



TAMPERE  
POLYTECHNIC

BUSINESS SCHOOL

FINAL THESIS

Improving internal information flow  
Case: The Case Company

**Leena Nousiainen**

Degree Programme in International Business  
04/2008  
Supervisor: Anasse Bouhlal

TAMPERE 2008



---

Author(s)	Leena Nousiainen
Degree Programme(s)	International Business
Title	Improving internal information flow: Case: The Case Company
Month and year	April 2008
Supervisor	Anasse Bouhla
	<b>Pages:</b> 58

---

#### **ABSTRACT**

Organizational communication and efficient information flow are a crucial part of any organizations operational processes. Without information flows no financial or material flows can exists. Having a well-organized information flow can provide a competitive advantage to a company through reduced costs, improved customer service, and more efficient business processes.

Computer based information systems, such as enterprise resource planning system (ERP), facilitate the information flow. ERP is a software that integrates a company's data and processes into a unified database which contains information from manufacturing, supply chain, financials, customer relationship management, human resources, warehouse management and decision support system. The purpose of an ERP system is enable real-time sharing of information throughout the company and support the company processes.

This thesis was made as a case study to examine the possibilities of improving the internal information flow. The purpose of this thesis is to study the information flow at The Case Company, and find the biggest problems in the flow. The goal is to give a description of the current flow and suggest improvement ideas. The thesis also offers advice to successfully carry out a change process in an organization.

The findings of this thesis point to the favor of changing some of the operational processes to smoothen the workflow in the order-delivery chain and performing some additional customizing of the ERP system so that it can better support the company's activities.

---

<b>Keywords</b>	Organizational communication	Process improvement	ERP
	Change process		

# Table of contents

<b>1</b>	<b>Introduction .....</b>	<b>5</b>
1.1	Background .....	5
1.2	Goals of the thesis.....	6
1.3	Research problems.....	6
1.4	Methods of research.....	7
1.5	Company introduction.....	8
1.5.1	The Case Company Group .....	8
1.5.2	The Case Company .....	8
<b>2</b>	<b>Organizational communication.....</b>	<b>9</b>
2.1	Interpersonal communication.....	9
2.2	Communication flow.....	10
2.3	Style of communication .....	11
2.4	Communication channels .....	11
2.5	Communication levels.....	11
2.6	The cost of poor internal communication.....	12
2.7	Information systems.....	13
2.7.1	Enterprise resource planning system (ERP) .....	13
<b>3</b>	<b>Improving information flow .....</b>	<b>14</b>
3.1	Collecting information.....	15
3.1.1	Business process mapping.....	15
3.2	Evaluation.....	16
3.3	Development tools .....	16
3.4	PDCA model.....	18
<b>4</b>	<b>Improving information systems .....</b>	<b>19</b>
4.1	Customization vs. process re-engineering.....	20
4.2	The requirements for ERP improvement.....	21
<b>5</b>	<b>Managing change.....</b>	<b>22</b>
5.1	Emotions and change.....	22
5.2	The process of change.....	24
<b>6</b>	<b>Current Order-Delivery chain at the Case Company .....</b>	<b>26</b>
6.1	Overall view of the order-delivery chain .....	27
6.2	Export – Order processing.....	28
6.3	Production planning .....	30
6.4	Production .....	31
6.5	Export forwarding .....	33
6.6	Warehouse/transportation .....	35
<b>7</b>	<b>Information flow at The Case Company.....</b>	<b>36</b>
7.1	Current information flow through ERP .....	37
7.2	Current information flow outside ERP.....	38
7.3	Possible future information flow .....	40
<b>8</b>	<b>Internal information flow survey .....</b>	<b>42</b>
8.1	Execution of the survey .....	42
8.2	Survey result analysis .....	43

8.3	Survey conclusions .....	48
<b>9</b>	<b>Future development suggestions .....</b>	<b>49</b>
9.1	Technological development suggestions.....	49
9.2	Operational development suggestions.....	51
<b>10</b>	<b>Conclusion .....</b>	<b>52</b>
<b>11</b>	<b>References.....</b>	<b>54</b>
<b>12</b>	<b>Appendices .....</b>	<b>56</b>
12.1	Appendix A:Internal information flow questionnaire in Finnish ...	56
12.2	Appendix B:Internal information flow questionnaire in English....	58

# 1 Introduction

## 1.1 *Background*

The Case Company has continuously strived to develop the internal operations of the company. Many efforts have been made in order to pin point the needs for development and also to launch development projects within the company. However, most of the development projects have concentrated on developing a small part of the company or a specific action. Although, improvements have been made, the processes must be seen in a wider perspective and the inter-relations between different processes must be taken into better consideration.

The importance of a smooth process chain is emphasized in a company that operates in a make-to-order principle. After an order is received, the customer has been given a promise of a delivery. In addition to the actual product, the customer service is an important part of the company's competitive advantage, since the customers always look for companies that can deliver the right product at a desirable time. By improving the overall processes and reducing the risk for delays or errors, the company's customer service also improves.

However, improving the processes is not only necessary in order to satisfy the needs of the customers, but also improving the job satisfaction of the company employees. When things run smoothly, the employees can concentrate on doing their work in the best possible way, instead of correcting mistakes. Delivering the final product to the customer should be the product of the daily work, not a continuous struggle to meet the demand.

With the development of the information technology, information exchange has been made much easier. Instead of writing things on paper or making phone calls, most of the work related information can be shared through the company enterprise resource planning system (ERP). Nevertheless, even the ERP system has a lot of potential in easing the process management; it is not much more useful than a typewriter if not used correctly.

This thesis concentrates on the communication between the operational processes that constitute the core business and create value. By improving the overall communication flow, the processes could be smoothed and more importantly, the strain caused by the inefficient information flow on the employees would decrease.

## ***1.2 Goals of the thesis***

The purpose of this final thesis is to produce an image of how the information flows internally within the company and find potential ways to improve the efficiency of the information sharing, consequently improving the overall processes. Improving the information flow could have a big impact by reducing mistakes and delays caused by insufficient or erroneous information. The ideal situation would be that the information would always be up-to-date and each employee would have the information available when needed, in a clear form. Each time the information needs to be sought out, it causes delay in the delivery chain.

The company has also a vision of reducing the physical paper flow between departments, in order to decrease the dependency on information that is not available in the ERP system, as well as decrease the possibility for errors cause by misunderstandings or misplacing of the papers. This thesis aims to identify the parts of the processes that are most depended on the non-electronic information flow.

The thesis will cover the internal parts of the company's demand-supply chain, starting from receiving an order from a customer, and ending in shipping the ready goods. This thesis gives a description of the company's operational processes and points out the problems in them concerning the information flow.

## ***1.3 Research problems***

The Case Company is a thriving manufacturing company that has grown rapidly during the recent years. However, the operational way has not changed remarkably during the growth spurt and thus the company management was interested to know, whether some small changes could be made in order to improve the overall performance especially in the export-forwarding department and at the same time throughout the order-delivery chain. After a short period of observation, the biggest problem within the export-forwarding department was recognized to be the inefficiency in the flow of information.

Therefore, through a case study this thesis aims to:

- o Explain the importance of organizational communication concerning operational information
- o Provide an overall image of the information flow
- o Critically examine the efficiency of the information flow
- o Suggest ideas how to improve the information flow

## ***1.4 Methods of research***

The research method used to carry out the thesis is case study. Case study strategy allows the use of both qualitative and quantitative information.

The thesis comprises from information from several sources. Firstly, several managers of the Case Company provided the information about the company and its development: supply chain manager, Process development manager and the materials management and purchasing manager.

