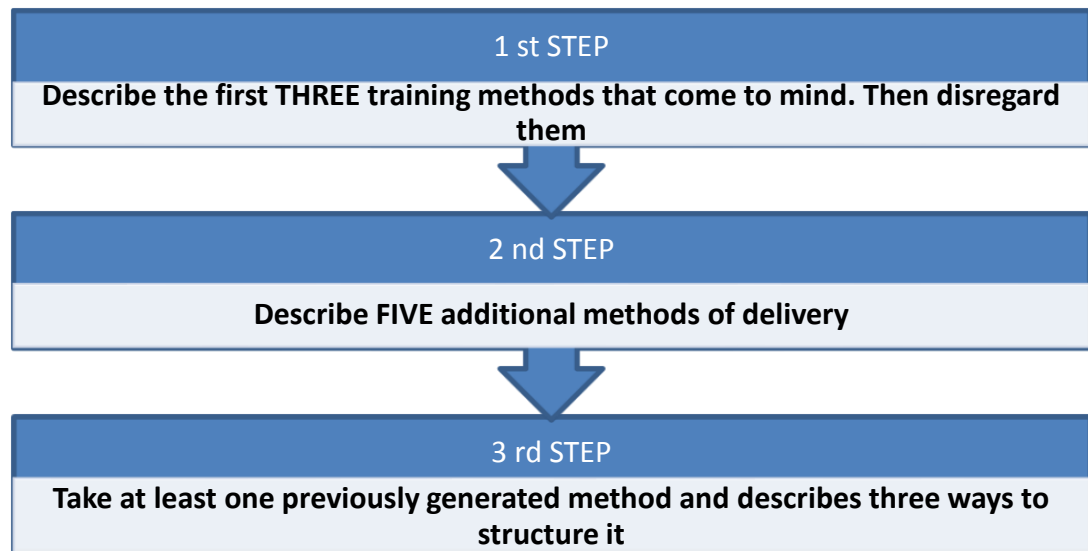


Figure 7: The 3-5-3 approach to creative training choices (Liebman et al. 1995).

The 3-5-3 approach to creative training methods is described in figure 7 above. In the first step, a trainer will choose three training methods or instructional strategies that come to mind. The trainer subsequently disregards them and selects another five methods that could possibly be used in a training session. In the final step, the trainer has to select at least one previously used training method and describes three ways to structure it. Sophie Liebman has used this method in several cases, for example when training the phone operators in a large company and while working as training specialist in the Citibank (Liebman et al. 1995). The method is useful also when larger companies are planning employee training but are not certain about the appropriate type of training program.

4.3.2 Training Methods Used in Employee Training

There are several successful methods used for employees training. As mentioned earlier, the method has to select according to the needs. According to Onnismaa (2008), the important issues for workplace managers are improving the employees' own work and deciding what kind of knowledge, attitudes, and procedures concerning work and duties should be transferred to the employee. If the entire organization is involved in the training process, the im-

portant questions are how learning on the job is related to the goals of the entire organization and what purposes such learning serves in the organization (Onnismaa. 2008).

Chart 1 below describes other widely used methods for employee training, and their pros and cons (Anderson. 1999-2012., Kermit. 2011., Luke. 2011).

Method	Pros	Cons
Hands on training	Provides general understanding about the process or equipment through theory and practical experience.	Time consuming, requires proper tools and place for training.
Trainers	Qualified professional; the trainer provides the material and place.	Improper training gives inefficient results; using an outside trainer might be expensive.
Role playing	Provides a real life situation for employees and enables them to understand processes from different points of view. A trainer can create special situations to show the employees how to handle them, or interrupt training if needed to show how it should continue.	Mostly used in sales but can also be adapted to cashiers, bank tellers, customer service representatives and service technicians.
On the job training	Provides instructions at the workplace and is focused on training employees in techniques needed for their current jobs; instruction is immediately reinforced by the employee performing the work he/she is trained for.	Interruptions are possible at the workplace, and these make it harder for the trainee to focus on the material that is being disseminated. The method is mostly used with students but also in internal training of companies.
Lectures, seminars	Provides the trainer with an easy way to communicate and exchange ideas with employees. Employees can focus on the material supplied. Gives the latest information employees need to know.	There might be a time lag between the training sessions and the time spent on the real job, and this might reduce the productive working time. Mostly used to teach new skills or update current knowledge. Might be also expensive if a company uses outside trainers.
Simulation	Provides an environment most closely matching a real life situation. A trainer can interrupt the simulation and give advice when needed. Easy to set up in a company's facility.	-

Computer based methods (CBM)	Provides numerous opportunities for positive interactions as learning is self-paced and available whenever employees want to learn, ensuring peace of mind and freedom of choice. Easy to check exercises, gives feedback immediately.	Might be costly and requires advance training on how to use the program.
Apprenticeships	Great training method when the new employees are part of a team with experienced employees. This helps new employees to learn the right way to do their job. At the same time, existing employees may not like having to mentor a new employee all the time. This can be executed also within a company as cross training within the departments/teams where employees train each other.	Might be challenging to find a more experienced employee who is willing to act as a trainer. In smaller departments/teams it might require reorganization of daily work as both participants are focused on the training session.
Online training	Allows employees to train according to their own schedules, and to go back and re-study things that they may have missed at some point.	Requires an initial investment in the program by the company.

Chart 1: Widely used methods to employees training (Anderson. 1999-2012., Kermit. 2011., Luke. 2011).

In addition to the methods listed in chart 1 above, a company can use for example a trainer method called key users. The training method is mostly used in computer based training. This training method uses specific persons who are trained to use the program and have been acting as test users during the training period. The key users are then responsible for training other employees to use the program. The case company has been using this method several times, when updating its ERP system or other computer based programs.

Cross training is one prerequisite for labor flexibility, and it concerns the training of multiple workers for certain tasks or machinery. Cross training enables teams and departments to prepare for changes that occur when an employee suddenly falls ill and a substitute person is required. (Bokhorst, J. C., Slomp, J., & Molleman, E. 2004.) The case company has already implemented the cross training method in the manufacturing department, with positive results. Currently the case company has three regional teams in the logistics department and similar training could be considered also for this department.

4.4 Integrated Logistics

Integrated logistics is defined as system-wide management of the entire logistic chain. It includes planning, implementation and controlling the flow and storage of goods, services, and information as a single entity, instead of managing the individual logistical functions separately. (Business dictionary. 2012) As the internal integration and its importance have already been discussed in the previous chapters, internal integration in such cases is obviously not adequate. Integrating the logistics of an organization can be seen as a foundation for the integration of the internal supply chain (Turpeinen. 2009). Integration has to be implemented not just within the organization but also with the suppliers, distributors and customers (Christopher. 1992, 198). Based on that argument, integration is logistical rather than “vertical”. Information plays a crucial role and companies put more emphasis on ensuring an uninterrupted information flow through the entire supply chain.

According to Bowersox et al. (2007, 208) the highest cost area in most logistical systems is transportation. Typically a company is strongly dependent on the logistical operations, and thus the high expenditure level combined with the dependence of the logistical operations on effective transportation means that the logistics departments must have a strong role in the supply chain planning process.

Integrated logistics depends on the industry, but usually inventories, inbound logistics, manufacturing operations and distribution are integrated (Turpeinen 2009). The major barrier for logistical integration is organizational: successful integration of logistical processes requires managers to look beyond their organizational structure and to aim at cross-functional integration (Bowersox et al. 2007, 258.)

4.4.1 Integrated Logistics Process

A process bringing together the five areas of logistical work is called integrated logistics. This process begins when an organization understands the value of logistical activities for the organization. Based on Bowersox et al. (2007, 26) the five areas are order processing, inventory, transportation, warehousing, material handling, packaging, and facility network. Successfully integrated logistics management ties these five areas together into a system that helps the organization to minimize total costs and achieve the desired level of a customer

satisfaction. The aim of logistical integration is to make organizational activities more effective and efficient at a lower cost.

4.5 Information Technology

The importance of an information technology cannot be underestimated. According to Chopra et al. (2007, 482) information is one key driver in the supply chain because it serves as a glue that facilitates the other supply chain drivers to work together to create an integrated, coordinated supply chain. Theoretically, information sharing, involving production, purchase, logistics, and other policy variables, between the chain entities can improve supply chain performance (Forgionne et al. 2007. vol. 196). According to Fawcett et al. (2007, 376) every critical SC process relies heavily on information flows throughout the life cycle of a product or service, from concept to customer. Effective use of an information system therefore enables organizations to manage and design their SC processes more efficiently and effectively than ever before. As Chopra et al. (2007, 55) states, information is “an important driver that companies have used to become both more efficient and more responsive.” Due to the large amount of information, it is crucial that the company is able to determine what information is the most valuable in reducing cost and improving responsiveness within the supply chain.

Based on the book Supply Chain Management, strategy, planning and operation (2007, 483) information should include the following characteristics to be useful in the decision making process of the supply chain:

- Information must be accurate
- Information must be accessible in a timely manner
- Information must be of the right kind

Modern information technology allows companies to share information more efficiently with the members of the company or with the parties of the supply chain (customers and suppliers). As Fawcett et al. (2007, 391) state, “companies have found that their efforts do not necessarily translate into information sharing and collaboration”. Based on Bowersox et al. (2007, 122) it has been found that integrated information sharing reduces delays, errors,

and resource requirements. Traditionally, information is shared with the customers and supplier at the middle portion of a product life cycle. However, as Fawcett et al. (2007, 392) argue, information sharing at the beginning and at the end of the product life cycle can prevent problems from occurring after the actual production work has started.

4.5.1 Enterprise Resource Planning (ERP)

We already know that there are several suppliers, with different technologies, that enable the sharing and analysis of information in the supply chain. Therefore the manager has to know how to choose the appropriate technology and especially how to integrate that technology into their company and their partners' companies (Chopra et al. 2007, 57). Enterprise Resource Planning (ERP) system is one that provides users with transactional tracking and global visibility of information from within a company and across its supply chain. Hence, information is entered only once to the database and it becomes available for anyone who needs it in a decision making process (Fawcett et al. 2007, 381). The database is like an information warehouse where all information is gathered and maintained (Bowersox et al. 2007, 115).

According to Bowersox et al. (2007, 115), an integrated ERP system enables a company to integrate its databases and to implement common processes across divisions and regions. A common ERP system covers the supply chain, services, financial, H&R, and reporting. These tools offer the capability to merge processes and to provide better connection between the company and the customer. According to Turpeinen (2009), ERP systems are usually expensive to implement and require a lot of tailoring; their implementation also requires a high degree of consultancy and training at the operative level.

The case company has not intended to change the existing ERP system in the near future. Therefore the focus is not on different ERP systems but on ways to improve the efficiency and effectiveness of the case company's performance by using the current ERP system.

Basically, the ERP system of the case company consists of several sub programs and tools that are designed to serve the needs of the different organizational bodies of the company. Figure 8 below describes product data flow in the ERP system of the case company. (Karjalainen. 2012).

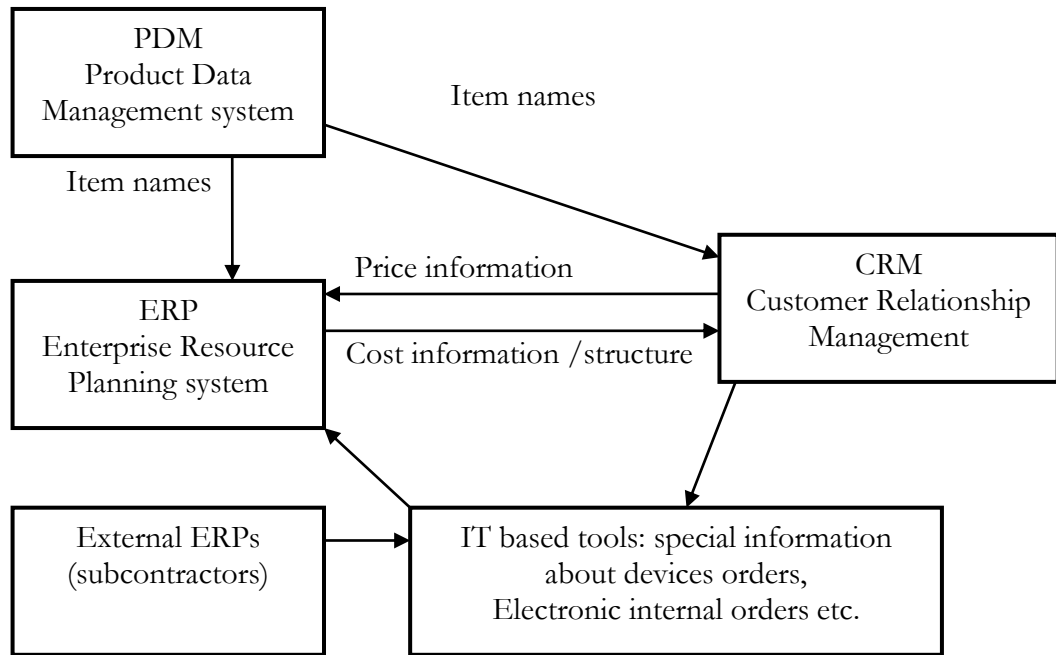


Figure 8: A product data flow of the case company

As figure 8 shows, the PDM system forms the main body of the ERP system in the case company. The PDM system shares item names with two sub-ERP systems: the ERP and the CRM systems. The ERP system itself shares cost/structure information about the devices and spares with the CRM system from which for example the salespeople get that information. The CRM system in turn transfers price information to the ERP and shares special information about the devices, orders etc. with the IT based tools from which the information is transferred in to the ERP system for use by the employees. External ERPs include for example the subcontractors' ERP systems; these are not linked to the ERP system of the case company, instead the information is transferred with email.

According to Etemoglu (2006), real-time access to production related information enables a company to manage their stock and inventory rates. Nowadays barcode readers are seen as the solution for inventory problems, as they provide information about stock rates, material codes, job orders, material lot numbers or serial numbers. Barcodes specified and used internally in an organization actually serve as labels. Based on the article by Etemoglu (2006) the two benefits of barcode use in terms of ERP systems are the following:

- Realization of rapid information flow due to rapid entry of data.
- Completion of data entry with minimum number of errors.

Especially in the manufacturing industry, barcode readers facilitate an accurate and timely information flow into the ERP system. For example in the case company, the current situation is that all information available in the ERP system is being entered by an employee. However, all employees are not familiar with the use of specific programs and thus for example stock transactions are not fully entered or are entered incorrectly to the ERP system. Therefore, when a materials transaction takes place, an employee might not be certain whether the transaction incorporates the correct lot and serial numbers, correct stock rates or even the correct materials code. As a result, employees may face surprising results when an inventory count is performed.

4.5.2 Employee Training to the Use of the ERP System

The lack of proper training to the use of the ERP and other IT based programs create additional problems within a company. As Duke Hyun Choi, Jeoungkun Kim, and Soung Hie Kim stated in their article (2006), effective training to the use of the ERP system can facilitates a positive attitude towards the system, engender user acceptance, and increase skills and knowledge.