The source for the qualitative information and the overall description of the company processes is made based the existing company process descriptions and discussions and observations in different departments within the Case Company. The thesis also includes quantitative material in the form of an internal information flow survey, which was conducted in the departments involved in the demand-supply chain: order processing, production, export forwarding, warehousing/transportation.

The theoretical part comprises of material gathered from different literature dealing with supply chain management, information flow management and process management.

The thesis is divided into four parts. Firstly, there is a theoretical part consisting of organizational communication theory and process improvement theory, which were used as the basis for the thesis. Secondly, there is a short description of the company processes and an analysis of the current information flow. The third part consists of an analysis of the survey results. And lastly, there is a future recommendations part, where solutions for improving the information flow are described

## ***1.5 Company introduction***

### **1.5.1 The Case Company Group**

The Case Company is a part of a company group which manufactures and sells products all over the world.

The Case Company Group employs over 2000 people worldwide.

The estimated turnover for the year 2008 amounts to over 500 million Euros. The key principles for success, according to The Case Company group, are product quality, customer satisfaction, motivated personnel, and innovative R&D.

With the aid of subsidiaries and over 500 distributors, approximately 98% of the production is sold to over 100 countries worldwide.

Within the passed ten years, The Case Company Group has more than tripled its turnover and doubled the amount of employees.

### **1.5.2 The Case Company**

The Case Company is the parent company of the Case Company Group. The Case Company was established in the 1970's and it has evolved to one of the world's leading companies in its field.

## 2 Organizational communication

The classical economics theories suggest that there are four factors of production: labor, raw materials, capital and land. However, in this day and age it is essential to include information as the fifth factor. (bozarth, hanfield, 2005)

The information in a company is used as a basis for decision-making, as well as to execute and control the daily operations. It could be said that neither physical nor monetary flows could be possible without information flows. (bozarth, hanfield, 2005)

### 2.1 *Interpersonal communication*

The process of communication can be defined as “Transferring information and understanding from one person to another.”( Naylor 2002: 149) The purpose of good communication is to ensure that the recipient interprets the information the way it was intended. John Naylor describes the process of communication in the following way:

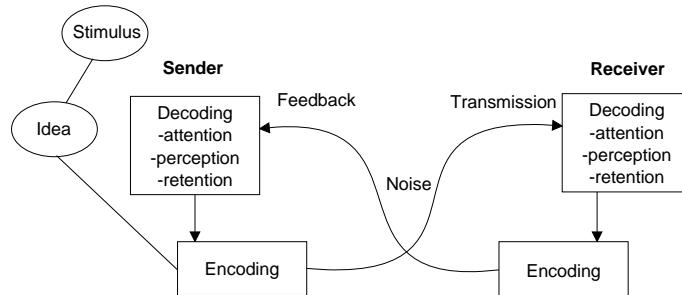


Figure 1. Model of interpersonal communication (Naylor, 2002:149)

Encoding	The process begins with the sender encoding the information to a form which the receiver can understand. The message is sent through the senders chosen medium, which can be for example, a phone call, a meeting or a web page. The media should be chosen based on the type of the message and the desired speed of feedback.
Decoding	The understanding of the message depends on the receivers decoding and perception. In order for the communication to be successful, both the sender and the receiver have to use language that both can understand.
Feedback	The feedback sent by the receiver is usually meant to assure the sender that the message has been correctly decoded, or in other words, correctly understood.

Noise	There can be interference, which can hinder the understanding of the message between the sending and receiving a message and giving and receiving feedback. The interference is called noise, but it does not only include sound interference but also other disturbing influences, such as unfamiliar language, poor transmission technology, poor listening or reading skills or simply negative attitudes towards the sender or message.
-------	---

## 2.2 *Communication flow*

There are numerous ways in which the information can move in an organization. In the classical theories about organizational communication, the most important route for communication is the vertical flow. The vertical flow follows the chain of the company hierarchy, traveling up and down between the supervisors and subordinates. According to the organizational communication theoreticians, most of the organizational communication happens vertically and flows downwards as orders, rules and directives. In this kind of model, there is not much of upwards communication, which means that very little feedback travels from the lower level employees to the higher management. (Miller, 2003)

In today's organizations, the importance of horizontal and free flowing communication flows are increasing. As many of today's companies strive to have a smooth chain of processes, the information needs to travel efficiently between departments and employees in order to facilitate planning, coordinating and managing the processes.

On the contrary to hierarchical structures, the free flowing communication flow encourages the employees of modern organizations to give feedback and suggest ideas to improve the existing processes. (Miller, 2003) The management should be open to development ideas coming from the employees and reward behavior that is beneficial for the whole organization.

### ***2.3 Style of communication***

The style of communication is dependent on the level of hierarchical and bureaucratic attitudes within the organization. In case of top-down communicating organizations, the communication is most likely to be formal and written. In less hierarchical organizations, where the information is allowed to travel horizontally or freely between departments and employees, the tone of the information is usually informal and in most cases verbal. (Miller, 2003)

The formal way of communicating tends to be well established and following the company's operational lines. At the same time it is more planned than the dynamic and complex network of informal communication. Therefore it is the free-flowing informal communication that needs more managing especially if it has a direct impact on the company's operations.

### ***2.4 Communication channels***

In addition to the direction of communication, there are different channels to facilitate communication flow. Information can be communicated, for example, through face-to-face channels, written channels or through mediated channels such as telephone or computer. Traditionally, the written communication would be the most prevalent in the form of rules, regulation and instructions. (Miller, 2003)

However, in today's business operations, the mediated communication has become increasingly important in the form of Enterprise resource management systems. After inputting the data in the system the information flows within the system automatically, and is available for multiple parties to view. The traditional written communication can form a base of instructions for the employees but their daily tasks are controlled and aided by a computer software.

### ***2.5 Communication levels***

In order to satisfy the customers' needs, the employees of an organization need to be working productively. In order to work effectively, people need to communicate effectively. In addition to different directions of information flow, styles and channels, organizations also have communication levels. (Heath, 2006)

- 1) Organization wide communication, involving all employees
- 2) Departmental communication, within a department
- 3) Team communication, within a team or a group
- 4) Individual communication – specific to one employee

The communication between and within the levels is the information that keeps the company running. The trend of the future is to collaborate outside and within an organization and provide visibility to each member of the chain. This can only be achieved by first sharing information inside the organization between the vertical and horizontal levels.

## ***2.6 The cost of poor internal communication***

The possible consequences of poor internal communication can be many and affect firms of any size. Firstly, it can create employee dissatisfaction and contribute to the lowering of work morale. In addition to affecting the employees' attitudes poor communication can result in increased absenteeism and increased employee turnover. The company might easily also lose focus on business objectives if the workforce is not motivated. (Heath, 2006)

Poor communication can also affect the relationship between the employees of an organization. If an employee feels like he/she does not receive enough information in order to perform his/her tasks, the negative feelings derived from it can easily be wrongly directed. Instead of finding flaws in the organization or the system, the employee can mistakenly accuse other people. Personalizing problems can accumulate to the extent where the members of a group, department or an organization lack the confidence, ability or desire to work together. This will ultimately cause the company performance to decline.

A consequence of bad communication is also dissatisfied customers. The reasons can be poor customer service, higher rates product defects or delayed delivery times. (Heath, 2006) For example, by improving the communication between the sales and production, the sales personnel are able to give the customer more accurate or timely information about the delivery dates. Or by offering the production personnel efficient tools to report defects in the raw material, the quality of the end product can be improved. In a modern customer service oriented organization, it is essential that the employees can share information efficiently thus increasing the value of good customer service as a competitive advantage.