Based on the article of Duke et al. (2006), distance education has been identified as effective as traditional on-campus approaches for delivering information. Distance education is one form of e-learning. The definition of e-learning refers to the use of network technologies to create, foster, deliver, and facilitate learning, anytime and anywhere. Perhaps the most effective method to train employees to use an ERP system is web-based training.

Based on Zimmerman (2001), the structure of web-based training includes three steps that guide an employee. In the first step, a trainer shows how a program should be used. The second step allows employees to practice the same thing, and in the third step the trainer watches when employees do the same thing by themselves, without assistance.

Web-based training has been successfully implemented for salespeople in an industrial manufacturing company called Chesterton. The company makes sealing devices, high performance protective coatings, and specialty industrial maintenance products (www.chesterton.com, 2012). During the first two week the employees received training material about the equipments online. In this way the company ensured that all employees had

the same level of knowledge when instructor-led classes began. This type of education especially for salespeople is seen to be effective, as the salespeople are usually located all around the country, or even the world, and are rarely able to come together like the traditional class training sessions requires (Zimmanman.2001).

5 RESEARCH RESULTS

The results of the research were obtained by means of interviews based on the predetermined interview structure (Appendix 1). The interviews were gathered in Finnish language and the results were translated into English for this thesis. Altogether eleven persons, in two local units, were chosen for the interviews. Eight persons were interviewed in the case company and three persons in another local unit. Due to the high difference in the size of samples between the two units, the results from the other local unit were used only for comparison. The interviews provided comprehensive information of the current processes in the internal supply chain, and therefore the information obtained from the eight interviews was sufficient to provide a basis for analysis. The interviews were conducted during 23 and 27 of January 2012 in the case company.

5.1 Purchase Department

Two persons from the purchase department were interviewed, both with a long working history in the case company. The first one, the manager of the purchase department, has worked for forty years in the case company. He has been in charge of the purchase department for last eleven years but is currently retired part time. The second interviewee has been working in the case company for altogether seventeen years and is currently in charge of spare part purchases and inventory. Based on their long working history, it can be stated that the interviewees also possess extensive knowledge of the different functions of the internal supply chain in the case company (Komulainen & Okkonen. 2012).

The interviews started by clarifying the actions of the purchase department. The interviewees stated that the main task of the purchase department is to make purchases and inventories of goods and services for the case company. More precisely, the department makes purchases of spare parts and devices based on customer orders or internal needs that arise from the manufacturing or product development departments. One purchaser works as an interface with the product development and makes purchases only for prototypes. Operations in the purchase department are designed so that each purchaser is in charge of designated suppliers. Demand is created based on a CO placed into the ERP system, and depending on the ordered item, a purchase request is sent automatically to a specific purchaser through the

ERP system. Interviewees feel that their responsibilities are clearly defined within the department. They also believe that the employees of the purchase department have a general understanding of the supply chain from a supplier to the end customer, excluding product initialization, and enhance their own actions accordingly. The only possible problem is that each employee focuses too strictly on their own work instead of looking at the performance of the entire supply chain.

From the purchase department's point of view, change management in the internal supply chain is seen as a challenging part of the everyday business. When investigating the main problems arising in change management, the researcher found that the majority of problems are related to co-operation, in particular the co-operation between logistics and purchase-departments, which is regarded as ineffective. Another related problem is product specification: the requirements are not specified precisely enough from the beginning, and this leads to a situation where changes occur even in the middle of manufacturing process. A change occurring after the manufacturing process has started has a huge impact on the performance of the entire supply chain. With regard to co-operation, the interviewees feel that the internal supply chain is not performing as effectively as it could, one reason being lack of effective communication within the internal supply chain. Another reason is that employees do not remember to inform others about changes when they occur.

5.2 Logistics Department and Dispatching

Two persons were interviewed from the logistics and one person from the dispatch departments. The interviewees from the logistics department have a long working history in the case company. The first one is the manager of the logistics department, with a 17-year working history in the case company. The second one has been altogether 37 years with the case company and is currently working as spare part specialist. Based on their long working history it can be stated that interviewees also have extensive knowledge of the different functions of the internal supply chain of the case company. The dispatch department is outsourced but is an important part of the overall performance of the internal supply chain. In addition, one person with an approximately one year working experience was interviewed (Leinonen, Tolonen & Valjus. 2012).

The interviews began by clarifying the main actions of the logistics and the dispatch departments. The logistics department consists of six assistants who are divided into three regional teams: EMEA, ASIA and AMERICA. These teams take care of customer order handling. The logistics department additionally includes the team leader and the spare part specialist who ensures that delivered spares correspond to customer needs. These eight persons are in charge of the order-supply-invoicing chain. In addition, they take care of the spare part business in its entirety. In other words, the logistics department ensures that the right spares are delivered at the right time to the right place. The main actions of the dispatch department are collecting, packaging and dispatching the spare parts and products. They also receive and store spares and In-House Service (IHS) goods.

The interviewees feel that their responsibilities are clearly defined within the departments, in their opinion the employees for the most part have a general understanding of the supply chain from a supplier to the end customer excluding product initialization, and enhance their own actions accordingly. However, they felt that when new employees are hired, there is need for more thorough familiarization with the internal supply chain.

When investigating possible problems arising in change management, the researcher found that most of the problems are related to the information flow within the internal supply chain: information is not always available when it would be needed. Another problem is that spares do not always arrive on time and hence the delivery to the end customer is delayed.

5.3 Manufacturing Department

Three persons were interviewed about the manufacturing operations. The first one works as a capacity planner, the second one is manufacturing manager and the third one works as program tester in the manufacturing department. The working experience of the interviewees in the case company varies from 11 to 37 years. Generally speaking, the manufacturing department produces products based on the CO and transfers the final products to the stock to be ready for dispatching. The interviewees also told that the employees of the manufacturing department take care of product testing and produce spare parts when needed (Heikkinen, Heikura & Piirainen.2012).

The interviewees stated that responsibilities within the manufacturing department are clearly defined. Generally there is a named person in charge for specific products, and in interview-

ees' opinion is that the current system serves their performance sufficiently. In addition, over the last couple of years the manufacturing department has had a special trainee program for its employees, "cross training", where each employee learns how to manufacture products for which someone else is in charge. This type of training enables more effective performance for example if one employee is taken ill. Anyway, the interviewees feel that the ERP system could be utilized more efficiently and the entire performance of the internal supply chain should be more effective.

When investigating the interviewees' knowledge of the actions in the internal supply chain, the interviewees feel that employees understand relatively well the supply chain from supplier to the end customer and enhance their own actions accordingly. However, the interviewees' opinion is that there is need for more thorough familiarization with the operations in the other functions of the internal supply chain. The interviewees also feel that the information flow is insufficient and complicates getting better knowledge of the actions of the internal supply chain.

Change management in the manufacturing department is dependent on when a change occurs. As the case company uses the pull process, if the manufacturing process has already begun the management of changes is more difficult compared to a situation where a change occurs before the manufacturing process. Another problem in change management is that the information flow between departments is ineffective information disconnects occur. The interviewees argued that information often does not reach manufacturing department when it should. A similar problem is also found elsewhere, when employees are not aware of who is in charge of what in other departments.

5.4 Internal Co-operation

When investigating the internal co-operation between departments, the researcher found that altogether six of the eight interviewees take the success of the whole company into consideration more than the daily performance of their own departments. Similar results were found in the other local unit where two of three interviewees are more concerned about the success of the entire corporation than the success of their own department.

According to the interviewees, information is shared between departments by email, mobile phone, face-to-face communication, ERP system, or meetings. The interviewees stated that

information is usually shared through emails or face-to-face discussions. They prefer face-to-face communication because it enhances cross-border communication and lets employees get familiar with each other. Anyway, there is the risk that information shared through face-to-face communication is dependent on how good the listener's memory is.

The interviewees feel that cross-border communication is easy, and most of them believe that mutual communication between the functions exists. Nevertheless, information is not always directed to the right persons or is not available when it would be needed. These are the two most important problems in information sharing. Based on the interviews, there seems to be similar problems in information sharing between the departments. In addition to the above, the interviewees stated that people do not always answer to emails or colleagues are not available.

When investigating possible remedies to the information sharing problem, the interviewees stated that better, timelier communication between departments is needed as the departments are involved in the order to customer process. According to the interviewees, clearer instructions on who is responsible of what in the different departments are needed. The interviewees also emphasized that clearer rules, and implementation of those rules, are necessary. Better utilization of the existing ERP system came up as one solution for the communication problems. For example, if an employee removes a spare part from the stock for his or her own use without entering information of this to the ERP system leads to a situation where the stock rate is not valid.

On the scale from one to five (when one is bad, two is weak, three is satisfactory, four is good and five is excellent), most of the interviewees evaluated the co-operation with the other departments as "good". The argument for this grade was that assistance is always available, the atmosphere is natural, and the employees are flexible in terms of working time and methods. However, the interviewees also pointed out several reasons why they chose not to give the grade excellent: lack of instructions, lack of common standards and their implementation, the employees are in hurry with the tasks, and if there is an agreed standard of activity someone always revises it. In addition, the interviewees pointed out that the flow of information is not efficient and sometimes a person might take feedback too personally even it was meant to improve the overall operations.

According to the interviewees they clearly understand the effect of their own actions on the other departments.

5.5 The ERP System

The case company has one main ERP system. In addition to that, there is a product data management (PDM) system mainly used by the product development department and customer relationship management (CRM) system that provides e.g. pricing information. Different IT based tools also exist within the ERP system; for example the contract of delivery specification for use by salespeople. The ERP system has its limitations for different people, for example the manufacturing employees have different view and access rights in the program than employees in the purchase department.

Slightly more than half of the interviewees stated that the ERP system is not completely utilized. Depending on the department, the ERP system is used for sharing different information of the customer order. For example, the logistics department enters a customer order into the ERP system and takes care of the order from the beginning to invoicing and archiving. The logistics assistant prints collection lists based on customer orders into the ERP system and manually transfers these lists to a mailbox next to the door in the dispatch department, from which employees then pick them up. After customer order information has been entered to the database the purchase department automatically receives information of the demand for items that need to be purchased. The case company does not have an ERP system where their supplier could see the case company's stock rates or needs. The manufacturing department is not usually informed by using ERP system. Instead, they receive the same list as the dispatch department and produce the products based on that list. Finally, the dispatch department delivers the items ordered.

The interviewees stated, depending on their position, that better knowledge and more intensive training for the use of the ERP system is needed. It seems that most employees have very narrow experience and knowhow about the ERP system: in a daily use or when usage does not require special experience, the employees have some knowledge of the ERP system, but they do not know what kind of added value the ERP system could create if they had a better understanding of it.

As already mentioned, the case company has a PDM system used by the product development department. This system is also used in the manufacturing department to receive information about the structure of a device. According to the interviews the link between the two ERP systems does not work properly and this causes considerable problems that are reflected in the processes of the entire supply chain.

It was also stated that IT based tools available for the salespeople should be utilized better, especially with regard to device/product deliveries. There is also no common method used in sales negotiations. The current system, where the salespeople enter information of sold devices into the IT based sales card, is inefficient. According to the interviewees, the lack of a common policy and insufficient use of paper contracts for delivery specification are the biggest reasons for changes occurring after a CO is placed to the ERP system.

When investigating possible remedies for the use of the current ERP system, the interviewees stated that an electronic collecting list, where the logistics department can find updated information concerning a CO, together with additional training on the use of the ERP system would be the solutions for more effective communication.

5.6 The Occurrence and Management of Changes

When investigating the different types of external and internal changes appearing in the case company, the interviewees from different departments described very similar situations.

Some examples of external changes are:

- There are no items available even though the stock rate indicates otherwise.
- Items are defective or a delivery is incomplete.
- A product or spare part is not ready for delivery when it should be. According to the interviewees this is caused by a supplier who has not shipped as promised.
- Change of the delivery time or contents of a delivery, delayed, or cancelled delivery.

The above examples of external changes are to some degree consistent with internal changes, but as the interviews stated, there are fewer internal changes occurring than external ones. Examples of the internal changes appearing are the following:

- Changes derived from the product home or R&D.
- Products or spare parts are not ready for delivery.
- Sick leaves and work resourcing.

The interviewees stated that changes caused by the customer are not predictable. However, they believe that the employees could manage the changes with considerably better efficiency if they had a common policy that everyone is required to implement. When investigating the departments' preparedness for change management, the interviewees stated that the information of a change should reach the employees of other departments earlier than it does at the moment. The current system where information reaches another department on the day when items should be sent to the end customer is insufficient. The interviewees believe that employees usually have the information for example about possible delays already earlier and this information should be shared in a more timely fashion.

According to the interviewees, one way to prepare for changes is more detailed product specification. Currently, the salespeople are not required to fill a paper contract of delivery specification where each part is specified, and thus they are able to sell a device by stating only its name, without specifying in detail in what processes the customer is going to use the device and, hence, what kind of spare parts are needed.

The importance of predictability came up several times during the interviews. When investigating alternative processes or standards of activity, the interviewees mentioned similar activities as they did in the previous question about change management. However, they also stated that if employees could give some advance warning about possible changes in the ERP system, the information would reach the end customer better than it does in the current system.

One of the interview questions asked how the effect of changes on the performance of the internal supply chain could be managed better. The interviewees stated that sharing infor-

mation about changes earlier between departments and implementing common rules play a crucial role in this respect. In addition, it should be possible to increase the predictability of changes. Better compatibility of the ERP and PDM systems is needed to reduce the number of changes appearing after an order has been placed in the ERP system.

Slightly over ninety per cent of the interviewees believe that they are aware of how the process should continue after changes appear. However, it seems that this belief is due to the fact that, up to the present, problems caused by changes have been solved somehow. After deeper investigation the researcher found that the employees do not know exactly how the process should go ahead and to whom they should contact when changes occur. Thus they contact the first person whom they believe to be able to take care of the problem, instead of contacting the one who is responsible for the changes.

The case company uses buffer stocks for the most sold items. According to the interviewees, this is one way to manage changes and to ensure that delays can be avoided. One department uses so called "cross-training" to ensure that product and spare parts knowhow is not dependent on the presence of any single person.

In any case, the interviewees stated that many things are done right in the case company. They are proud of the innovation process, clear responsibilities within the departments, and the flexibility and helpfulness of employees. They also feel that employees are nowadays more ready to ask for assistance when they need it. In addition to this, the interviewees emphasized the importance of non-work activities and the different supporting operations arranged by the case company.

5.7 Relationship with Suppliers

According to the interviewees, information is mainly shared with the suppliers by using email or mobile phone. It seems that face-to-face communication is used with one supplier located in the same city as the case company. There are face-to-face meetings with the suppliers and subcontractors twice per year. The interviewees want to have more face-to-face communication with suppliers because it enhances cross-border communication and familiarizes the suppliers with the purchasers.

The interviewees stated that information sharing with the suppliers is mutual even if they sometimes feel that they have to milk the suppliers for information. Based on the interviewees, information should be shared automatically instead of the current system where purchasers have to make separate enquiries for example when they realize that some purchased items have not arrived as promised.