## ***2.7 Information systems***

An information system is the system of persons, data records and activities that process the data and information in a given organization, including manual processes or automated processes. Usually the term is used erroneously as a synonym for computer-based information systems, which is only the information technologies component of an information system. (wikipedia)

Before the integrated information systems started to develop, the typical solution for a company was to have many separate software solutions, usually running on different systems. Sharing information between the systems was very complicated, if not impossible. Often, the information also needed to be entered to the systems multiple times in different ways. Enterprise resource planning system (ERP) was developed as solution to combining all the software applications into one system. (Bozarth & Hanfield 2005: 514 -520)

### **2.7.1 Enterprise resource planning system (ERP)**

The development of ERP systems started in the 1960s as inventory management systems that used historical data to forecast inventory demand. The next step in 1970s and 1980 were the Material Requirements Planning (MRP) system and the MRP II which were designed to combine the planning and managing of inventory, with production management. In the 1980s the MRP systems expanded from planning and controlling systems to providing more assistance in meeting the customers' needs by using customer behavior data to plan the production schedules. (Sumner, 2005)

The Enterprise Resource Planning system (ERP) developed in the late 1990s integrating manufacturing and supply chain processes in order to create a seamless information flow from suppliers, through manufacturing to customers. It was a new approach that used one system instead of a collection of separate softwares. The implementation of an ERP system usually requires re-engineering of business processes to reach better functionality with the ERP system. (Sumner: 2005)

The purpose of the ERP system is to join the functions of business transaction processes into one package to enable the automation and integration of business processes by sharing data and producing and processing information. It is an integrated approach to computer-based processing and reporting that unites business functions such as

accounting, finance, sales and operations to use a common database. I, (Sumner, 2005: 3)

Besides the routine decision-making and executing and controlling operations, the ERP can also support the higher level planning and decision-making. Extracting data from the system can provide valuable information about the company's operations. (Bozarth & Hanfield 2005: 514 - 520)

#### Benefits of ERP

The 2007 ERP in Manufacturing Benchmark Report, states that ERP is a strategic tool to streamline and automate processes in order to improve efficiencies.

The benefit of ERP systems is that the information can be seamlessly shared between different business functions in real time and some of the processes can be automated. In addition to integration and automation, ERP systems enhance the speed and accuracy of the information while reducing transaction costs. The ERP is also an important source where information can be extracted in order to monitor the processes and to aid in decision-making. The ideal situation would be that the data would only be entered once, into a common database, shared by all applications. (Heizer & Render 2005: 430 - 434)

Companies with well planned and well functioning ERP systems are more likely to, for example, anticipate exceptions, have higher manufacturing schedule compliance, lower inventories, shorter throughput time and improved overall productivity.

#### Disadvantages of ERP

Unfortunately ERP systems are very expensive to purchase, and they are also not easy to manage. Customizing and implementing the system can prove to be a long and costly process, where many of the organization's processes need to be changed. The system can also require constant improvement processes that may never be completed. In addition, the system needs people with expertise to manage it. (Heizer & Render 2005: 430 - 434)

## 3 Improving information flow

In order to find ways how to improve the internal information flow of an organization, it is crucial to first understand what information is needed and how does it support a particular process. By identifying the need for information, one can also discover the possible failures in the flow. (bozarth & hanfield 2005: 514 - 520) In many cases, information flows should be managed in similar ways

as material flows. If the production doesn't have enough material it cannot operate, or if excess products are produced it is not well managed. The same principle can be applied to information as well.

The way the information flows is usually much dependent on how the business processes are designed. The flow can be a part of the process supporting other tasks or it can be the enabler of the whole chain of events. Therefore the improvement of information flow should be examined from the point of view of business process improvement. Changing the process in order to improve the flow or changing the flow to improve the process, both require the understanding of the business process as well as the understanding of the information flow.

Organizational communication surveys can aid in determining how the communication systems and practices are contributing in regards to the business performance. Communications affect every aspect of the business process, and therefore it is crucial to have a well-designed business communication system. (Heath, 2006)

### ***3.1 Collecting information***

#### **3.1.1 Business process mapping**

Being able to meet the changing customer wishes requires constant development and reassessing of business processes. Improving a business process should begin with understanding the processes. The best way to do this is to make a graphical representation of the activities and relationships, known as mapping. The advantage of mapping is that it gives a full image of the process: its activities, results and performers. It also defines the scope of the process and provides a description to which the impacts of possible improvements can be seen on. (Bozarth & Hanfield 2005: 45-54)

There are different kinds of maps: relationship maps and process maps. The relationship map provides an image of how the organizational entities are connected together with either through physical, informational or monetary flows. A process map identifies the specific activities required to create the informational, physical or monetary flow of a process. Before creating the detailed process maps, one should first identify the focus point of the map and the boundaries of the process. (Bozarth & Hanfield 2005: 45-54)

The process map is a good way to see the how the information should flow between processes. One process' output should

automatically be another's input. The information should travel in a controlled manner without passing through too many mediators, or flowing from too many channels. Figures 8 and 9 in chapter 7 provide a map of the information flow at The Case Company.

### ***3.2 Evaluation***

Evaluating the information flow should start from envisioning of how the flow should look like. The “introduction to operations and supply chain management” by Bozarth and Hanfield, suggests that there are five dimensions that should usually be evaluated.

- 1) Accuracy
- 2) Timeliness
- 3) Reliability
- 4) Form and detail
- 5) Availability

The first dimension, accuracy, means that the information should be 100% accurate in order to be useful in the planning and execution of business processes. Timeliness means that the information should be delivered without delay. Reliability is about how dependable the information flow is. Information should not be lost in the process or influenced by unexpected interruptions. The fourth dimension, form and detail, means that the information should be in a correct form to fill the need at hand. Lastly, even if the information would meet all the other four requirements, it is not of any use unless it is available for the people who require it. (Bozarth & Hanfield 2005: 514 - 520

The process mapping and formulating process descriptions will automatically give insight to what kind of information is needed. The evaluation of the information can be done through measuring the quality of the information from an information system. For example, in order to obtain an image of the reliability of the information, a calculation of how many delivery dates were accurately estimated per month, could be performed. Another way to measure the quality of the information is to ask the people who are dealing with the information everyday. The best way to collect that information would be in the form of a survey or an interview.

### ***3.3 Development tools***

The use of continuous improvement techniques, such as root cause analysis, can provide useful tools in determining the causes for the problems with the information flow. Together with the process map,

surveys and interviews this kind of tools aid in pinpointing the possible reasons for operational problems, and with structured analyses and data gathering the problems can be traced to their root causes.

### Root cause analysis

The purpose of the root cause analysis is to fill the gap between the problem and the proposal for a solution to the problem. The analysis begins by deciding on an effect that should be examined, such as late deliveries, and then continues by categorizing possible causes for the effect. These categories are often known as the five Ms: manpower, methods, materials, machines, and measurements. However the categories should always be adjusted according to the case. (Bozarth & Handfield 2005: 82-86)

The figure 2 represents the root cause analysis of a late delivery at the Case Company, seen from an export-forwarders point of view. The categories are adjusted to fit the case in question and the causes mentioned are the ones most often referred to in the export-forwarding department as reasons of late delivery. The end of the horizontal line is the cause and the horizontal lines represent the reasons for it.