When investigating the most common communication problems, the interviewees stated that sales forecasts from the case company to suppliers and delivery confirmation from the suppliers to the case company are the biggest issues in the current communication. Basically the suppliers have to send confirmation of an order within two days to the case company, and sometimes they do this within the same day. However, the interviewees stated that suppliers do not always inform the case company if there are delays or changes related to the purchase order (PO); instead the purchasers have to ask for it when the ordered items do not arrive on time.

More intensive co-operation with the most important suppliers is needed. The interviewees stated that face-to-face meetings should be arranged more frequently than twice a year.

The ERP system is not currently used to share information with suppliers. Based on the interviews, there is a database for open purchase orders in the ERP system. From this database the purchasers must export information to an Excel sheet and then forward the obtained file to suppliers. Based on this file the suppliers are asked to confirm the delivery date or other changes made to the PO. As stated, there is no ERP system where the suppliers have access to see any kind of information about the case company.

5.8 Relationship with Customers

The case company has two types of customers: subsidiaries and individual companies. According to the interviewees, customer orders are usually received from the subsidiaries but items are sent directly to the customer. Depending on the case, invoices are sent either directly to the customer or to subsidiaries. Information is mainly shared with the customers by email. This is seen to be adequate, as telephone communication could create language problems. Another problem is the time zones, as the business operates globally. There are no

face-to-face meetings with customers. Based on the interviews, information is mutually shared.

However, a problem exists with the device deliveries. As the interviewees stated, they do not receive sufficiently detailed information about the ordered products. This information should be automatically sent by the salesperson to the logistics department, as they have the best information about the technical specifications of the ordered devices. The lack of technical specification creates problems during the normal delivery process and causes delays.

The ERP system is better utilized in the communication with customers than with suppliers. Subsidiaries with the same ERP system enable to check for example the balance of stock, and they have the same view with the case company. Usually customer orders are sent through email, but also an electronic internal purchase order (e-IPO) has been in use. This e-IPO is placed in the ERP system and it only requires the case company to confirm the delivery date and price of the purchased items to the subsidiary. This is done in the ERP system and the subsidiary will see the confirmation immediately. According to the interviewees, the ERP system is used for invoicing, for printing of dispatch notes and so on, but those documents are sent to the customers by fax or email.

6 DISCUSSION

As mentioned above, the research interviews were conducted mainly in the case company. In addition, three persons in another local unit were interviewed. In spite of quite different working processes between the units, there were many similarities in the answers. These similarities are better explained in the end of Recommendations- chapter.

The researcher found that there is a connection between working history and how employees consider the success of the entire corporation. Altogether 72.8 per cent of the interviewees (in the case company and another local unit) have more than 15 years of working history, and all of them think more of the success of the entire corporation than the success of their own department. At the same time, employees with a shorter working history are more interested in the performance of their own department. This means that in the long term this attitude may create more communication problems if the employees are not interested in the needs of the departments around their own.

As figure 9 shows, it was found that employees with a long working history seem to be more committed to the success of the case company while employees with a shorter working history are more interested in the performance of their own department

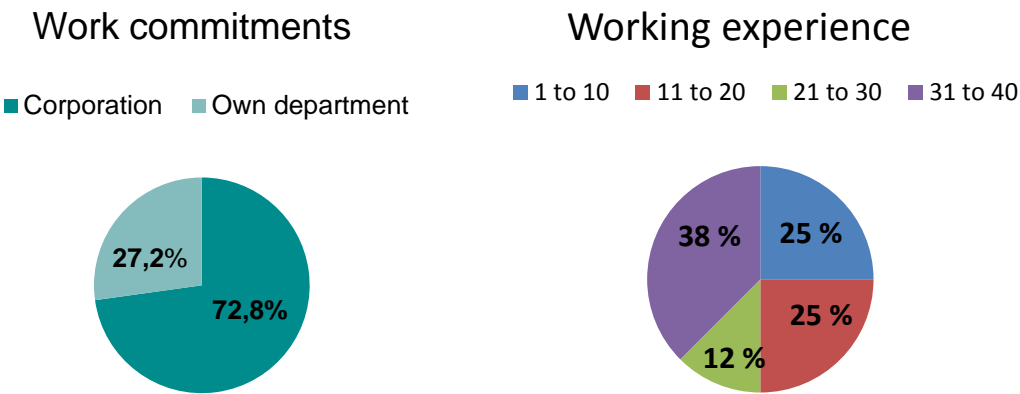


Figure 9: The connection between working history and work commitments

6.1 Internal Co-operation

When investigating the co-operation between departments, the interview questions were related to communication, information flow and responsibilities within and between the departments. As stated in chapter 4.0 Internal co-operation, communication helps the members of an organization to accomplish both individual and organizational goals, to implement and respond to organizational change, to coordinate organizational activities, and to engage in virtually all organizationally relevant behaviors.

When examining the daily performance of each department separately, no communication problems within the department were found. However, when examining communication between the departments a lack of effective communication could be observed, based on the lack of common rules and implementation of those rules. Even though the interviewees feel that communication across the departments is easy and most of them believe a mutual communication between the functions exists, there are some major problems.

For example, some employees might take a spare part from the stock without entering information of this in the ERP system, while at the same time for example the logistics people might confirm the same spares for a CO. This leads to a situation where the stock rate is not valid and eventually the CO might be delayed. This seems to complicate the normal performance of the departments and the end customer will not be satisfied. One possible solution here could be a barcode reader. According to chapter 4.5.1 Enterprise resource planning, barcode readers provide immediate information about stock rates when items or materials are taken from stock for internal use. As mentioned in the chapter 4.1 Internal integration, the most important issue in internal integration is to understand how important it is that the participating partners perform as promised. Based on the interviews, the case company has need for internal integration that requires seamless communication and cooperation between the departments.

As the interviewees stated, responsibilities are clearly defined within the departments, employees mainly understand the supply chain in general and enhance their own actions accordingly. Still there seem to be problems with understand the actual influence of actions in one department on the actions of another. Therefore, it is crucial that processes are described to indicate a role of each interest group within one picture. Consequently, employees will learn an influence of their work to work of other interest groups.

As explained in chapter 3.1 Supply chain management, there are several functions within a company that are related to each other, and decision making within one function always has consequences for the other functions. This should be made clear to all employees because it enables the employees to alter their attitudes so that they better contribute to the success of the entire corporation.

In addition, during the interviews it emerged that employees do not know who is in responsible of what in the other departments, but they have a general understanding for example of the responsibilities of the logistics department. Based on the interviews, there seems to be a communication gap especially between the logistics and purchase departments. This naturally complicates the performance of the internal supply chain and undermines its efficiency.

Downward information flow, from managers to employees as well as from one department to another, is also seen to be ineffective. Based on the interviews, the employees are not informed sufficiently when organizational or functional changes appear. For example, if normal practices change in one department, all other departments should be automatically informed. This kind of information gap weakens the performance and creates frustration as employees are not informed about what is going on in another department even though the actions are connected with each other. This seems to be a problem especially when functional changes appear.

Referring to chapter 3.8 Information flow and internal communication, real information sharing requires investment in a culture of willingness to share decision-making information. The lack of information sharing between the different stages of the supply chain creates an internal bullwhip effect. The problem described above could be corrected for example by sending an email about the functional changes to all employees constantly working with the department in question. On the other hand, many employees receive even hundreds of emails every day, so there is a high risk that important information gets lost in the flood. There is thus a more effective channel to share information related to the case company's internal and functional changes: TV screens that could be located in the cafeteria and other visible places. In my opinion this is the most effective way to inform the employees inside the case company. The case company already has a common practice to update information especially about organizational changes in the intranet.