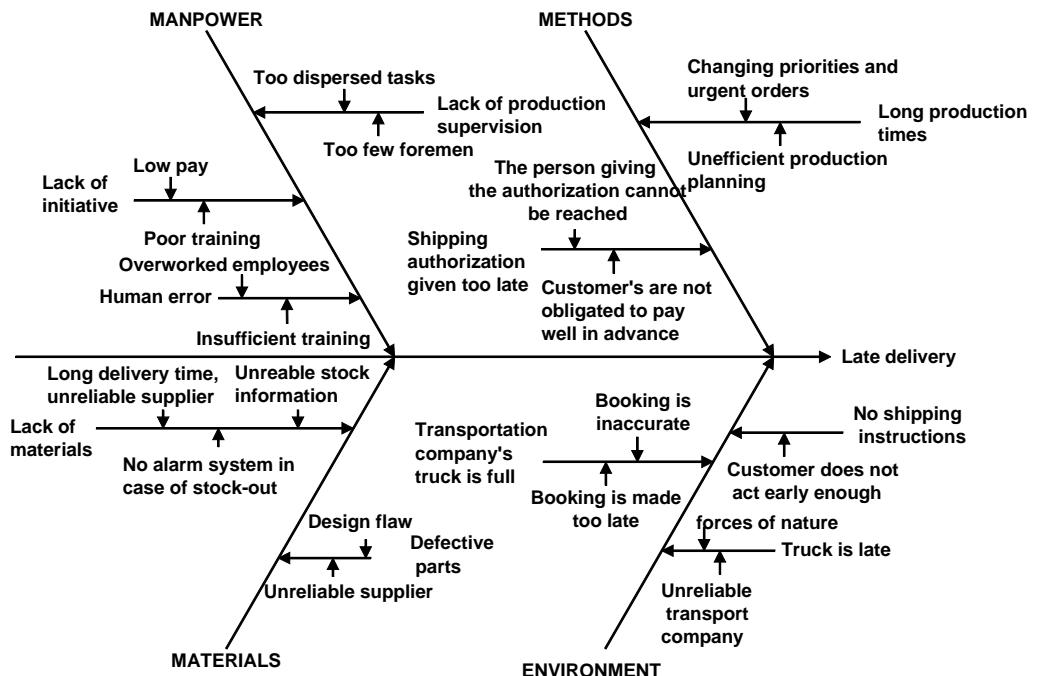


Figure 2. Root cause analysis of The Case Company's late deliveries

As can be seen from figure 2, the reasons for late deliveries can be many. From this analysis, the causes can be researched one by one, and possible solutions can be brainstormed.

### **3.4 PDCA model**

The PDCA model, which is also known as the Deming cycle, is a useful model when planning of process improvement or change. The essence of the model is to examine the process in relation to other processes and thrive for continuous improvement. The model is based on measuring the efficiency of the process from the point of view of the related interest groups and especially the customer. The process development concentrates on improving the process itself as well as its overall efficiency. (Laamanen 2001: 210 )

The essence of process improvement is measuring the process. May it be analyses of throughput time, cost, errors, or customer feedback, the process improvement process aims to find the crucial points that need to be influenced in order to improve the overall efficiency of the process. (Laamanen 2001: 210 ) The PDCA model offers a structure on how to organize an improvement process and how the impacts should be planned, tested, implemented and evaluated.

The first quarter of the PDCA model means establishing objectives and planning necessary processes in order to achieve the wanted results.

The second quarter means implementing the process improvement in a small scale in order to test the impact of the planned improvement.

The third step is to monitor and evaluate the achieved results in comparison to the objectives of the improvement process.

The last quarter means taking action according to what was learned. In case the test proved to be successful the change can be carried out in full scale and the improvement can be internalized in the organization. The fourth step also means evaluating how the process was carried out and how it could be used in future improvement projects. If the evaluation of the test part did not lead to desired outcome, the cycle needs to be started again from the beginning

1 Plan – setting goals  
What needs to be achieved?  
What kind of change is wanted?  
What information is needed?  
Decide how to use the information

2. Do  
Test the planned change  
Actualize the change in a limited scale

3. Check  
Observe changes and improvements  
according to test results.

4. Act  
Carry out the change process.  
Examine results  
What was learned and what conclusions can be made.

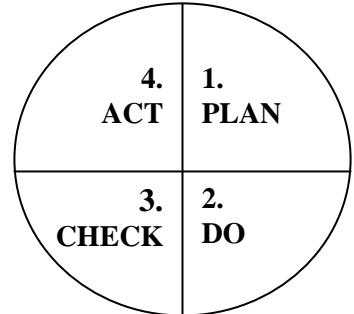


Figure 3: PDCA model  
(Deming, 1986)

The PDCA model can be used as a change model in different situations, for example:

- as a model for continuous improvement
- as a plan when starting a new improvement project
- as a guideline in developing a new or improved process, product or service
- when implementing any change

## 4 Improving information systems

Since in most modern organizations the process is controlled and managed with computers and the information required is passed on through an information system, most likely an enterprise resource planning system (ERP), the natural choice for a solution would be to study the current system and examine whether it could be improved. Changing the ERP system to better match the needs of the organization could improve or automate the processes, thus improving the flow of information. An easier option to fully customizing the system would be to check whether there are upgrades available for the system that would provide solutions directly. Upgrading would be the best choice since finding, testing and implementing a new system will most likely prove to be too time consuming and costly.

In case changing the system itself would not provide solutions to improving the company's operations, the management needs to examine whether the processes of the organization need to be changed

According to Peter Aiken from the Institute for Data Research examining the current system will lead to four choices:

- 1) Modify the ERP to match better the organizational structures and/or processes.
- 2) Modify the organizational structures and/or processes to match the ERP.
- 3) Make some modifications based on alternatives 1 and 2.
- 4) Ignore the problem.

## ***4.1 Customization vs. process re-engineering***

According to Mary Sumner in her book “Enterprise resource planning” (2005), there are two dominant alternatives to improving the current ERP system. The choices are to either modify the ERP through customization or modify the business processes through re-engineering.

### Customization

Customization means adapting the information system to function according to the existing business processes. The benefits of customization are:

- it preserves the current unique processes and supports the current strategic processes.
- it provides a greater flexibility and sets no boundaries to the system design
- it creates a unique system that no one else has, thus it can provide extended competitive advantage

The disadvantages of customization are:

- the costs of customization are high
- it may involve lengthy system development activities
- as a unique system, it may not be as well supported by the provider as standardized systems

## Re-engineering

Re-engineering means the rethinking and redesigning of business processes to achieve improvements of performance. When talking about ERP systems, the re-engineering means changing the business processes to match the implemented system. The benefits of re-engineering are:

- the ERP supports the transition from unique processes to industry best practices
- the software is available and ready to implement
- implementation is less costly than customization

The disadvantages of re-engineering are:

- big organizational changes can disrupt the operations of the company
- the evolution is dependent on the software providers' upgrades
- the design is limited to support the best practice business models

When choosing the best alternative for organizational development the management needs to make a strategic decision about whether to follow the industry standards or create a unique way of working. The pros and cons of both alternatives need to be equally examined and the costs and possible return on investment weighted carefully.

## **4.2 *The requirements for ERP improvement***

Before the actual changes or improvements can be made in the system or the organization, the company needs to have a group of people with the necessary skills and dedication to improve the system or the business processes. The project also needs to have an experienced project manager and enough influential power to design and approve the planned changes.

The ERP planning process starts by having a clear image of the organization's vision and objectives and slowly develops into concrete ideas. An important factor of change management should also be taken into account since changing the ERP will most likely trigger a cultural change in the company. Efficient communication and training will be needed to facilitate the technical change. And lastly, the project needs to have sufficient financial resources and a realistic timetable to succeed.

## 5 Managing change

In an organization the changes take place through structural changes. Some of them can be easily implemented and welcomed; some might be seen as forced and difficult. A major part of a change is always the people involved in the process. Each individual and group affected experience the change in a different way.

### 5.1 *Emotions and change*

Understanding the whole process and the phenomena related to the change is essential in motivating people to commit to the change. People tend to first react to change emotionally, rather than rationally. Sometimes the change is considered as positive (figure 4) and sometimes negative (figure 5) After the need for a change is recognized, people are likely to go through different emotional phases.

The beginning of a change process is the acknowledgement that change is needed. The second phase depends on the complexity of the change and the individuals involved in, and it can include stress concerning how the changes affect the individual and what kind of risks does the change bring. In a positive change process, the people involved are quick to start looking for the different alternatives and possible solutions on how to carry out the change. After some solutions have been presented, the decision of the best solution is made. However, very often, the decision has been made on emotional basis and the rationale arguments for the solution are being generated later. In the third phase of the process the chosen solution is tested and evaluated and lastly it is practiced and eventually accepted as a new way of doing things. (Laamanen 2001)

## Positive change

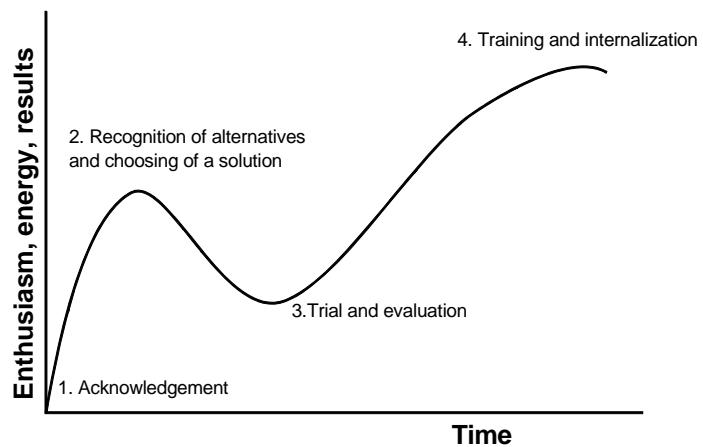


Figure 4: Laamanen 2001

In addition to the four steps of positive individual change process, the negative change figure also includes phases of shock, denial and acceptance of reality. These are phases that an individual must go through, in case the change taking place is perceived to be negative or difficult. However, after need for change has been acknowledged or the reality has been accepted the change can continue as it does in the positive pattern.

Because of the emotional factor involved, it is important that the management of an organization can present valid arguments in favor of the suggested changes right from the start. The employees tend to feel more comfortable with the familiar ways of working or they can be affected success or failure of previous development projects. Presenting reasonable arguments can prevent the employees from reacting to the changes only based on their emotions, and steer the decision making towards rationale solutions.

## Negative change

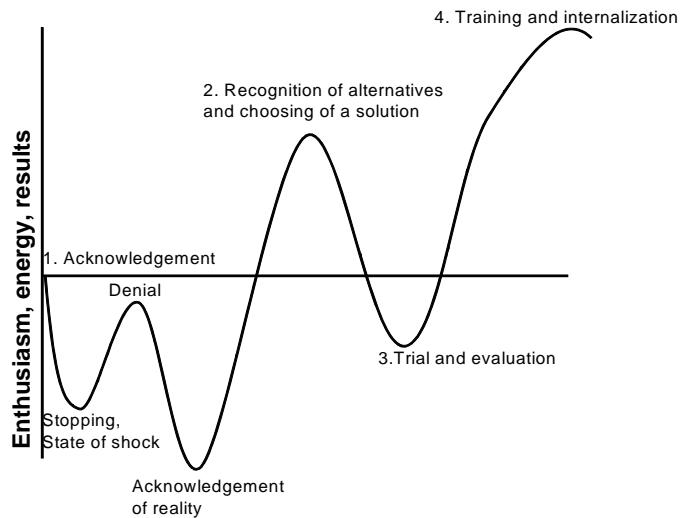


Figure 5: Laamanen 2001

## 5.2 *The process of change*

Even though the process of change is different in each organization and it cannot completely be planned far ahead, there are certain phases through which the change takes place. Kai Laamanen has divided the process of change into seven phases, which can help to lead an organization through the change process. (Laamanen 2001)

### 1) Recognising

The first step requires that the need or possibility for a change is recognized and the people who have influence in making a difference agree on the usefulness of the change. The challenges of initiating change includes overcoming the denial of the need for change or changing the belief that the current situation is only temporary and therefore will correct itself eventually. Recognition of the causes and consequences of the change and clarifying the advantages and disadvantages is the first step towards change. Acknowledging problems creates the will for change and facilitates the creation of the preliminary vision for a solution.

### 2) Visioning

The second phase of the change process should comprise of the creation of a change plan and the vision of the desired situation. The aim is to identify key factors, which affect the success of the change process. The challenges of this phase can be the passive attitudes of the participants' or the belief that the situation will

change for the better on its own. Peoples' attitudes may have been influenced by previous projects, which can hinder any productive thinking later on. Overcoming the emotional factors, assigning responsibility for key people and giving resources for the change process is the first step of creating an action plan, timetable and goals for the change. In consequence, the process gets an official status and the belief for the success of change is enhanced.

### 3) Energising

The third phase of the change process should be the time when all the people involved in the change fully understand the necessity of the change and the possibilities involved in. As a consequence they will see how the change will affect them, and they can express their ideas and concerns in regards to the process. The purpose is to clarify the personal advantage, which each individual will achieve from the change and communicate about the change in a way that everyone can understand. This phase should convince people that even if the old system seems like a safe alternative, the future looks even better. After the plan has been shared, it is important to recognize and involve the people that need to be most influential in the first steps of the process. As a result, all the people affected will know how the change will change their lives and they will be positively engaged in the process.

### 4) Testing

After the planning, the solutions need to be tested before actually carrying them out. Testing should involve the people most vital for the practical side of the change process. It could be the testing of a first version of computer software, or a discussion how a new business process would work. The purpose of the testing is to see how the desired change would function in reality and it is meant to aid in the planning and starting of smaller projects through which the whole process of change is eventually carried out. A smaller project can include, for example, process mapping. The challenge of this phase is to move from planning to actions.

When the smaller projects have been planned it is time to choose the people and assign time and resources to carry out the projects. Reporting, evaluation and communication about the project results are very important, since the plan should still be flexible enough to take changes along the way.

### 5) Implementing

The idea of the fifth phase is to create the basis for the change to take place in a larger scale. It means reconstructing the current system to facilitate the change in the ways of working and training the people so that they are able to find their roles in a new situation. It is important that people would see the new model as an improvement compared to the old, and would be motivated to keep the change process going. The management should show an example by clearly and consistently operating according to the new ways.

### 6) Rooting

After implementing the planned changes it is time to measure the performance of the organization, reward people for their work and keep them from falling to old patterns. The key is to maintain the atmosphere of positive change by constantly asking for feedback and setting new goals. The success off the change is measured when the organization is hit by a crisis for the first time. The changes are likely to become permanent if the employees can handle the crisis without returning to their old ways of working. The permanency of the change can also be measured through auditing and constant supervision of the performance and results.

### 7) Renewal

Evaluating the process of change provides valuable information how to realize changes faster and more efficiently in the future. Although the projects enabling the change may have been a success, one must not forget that the surroundings and competitive environment changes and the blueprints used for the previous change process might not work as well for the future projects.

## 6 Current Order-Delivery chain at the Case Company

The Case Company's order-delivery process will be examined in the next chapter through the IDEF0 mapping standard, developed by the US Department of Defense. The IDEF0 model was originally used as a software development tool, but is now widely accepted as a general process-mapping tool in manufacturing and service organizations. (Peppard & Rowland 1995)

The mapping in this thesis concentrates mainly in identifying all the information needed and produced during each process of the order-

delivery chain. The process is first shortly described and then the information needed for the process is listed in detail.