As some of the interviewees prefer informal communication, it was stated that informal communication occurring in real time as problems and opportunities occur is a key to team

performance. For example, regular meetings encourage informal communication between employees as they become more familiar with each other. Seamless communication and cooperation between departments can thus be improved by providing employees with opportunity to regular meetings with the other departments that must be well informed about each others' actions.

The problems described above indicate that information is not always addressed to the right persons and therefore is not available when it is needed. For example, once an employee has got an answer from a specific person, he or she continues to ask the same person for assistance even when the question is not in the person's area of responsibility. This kind of behavior easily makes the other person feel overloaded with work and, even more importantly, makes the entire performance ineffective. According to chapter 4.5 Information technology, information must be accurate, accessible in a timely manner, and the right kind to be useful in the supply chain decision making process.

Communication between departments in the case company is currently transferred manually, whereas it should be handled more automatically. Therefore the employees have to infer by themselves who might be in charge of what in the other departments, whereas they should be able to check that information from the database. These communication gaps could be closed if the employees were better informed of who is responsible of what. As stated in chapter 3.8 Information flow and internal communication, the pull system requires that information based on actual demand must be transmitted extremely quickly throughout the entire supply chain so that the production and distribution of products may reflect the real demand accurately. This problem will be at least partly solved when the process description charts are finished and employees are able to check who is in response for what. This of course requires that the internal roles are clearly described to the employees.

6.2 The ERP System

As stated in chapter 3.6 Drivers of the supply chain performance, sustainable supply chain excellence requires getting three things right: the business process, the human system, and integrating the two with the right enabling technology.

Based on the results of the research, the current ERP system could be utilized better. The employees feel that due to incomplete training they are not familiar with all the possibilities of the existing ERP system. It seems that the employees have only very narrow experience and knowhow of the ERP system in use. The employees are able to use the ERP system in a daily use or when usage does not require special experience.

As stated in the chapter 4.3 Training of employees, training lets employees feel more comfortable for example with the use of computer systems and it also reduces mistakes. As the middle age of the employees in the case company is 46.5 years, training methods has to correspond to way of adults to learn. Referring to chapter 4.3 Training of employees, adults learn better by doing things instead of just listening or watching the topic of education. Another issue to ensure is that the training has to correspond to the current level of knowledge and the work position of the employees participating in it. There is a risk that the motivation of the employees to use the ERP system deteriorates if they feel that they do not know how to use it. Decreased motivation in turn may distort the flow of information, when employees do not enter all information into the system.

ERP systems are usually expensive to implement, require a lot of tailoring, and their implementation also requires a high degree of consultancy and training at operative level. I believe that more intensive training of the employees would be a solution here. According to chapter 4.5 Information technology, information is one key driver in the supply chain as it serves like glue that facilitates the other supply chain drivers to work together in creating an integrated, coordinated supply chain.

The case company has used different methods to train the employees for the use of the ERP system. However, it seems that more intensive training is required. That is why the case company could arrange computer-based training for its employees. As mentioned in the chart 1, computer based training provides numerous opportunities for positive interactions as learning is self-paced and available whenever employees want to learn, ensuring peace of mind and freedom of choice. The method is allows employees to check exercises and gives feedback immediately.

As already mentioned, there are communication gaps between some of the departments due to the different conventions of what kind of information should be entered into the ERP system. With regard to the results of the research, a few minor issues are increasingly dis-

torting the effective performance of the supply chain. One of these is that someone takes spares from the stock without updating the data in the ERP system. This might be caused by insufficient knowledge of how to use the ERP system, and could possibly be solved by increased system training for the employees. As stated in chapter 4.5.1. ERP system, use of a real-time access, such as barcode readers, to production related information enables a company to manage their stock and inventory rates. Especially in the manufacturing industry, barcode readers facilitate an accurate and timely information flow into the ERP system. Integrated information sharing also reduces delays, errors, and resource requirements.

The case company has a PDM system for the use of the product development department. This system is also used by the manufacturing department to receive information about the structure of a product. Based on the interviews, when information is transferred from the PDM system to the ERP system, sometimes some of the product structure information in the order lines is missing. As a result, the manufacturing department receives defective information from the very beginning, because the structure of the product is not completely described. Parts for the product are ordered based on the information in the ERP system, and quite often this leads to a situation where some parts are found to be missing when the production process is already well underway. This in turn leads to the delay of the CO. As the link between the two ERP systems is not working properly, considerable problems arise that affect the performance of the entire supply chain.

This problem has been common knowledge within the case company for a longer time but for some reason it has not been fixed. Based on the interviewees, there is an option to manually fix the missing lines. In any case, the system has automated timing for updating the entire product structure and least a couple of hours are needed to complete the process.

It is stated that especially with devices/ deliveries, there is need to better utilize the IT-based tools available for the salespeople. In addition, there is no common method to be used in sales negotiations. The current system, where the salesperson enters information about the sold product into an IT-based sales card, is inefficient. As the sales card does not require detailed information about the sold product but requires only upper level configuration information, the sales men should be required to fill a system description form. The system description form provides more detailed information about components required in production. At least the system description form it should be filled sufficiently or sufficient amount of information about the sold product provided to the case company so that supply chain

processes can be started. Later on, if there are changes occurring in the order, those go through normal changes management process described in the process descriptions.

The problem described in the text above might stem from the lack of knowledge about how to use the IT-based sales card. However, as stated in the chapter 4.3 Training of employees, the most effective method to train employees to use an ERP system is web-based training. This type of education especially for salespeople is seen to be effective, as the salespeople are usually located all around the country, or even the world, and are rarely able to come together like the traditional class training sessions requires. The problem could be solved if the case company focused on training the salespeople to use the IT-based sales card correctly.

In the future, the case company may require that a CO is not processed before the IT-based sales card is more detailed filled or the system description form is given to the case company. The salespeople should be required to fill the forms already during a sales meeting. In addition, the salespeople should be required to give more detailed information of the entire sales negotiation process, so that the other departments could better taken the information into consideration while planning their performance. The lack of common policies and the insufficient use of paper contracts of delivery specification are the biggest reasons for changes occurring after a CO are placed in the ERP system.

Based on the interviews, the problem related to the actions of the salespeople and their style of recording the devices sold is a significant one for the performance of the entire case company. As we are talking about a paper contract, the reason cannot be a lack of knowledge about how to use the ERP system. The problem is rather derived from ignorance of the salespeople of the entire supply chain process; they probably do not understand the importance of the delivery specification for the performance of the entire supply chain.

When the case company desires to improve the speed and efficiency of its value chain, the key is to eliminate non-electronic processes. As mentioned in the previous chapters, companies frequently use printers, paper reports, faxes, and telephone calls as their only choices for communication. Instead, they should implement online, Web-based access to value chain data for all authorized users in the process. As a result, time-to-decision barriers created by non-electronic media are removed. This would also externalize the company's internal processes to value chain members. This empowers employees to make decisions based on timely and accurate information and to wring out costs and inefficiency.

6.3 The Occurrence and Management of Changes

Changes occurring in the internal supply chain are basically manageable. Based on the interviews, I believe that creating common rules and requiring that these rules are implemented can remove most of the current problems in the case company. It seems that with the exception of the problems appearing with the two ERP systems, problems caused by changes could be fixed with only minor changes to the current actions. On the other hand, the problems due to the functionality of the two ERP systems require financial investments.