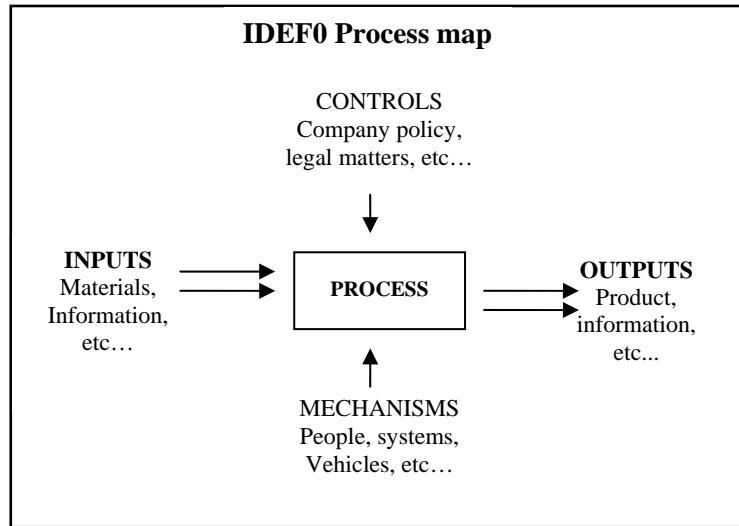


Figure 6: IDEF0 Process map (Peppard & Rowland 1995: 173)

After the process description and the input-output details, there is a general description of the problems with the process, compiled based on observations and discussions with the employees at The Case Company. The information flow between the departments is described in chapter 7.

## *6.1 Overall view of the order-delivery chain*

The order-delivery chain begins when a sales assistant receives an order from a customer and inputs it in the system. The order is then passed on to production and to the export-forwarding department. After an export-forwarder receives the order confirmation, the responsibility of monitoring and making sure that the customer receives the order on time is passed to the export-forwarding department. Last part of the chain is the transport and warehousing department which makes sure that the goods ordered are delivered or made available for the transportation companies.

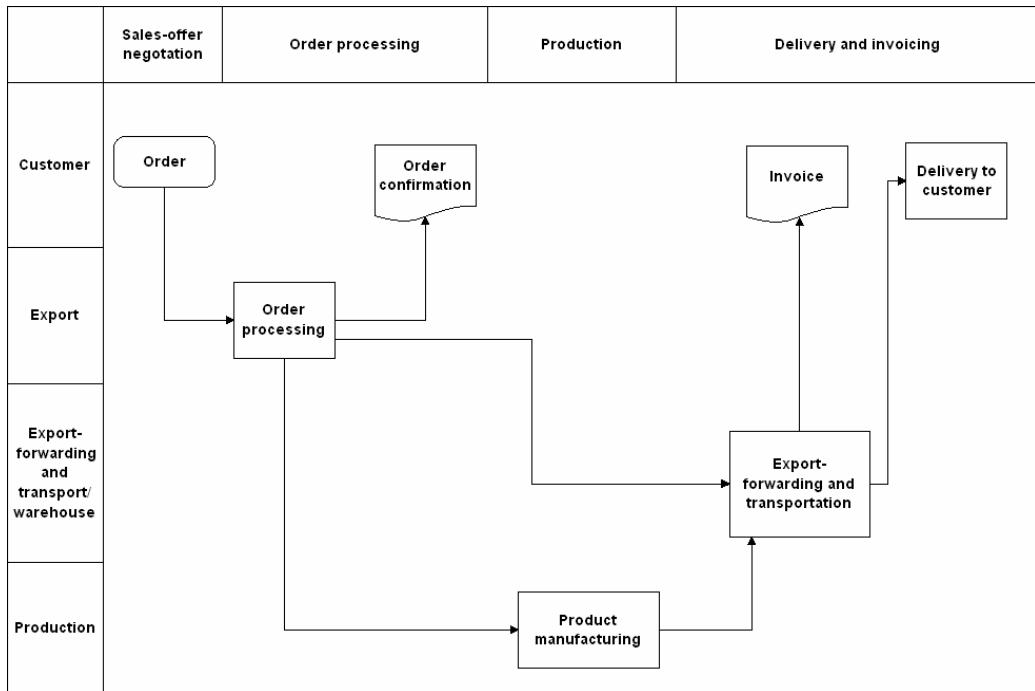


Figure 7: Order-delivery process, The Case Company quality guide

## 6.2 Export – Order processing

### Current process

A customer can submit an order to The Case Company's sales assistants either by phone, fax or email. The basic information of each customer, such contact information, delivery address, payment terms, have already been saved in the ERP system, and only small modifications are usually needed.

The order is first checked and then the sales assistant either inputs the order in the system as such, or uses a configurator to create a structure for the ordered equipment. The configurator aids the assistant to create a product specifically for the customers needs, and prevents the assistant from combining incompatible parts. After the equipment specifications have been set, the assistant checks the production capacity for the next weeks from the ERP. The work order is then placed for the first week that still has not reached the full capacity amount of the production. After checking a suitable week the assistant transfers the work order to the production.

After transferring the order to production, the assistant prints out an order confirmation, sends it to the customer and sets it aside to wait for the delivery week to come.

In the end of each week, the assistant goes through all the orders and changes the status of the order from "confirmed" to "available for

“delivery”. In case the customer has exceeded a given credit limit, the system automatically issues a notification. In order to release the order, the customer has to make a payment for the previous orders or be given a special permission from the Case Company management. After the orders have been given a shipping authorization the assistant passes the order confirmation document to the export-forwarding department.

**Controls:**

Company protocol (toimintaohje)  
Credit limits

**Input:**

Customer order: products,  
specifications  
Desired delivery time  
Desired delivery mode

**Information needed:**

Stock information: Available stock  
Production information: production  
schedule, factory delivery date,  
production problems, lacking parts,  
Production capacity

Pricing information: Pricelist,  
campaign prices, freight cost

Customer information: Delivery  
address, installation date, payment  
terms

Credit information: Credit limit, Credit  
release, payment information,

Transportation information: Available  
transportation, transportation schedule,

**Mechanisms:**

ERP-order processing, email, phone

**Output:**

Order confirmation  
Work-order (to manufacturing)

**Information given:**

Production information: product  
specifications, desired delivery date,  
lacking parts

Transportation information:  
transportation mode, delivery time,  
delivery address, who pays the freight  
charges

Credit information:  
Estimated payment date

## Problems with information flow

The main problems with the order processing are related to the interaction between the sales assistant and the customer. There are no clear order policies that the customers should follow and therefore the customers often send incomplete or unclear information, which the sales assistants have to interpret and clarify. The customers can expect an order to be delivered in a certain date, even though they have not even given all the product specifications. This creates a big factor of uncertainty in the production planning,

when the manufacturing needs to be planned without knowing the final specifications.

Another problem with the information coming from the customer deals with the payments. In case a customer exceeds the given credit limit, the ERP system issues a warning and the sales assistant cannot proceed with the processing of the order until the customer has made a payment for the outstanding invoices and the assistant has received an authorization from the financial department or higher management to ship the goods. The authorization can sometimes take time from hours to days and it can come in a very late point of time considering that the export-forwarding department also needs time to prepare the shipment.

Problems with the production can emerge from the unreliable production planning. The confirmed delivery dates may not be accurate, but the information about the changing of the estimated factory delivery date is not passed on to the sales assistants. In most cases the sales assistants are not aware of any delays until the on shipping day when they are informed by the export-forwarding department. Consequently, the customer may have arranged an installation date according to the promised delivery and is not happy to receive bad news in such a late point of time.

### ***6.3 Production planning***

#### **Current process**

The production planning begins when a sales assistant releases the product structure in the ERP and it becomes visible for the production. The production planner uses the ERP to calculate the capacity of the production based on specific parameters and to check the amount of orders planned for each week. Then he assigns the work (työ) on a certain week and prints out a work card (työkortti) that triggers the manufacturing process.

The production planner also estimates the delivery times for each product, and gives them to the sales assistants. The product delivery time is determined based on the production load, meaning that a product's delivery time will be set to a week which has not yet been planned to reach full production capacity.

The process of production planning is very dependent on the experience and knowledge of the production planner, since most of the schedules need to be done based on estimates, instead of hard facts. The production-planning tool doesn't fully support the

planning either because it cannot recognize the difference between the production times of different products.

<b>Controls:</b> Company protocol (toimintaohje)	<b>Mechanisms:</b> ERP- work balancer,
<b>Inputs</b> Product specifications	<b>Output:</b> Work card (työkortti)
<b>Information needed:</b> Production information: product specification, ordered parts, desired delivery date, capacity load/restrictions/changes	<b>Information given:</b> Production information: capacity load/restrictions/changes Factory delivery dates, lacking parts, production delays,

### Problems with the process and information flow

The production planning process suffers not only from insufficient information flow but also from having inadequate production planning tool for the multitude of products. The planning software does not allow scheduling the production differently for each item, but gives the same estimated production time for each product.

Another problem arises from the incomplete or late orders being given to production by the sales assistants. The production planner cannot clearly assign capacity for products that are ordered but not yet fully specified. Some of the orders also come late, which can confuse the already made schedule.

The production planner also does not know the precise time when a product has to be completed. Therefore the production may finish a product, which needs to be completed on Friday at 2pm before a product that is needed on Thursday at 12pm.

## 6.4 *Production*

### Current process

Once a work (työ) has been scheduled by the production planning, the department foreman/production planner prints out a work card (työkortti) which indicates the specifications of what needs to be manufactured or collected. The work card travels with the product through the production.

The production process is divided into phases, such as assembly, testing and packaging, depending on the amount of steps needed to produce the product in question. After completing each phase, the production workers sign the phase completed and transfer the product to wait for the next phase.

After the product is finished it is taken to packing department, which packs, measures and weights the package and inputs the measures into the ERP. After the product is packed the product is signed as complete in the ERP.

**Controls:**

Company protocol (toimintaohje)  
Quality control, Eu-directives, national-  
and international quality directives

**Inputs**

Work card (työkortti)

**Information needed:**

Production information:  
Product specification(destination  
country), Delivery dates, delivery time  
Problems with  
assembling/testing/packing/

Stock information: availability of parts

**Mechanisms:**

ERP – work balancer & production.  
Production machines and tools

**Outputs**

Ready product, Packaged parts

**Information given:**

Production information: completion  
information, lacking parts, delivery  
delays, production problems,

Stock information: stock-out

Problems with the process and information flow

The problem with the production is that it operates according to the production planner's instructions. Since the instructions are not accurate enough to plan the production on hourly basis, the production also operates inefficiently.

The production personnel are also lacking a well-organized system for reporting or production problems or stock outs. It seems that usually no action is taken in case a product cannot be finished and therefore the problems are not communicated to other departments either.

## ***6.5 Export forwarding***

### **Current process**

When the export-forwarder receives an order, he/she checks the requested mode of transportation and delivery date. The export-forwarder also then reads any instructions related to the shipment and checks whether the transportation suggested is the best alternative for the case. After reviewing the case the forwarder checks the progress of the order from the ERP system and plans a suitable shipping date according to the estimated factory delivery date and the selected transport company's schedule. Then the export forwarder prints out the order view, which functions as a pick list, from the ERP and takes it to the warehouse with information about the transportation time and company, and whether the products in question need to be delivered to the transport company's terminal or whether the transport company will pick them up themselves.

In case the order's delivery date is near, and the production has not completed the product, the export-forwarder sends an enquiry to the production in order to find out whether the product will be completed in time for the transportation. In case the production is working on several products of the same kind, the export forwarder gives a priority recommendation to the production. Enquiries about the order will be sent again and again until it is confirmed whether the product can be shipped or not.

After the production has completed the order, the export-forwarder creates a delivery by choosing product lines from selected orders and creating virtual packages in order to have the measurements on the shipping documents and detailed information on the address labels. Most products have been packed to a standard size box, and the export forwarder can check the measurements from a checklist. For the non-standard boxes, the production writes down the measurements in the ERP system when the product is packed.

After creating the delivery and assigning the products into boxes, the export-forwarder prepares all the documents needed for the shipment, such as packing lists and waybills. Then he/she prints out the address labels and delivers the documents to the warehouse.

<b>Controls:</b> Company protocol (toimintaohje) Export regulations, customs regulations, international trade rules, Eu-regulations, customer instructions	<b>Mechanisms</b> ERP- delivery, invoicing
<b>Inputs:</b> Order confirmation Shipping instructions Letters of credit	<b>Outputs:</b> Pick list, Stickers Packing list Shipping documents (certificates) Customs papers, Invoices
<b>Information needed:</b> Customer information: Shipping address, invoicing address, Payment terms,	<b>Information given:</b> Order information: What items to pick, changes in orders, cancellations,
Order information: Ordered products, Invoice total	Transportation information: name of transport company, time of delivery, time of pick-up, change of delivery date Shipping information to customer
Production information: factory delivery date, production delays, lacking parts, package measurements	Production information: Priority list, Rush-request
Transportation information: Shipping date, Shipping mode, Delivery term, Transportation company, Expenses charged or not, Special instructions for shipping, Packing marks, required shipping documents	

## Problems with the process and information flow

The biggest problem in export-forwarding is, that the responsibility for almost the whole order-delivery chain has been pushed to that department. After receiving the order confirmation, the supervision of completion and arranging the suitable transportation is an export-forwarder's responsibility.

If the export forwarder does not receive information about how and when to ship orders, or if there are delays in production, the export forwarder has to use a great deal of his/her working time in finding out these issues. This can limit the available time used on the actual export forwarding tasks and can cause mistakes in the transport arrangements, thus worsen the company's customer service.

## **6.6 Warehouse/transportation**

### **Current process**

The warehouse starts the week by planning the transportation schedule based on the pick lists sent by the export-forwarding department. After the schedule has been made the warehouse workers plan how to place all the ready packages in the warehouse. The planning is done based on the transport company used and the destination country of the packages. The purpose is to arrange the packages so that they are easy to load to different trucks on different days.

After the planning, the warehousemen start to collect the packages from the production facilities and bringing them to the warehouse. After all the products of an order have been completed and the export-forwarder has delivered the transportation documents, the warehousemen stick the address labels on the packages and count that the amount matches the amount on the documents.

In case of discrepancies such as mismatch in the amount or size of packages, the warehouse workers contact the export-forwarding department, to find out what has caused the discrepancy and in order to correct it. The warehouse workers also contact the export-forwarding in case some parts did not arrive from the supplier as expected.

**Controls:**

Company protocol (toimintaohje)

**Mechanisms:**

Blackboard, trucks

**Input:**

Picking list, Stickers  
Waybill, Shipping documents

**Output**

Signed waybill

**Information needed:**

Order information: What to pick

Production information: Production schedule, production delays

Transport information: name of transport company, time of delivery, time of pick-up, change of delivery date, what documents go with the goods

**Information given:**

Stock information: whether goods arrived from supplier, if package is not found from warehouse, discrepancies with amount or size of packages

Production information: If goods were or were not completed by on time by production.

Transportation information:  
Calculations for container loads,  
Time of pick-up

## Problems with the process

The warehouse does not have a reliable system to check which orders are leaving on a specific day. The planning requires a trustworthy overview of the products being shipped during one week. The pick slips are unreliable and cannot be updated automatically. The warehouse workers are highly dependent on instructions coming from the export forwarding through phone or on paper.

## 7 Information flow at The Case Company

In order to deliver the products, which a customer has ordered, the different departments at the Case Company have to constantly share information related to the order. Based on discussions with the employees and observing the operations of the Case Company, the following pattern in the information flow can be recognized.

The basic information, such as customer information, order information or how and when the order has been shipped, can be found from the ERP system. However, the flow of information between departments through ERP is not always sufficient to support the order delivery and the overall flow is not as clear, controlled or fast as required. The figure 8 displays the flow of information between departments through ERP.