When investigating the preparedness for change management, the interviewees stated that information about changes occurring in one department should reach the employees in another department earlier than they now do. To ensure timely information flow, the employees should be aware of whom to contact. In addition, there is a need for a culture of increased willingness to share information. The problem could be solved by determining clear fields of responsibility and naming substitute persons, and by creating a system that provides up-to-date information at all times.

According to the interviewees, one way to prepare for changes is a product specification. Currently the salespeople are not required to fill a paper contract of delivery specification where each part is specified; instead they are able to sell a product only by its name, without specifying the parts needed based on the processes where customer is going to use the product. This is a significant problem for the performance of the entire case company. As we are talking about a paper contract, the problem cannot be insufficient knowledge of how to use the ERP system. Anyway, I think that sometimes the problem is derived from the ignorance of the salespeople about the core process of the supply chain; they do not understand the importance of the paper contract for the supply chain performance of the case company. In addition, I think this reflects a lack of common rules and especially a lack of requiring implementation of the rules.

The importance of forecasting came up several times during the interviews. When investigating alternative processes or standards of activity, the interviewees stated similar activities than to the previous question about change management. Anyway, I believe that forecasting possible changes earlier in the ERP system will enhance the performance of the entire supply chain and reduce the amount of CO delays.

The case company uses buffer stocks for the highest selling items. According to the interviewees, this is one way to manage changes and to avoid delays. One department uses a method called "cross training" for change management: cross training ensures that knowhow about the products and spare parts are not dependent on the presence of any one person. I think that similar cross training in the other departments would increase the efficiency of the supply chain. As stated in the chapter 4.3.2 Training methods used in employee training, cross training enables teams and departments to prepare for changes. For example, cross training in the logistics department or in the purchase department would ensure that employees are able to stand in for each other when needed. This kind of training would also increase the motivation of the employees as they learn more about different fields.

The interviewees also feel that employees are nowadays more active in asking assistance when needed. In addition, they emphasized the importance of non-working activities and different supporting operations arranged by the case company.

6.4 Relationship with Suppliers

According to chapter 3.3 Management of the customer- supplier relationship, supplier relationship management (SRM) is one of three macro processes and its aim is to arrange for and manage supply sources for the various goods and services. Open communication between the suppliers and company is essential for successful co-operation.

Based on the interviews, the purchase department wants to have more face-to-face communication with the suppliers as it enhances cross-border communication and familiarizes the suppliers with the purchasers. As the interviewees stated, the purchasers have monthly meeting with one supplier but there is need for regular meetings especially with the most important suppliers. The case company could consider whether there is room for regular meetings with the suppliers.

6.5 Relationship with Customers

Chapter 3.3 Management of the customer- supplier relationship states that customer relationship management (CRM) is one of the macro processes and its aim is to generate customer demand and facilitate the placement and tracking of orders. Well implemented CRM generates several benefits for the company: customized products and services, and improved customer service efficiency and effectiveness.

Based on the interviews, there are no major problems in the customer relationships of the case company. This is derived from the business practices: as explained above, the case company mainly makes business with its subsidiaries.

However, there seems to be a problem with device deliveries. This is related to customer relationships, as the delays are mostly derived from inaccurate technical specifications. As the interviewees stated, they do not receive specific information about the ordered products. This information should be automatically sent by the salespeople to the logistics department, as they have the best information about the technical specifications of the ordered devices. The lack of technical specification of orders creates problems during normal delivery process and causes delays.

7 CONCLUSION

A supply chain consists of series of linked value chains (Fawcett et al. 2007, 9). There are basically three macro processes in a firm's supply chain. The main purpose of each macro process is to manage the flow of information, products, and funds required to generate the overall value and to fulfill the customer's request. These three processes are related to customer relationship management (CRM), the firm's internal supply chain management (ISCM), and to supplier relationship management (SRM). As the supply chain is dynamic and involves a constant flow of information, products, and funds between and inside the different stages, the success of a supply chain is relative to the design and management of the supply chain flows, and the integration of the three macro processes is crucial for successful supply chain management. (Chopra & Meindl. 2007, 3-4, 15.)

There were three main objectives of the study: The first objective was to identify and clarify the external and internal factors causing changes in the internal supply chain. The second objective was to investigate how those changes could be managed in the supply chain. The third objective was to find ways to make the core processes of the case company more effective and efficient by utilizing the existing ERP system. After analyzing the research result, it can be stated that the main objectives of the study were accomplished.

Based on the research results, some rather common factors were found to cause changes in the internal supply chain, and thus the research results were no surprise to the author or to the case company. As the second objective was to investigate how to manage changes in the internal supply chain, answers for the question can be found from process description charts (APPENDIXES 2-4). Drawing those charts from the point of view of change management for use by the case company was one part of the thesis. The charts are intended for global use within the case company. The third objective was to find ways to better utilize the current ERP system, and based on the research results the author found several opportunities to do that.

This process was a challenging and interesting way to research how the internal supply chain of the case company could be improved. As competition is hard and customers require better service or products all the time, delivered faster than ever, it is crucial for the case company that its internal supply chain is working as effectively as possible.

8 RECOMMENDATIONS

The primary process for the case company is to ensure the flow of items from the supplier to the customer. As the case company is a manufacturing company it should be able to manage its internal supply chain efficiently. There are some issues that the case company should do in order to improve their internal operations. In the following are some recommendations for the case company based on the research results.

After analyzing the research results, the problems seem to cumulate into three main issues: a lack of common rules and implementation of those, ineffective flow of internal information, and weakly interoperable tools (ERP and PDM).

The case company can take the internal integration further in terms of co-operation, by emphasizing the importance of co-operation already when a new employee is first hired and by creating an atmosphere that inspires the employees to co-operation instead of working individually.

There is a need for improved flow of information within the case company. The employees should be properly informed about organizational changes and especially about functional changes. When changes are made in the practices of one department, the other departments around it should be informed e.g. by email. As the employees use email continuously the information would reach them most effectively in this way. In addition, the information could be placed into the intranet or some internal message board where everyone can find it when needed.

As mentioned earlier, the information flow can be improved either by looking for physical solutions or by technological solutions. One IT based solution here could be TV screens that are located for example in the case company's cafeteria and manufacturing department. These screens show information about functional changes, common rules, etc. I believe that such info screens would ensure that the employees cannot avoid information meant to reach them.

As there obviously is a communication gap especially between the logistics and purchase departments, one recommendation is that the case company should arrange monthly meet-

ings of the two departments. In these meetings the employees would be able to share and discuss the issues that have come up. Similar meetings between manufacturing and R&D could also be necessary.

The current ERP system is an important part of the internal supply chain process, but it is not utilized to the full. The case company is recommended to provide more training on the ERP system to the employees. A method used for training here could be the key user training. As mentioned earlier, the line workers are those who usually are in the best position to improve processes, and thus they must get a sufficient amount of statistical training and be empowered to make decisions.

As there is a lack of effective communication between the purchase and the logistics, the case company could investigate whether the current ERP system can be configured to remind automatically logistics department if changes occur e.g. in the promised delivery times by the actions of the purchase department.

In the future, if an updated version of the ERP system is launched it is crucial to clearly communicate the purpose to the employees and to provide as much training as necessary in order to improve the performance of the supply chain.

As there seem to be considerable problems in the proper use of the ERP system, the case company should arrange special training for the people working in the IHS and the R&D. The importance of entering all removals from stock into the ERP system should be a central part of the training. This is one way to solve the current problem. Well implemented training enables all participants to see accurate stock rates and to act based on those. Training could be implemented through online training that allows the salespeople to train on their own whenever they find the time.

Another possible solution here is to invest in a barcode reader. As mentioned in chapter 4.5.1 Enterprise resource planning (ERP), barcode readers facilitate an accurate and timely information flow into the ERP system and they can be adapted for the current ERP system. The third possible solution for the problem is to require an internal order every time when parts are meant for internal use, but this will not reduce the use of paper.

The case company is recommended to arrange training for the salespeople about the use of delivery specifications. Even more importantly, the case company should require a completely filled contract before the manufacturing process begins. This is another part of the standardization of work. Another solution here would be investing in an IT based sales card and requiring that all salespeople fill them properly during a sales negotiation based on the process where the customer will use the device.

Training here could be arranged as online based training, with material including video clips about the fill of delivery specification and other processes related to the sales men work.

Another way to decrease the amount of changes appearing after the CO is entered into the ERP system is to make an agreement with the customer that the confirmed delivery time is not binding if they make any changes to the order afterwards.

As the connection between the two ERP systems is not working properly, the problem could be partly solved if an application could be added that allows the users to manually update the entire system. Another possibility is to figure out whether the two systems could be integrated.

By standardization a company clearly defines practices and procedures for its employees. Standardization enables groups to easily communicate through the set guidelines in order to maintain focus. The situation could be improved by clearly defining the roles and responsibilities of each person, and the managerial level should also appoint substitute persons for each department, for example in the case of sick leaves. This information should be entered into the intranet so that everyone would be able to see the persons in charge and to contact the right person in each situation. If the case company decides to invest in the TV screens, this information is easily shared through this channel for the employees.

I would recommend the case company to focus more on the opportunities provided by the implementation of the basic 5S principles. I believe an implementation of the Lean would be able to assist the case company to better change management and even to eliminate some of the current problems.

Based on the interviews, the purchase department desires more face-to-face communication with the suppliers as it enhances cross-border communication and familiarizes the suppliers with the purchasers. The case company could consider whether there is room for regular

meetings with the suppliers, not only suppliers located near the case company but also those further away.

As mentioned earlier, the interviews brought up some similarities between the case company and another local unit. First of all, most of the employees think more of the success of the entire corporation than the success of the own department, and in this sense the current situation is good. However, in the future the case company and the entire corporation has to focus more on how to make new employees more committed to the success of the entire corporation than their own department.

The employees recognize a need for standardization in terms of determining who is in charge of what. This information should also reach the employees in other departments. In this respect the employees are missing real time information about functional changes in other departments. The employees also feel the same way about the need for common rules and their implementation.

The employees seem to have similar feelings about the positive sights of the current performance. They feel that assistance is available when needed and that the working atmosphere is great. Based on the research results, the issues mentioned above are part of the corporation culture. Therefore not only the case company but the entire corporation should pay attention to figure out about how they can solve current problems and improve the corporate culture to be more open for information sharing.

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LIST OF APPENDICES

Appendix 1: Interview structure in Finnish

Appendix 2: Change Management; Cancellation

Appendix 3: Change Management; Content or Schedule Change

Appendix 4: Change Management; Item is not Available

HAASTATTELU KYSYMYKSET

Puhuesssa osastoista yleisellä tasolla viitataan ostoon, tuotantoon, logistiikkaan ja lähettämöön.

HAASTATELTAVA

- Haastateltavan tausta
 - työkokemus
 - tämän hetkinen työtehtävä ja osasto

OSASTON TOIMINTA

- Mitkä ovat kyseisen osaston pääasialliset tehtävät?
 - Miten vastuu on jaettu kyseisellä osastolla?
 - vastuiden määrittelyminen (selkeästi/epäselvästi määritelty)
- Koetko että oma osasto tuntee kokonaiskuvan toimitusketjusta (toimittajalta-käyttöönottoon) ja edistät omaa toimintaa sen mukaisesti?
 - tehtävät
 - mitä ongelmia on ketjun tuntemisen kanssa?
 - mitä ongelmia on muutosten hallinnan kanssa?
 - perustelut!
- Ajatteletko omassa toiminnassasi enemmän oman osastosi toimintaa vai koko yrityksen toimintaa?

YHTEISTYÖ MUIDEN OSASTOJEN KANSSA

- Yhteistyö muiden osastojen kanssa
 - Yhteydenpito tapa (puhelin, sähköposti, kasvokkain)
 - Informaation jakaminen (molemin puoleista vai yksipuoleista?)
 - minkä tyyppistä informaatiota on jaettu käytämällä ERPiä?
 - mitkä ovat pääasialliset esteet/ongelmat informaation jakamisessa? (ihmiset ei vastaa maileihin, vaikea tavoittaa työkavereita)
 - Miten informaation kulkua voisi mielestäsi parantaa?
 - miten arvioisit yhteistyön muiden osastojen kanssa?
- Ymmärrätkö mielestäsi toisten osastojen toimintatavat ja oman toimintasi vaikutuksen muihin osastoihin?

ERP-OHJELMA

- Onko ERP mielestäsi hyödynnetty niin hyvin kuin voisi?
 - kyllä
 - ei -> miten sitä voisi mielestäsi paremmin hyödyntää?

MUUTOSTEN ILMENEMINEN JA HALLINTA

- Minkälaisia ulkoisia ja sisäisiä muutoksia yleisimmin esiintyy joilla on vaikutusta toimitusketjun toimintaan?
 - esimerkkejä ulkoisista muutoksista
 - esimerkkejä sisäisistä muutoksista
- Miten muutoksiin voitaisiin mielestäsi ennalta varautua?
- Miten muutoksien vaikutuksia toimintaan voitaisiin mielestäsi vähentää?
 - onko vaihtoehtoisia toimintamalleja, prosesseja?
- Miten osastosi on valmistautunut muutoksiin?
 - tiedätkö miten toiminnan tulisi jatkua muutoksen esiintyessä?
- Onko sinulla parannusehdotuksia muutosten hallintaan?
- Tuleeko mieleesi mitään millä sisäisen toimitusketjun toimintaa voitaisiin tehostaa?

- Mikä on hyvää ja sellaista mitä ei pitäisi muuttaa nykyisissä toimintatavoissa?

LISÄKYSYSMYS OSTOLLE

- Yhteistyö alihankkijoiden kanssa
 - Yhteydenpito tapa (puhelin, sähköposti, kasvokkain)
 - Informaation jakaminen (molemin puoleista vai yksipuoleista?)
 - minkä tyyppistä informaatiota on jaettu käytämällä ERPiä?
 - mitkä ovat pääasialliset esteet/ongelmat informaation jakamisessa? (alihankkija ei vastaa maileihin tai on vaikeasti tavoiteltavissa kun olisi tarvista)
 - Yleisin vastausaika alihankkijan puolelta
 - Miten yhteistyötä alihankkijoiden kanssa mielestäsi voitaisiin parantaa?

LISÄKYSYSMYS LOGISTIIKALLE (tilausten käsittelijät)

- Asiakassuhteet
 - Yhteydenpito tapa (puhelin, sähköposti, kasvokkain)
 - Informaation jakaminen (molemin puoleista vai yksipuoleista?)
 - minkä tyyppistä informaatiota on jaettu käytämällä ERPiä?
 - mitkä ovat pääasialliset esteet/ongelmat informaation jakamisessa? (asiakas ei vastaa maileihin tai on vaikeasti tavoiteltavissa kun olisi tarvista, aikaero, jne.)

Appendix 2: Change management, Cancellation. The appendix has been removed due to the confidentiality agreement with the case company.

Appendix 3: Change Management; Content or Schedule Change. The appendix has been removed due to the confidentiality agreement with the case company.

Appendix 4: Change Management; Item is not Available. The appendix has been removed due to the confidentiality agreement with the case company.