## 7.1 Current information flow through ERP

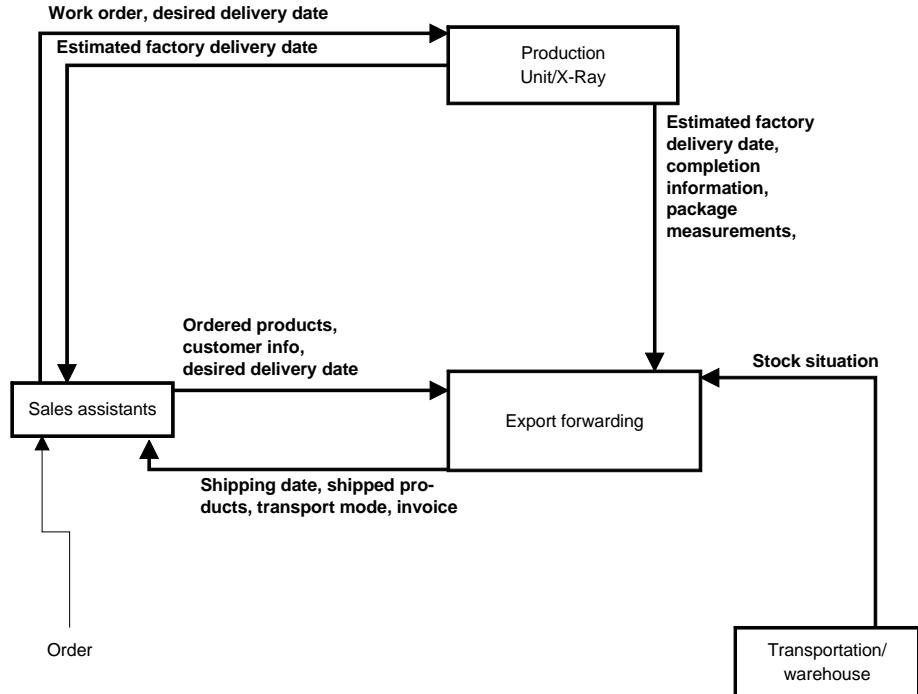


Figure 8: current information flow through ERP

The figure 8 shows the where certain information originates from and where it is going. The first input to the system is an order, placed by a customer to the sales assistants. After the sales assistants input the order in the ERP, the order information is shared with the production, in the form of product specifications, and with the export forwarding as shipping instructions. The production information is then shared between the production and the export forwarding, while the warehouse inputs stock information about ready-made products that arrive from suppliers.

As can be seen from the figure 8, the flow of information on ERP is not sufficient to support the whole process of delivering an order. There is no two-way communication between export-forwarding and production nor between export-forwarding and the warehouse. Consequently, the communication between these departments happens outside the system.

In case the process of inputting an order, manufacturing it and shipping the products happens as planned, the process can proceed fairly smoothly. However, since the information shared through ERP is not sufficient, and it does not clearly show in case changes have been made in the information that has been input before, many

supporting activities have to happen. The system does not support warning systems nor exception notices, so the employees are dependent on each other to communicate issues of that nature.

## 7.2 Current information flow outside ERP

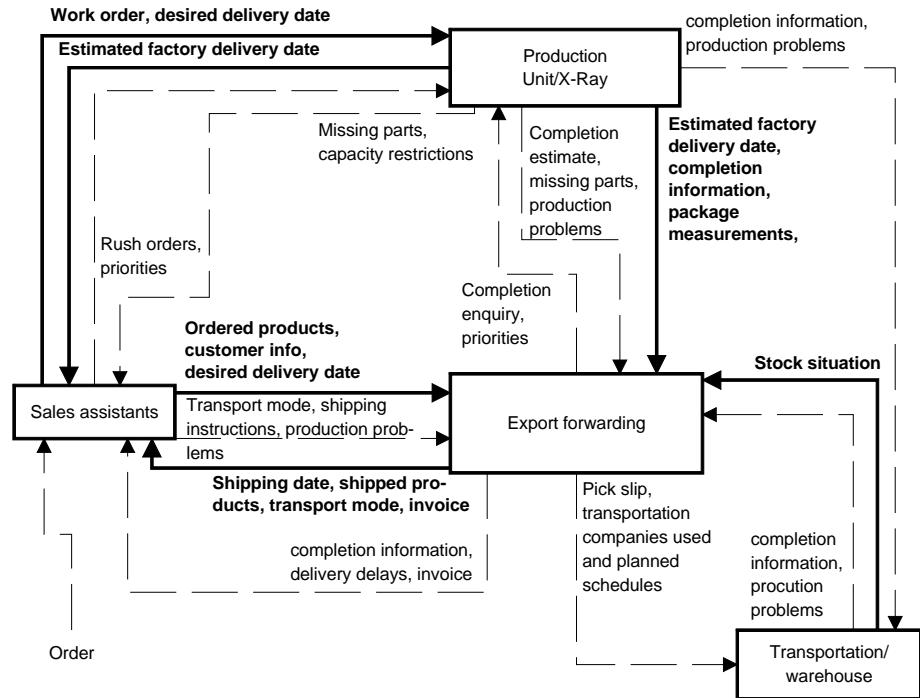


Figure 9: Current information flow outside ERP

The figure 9 shows the information flowing in ERP as well as the information outside the ERP. As can be interpreted from the picture, a great deal of the everyday information, information specifying the existing information or information signifying changes or exceptions needs to be delivered from outside the system.

Although the company has a modern information system at use, the information in some cases is traveling in a fairly old-fashioned way. For example, an export-forwarder very often receives an order confirmation, which has specific information concerning the order or shipping instructions written on it by hand, but this extra information cannot be found from the ERP system. Consequently, if the handwriting is unclear or the papers are misplaced, the information is lost.

Another clear case of inefficient ERP usage is the pick slip. There are no pick slips per se, but the picking information is given from export forwarding to the warehouse on a printout from the system. The export forwarder checks the order and prints out a selection of lines from the order, which the export forwarder assumes to be packed separately. Then the export forwarder writes the name of the transport company and the delivery/pick up time by hand on the paper. Again, if the paper is unclear or lost, the information does not reach the target.

Since even the basic information in the ERP is not always sufficient or up-to-date it is clarified or complemented through using other methods, such as emails, phone calls or paper notes. For example, the orders are visible to production, but the priority of orders leaving on the same day does not show. Therefore it needs to be clarified, based on the outside transport companies' schedules, through phoning or emailing. Similarly, the ERP shows that a product has not been completed by the production on time, but it does not show why it was not completed. As a result, it needs to be asked from the production by phone or email.

As a consequence of the system not being able to support detailed information, exception based messages, warnings or quick responsiveness to changes; the information has found other channels to flow from. For example, the information about a delay in the completion of products can reach the export-forwarding department from four different sources.

- o Firstly, the estimated factory delivery date may have been changed in the system.
- o Secondly, the export-forwarder may have asked for the status of the product by phone or email.
- o Thirdly, the production may have informed the sales assistants of production problems or stock-outs who then pass the information to the export-forwarding department.
- o And lastly, the warehouse employees may have seen or heard the situation of the product while picking up other products from the production.

Besides the obvious consequence of making the everyday tasks unnecessarily difficult and laborious for the employees, the poor information flow has can have other effects.

The flow of information from different sources is a risk, considering that it can easily cause misunderstandings, or false information. In case the information coming from different sources is contradictory, it is confusing to the recipient and can stir up negative feelings. In addition, confusing information can also result into distrust of information coming from any source, and therefore cause the losing of motivation to even seek for the accurate information.

### 7.3 Possible future information flow

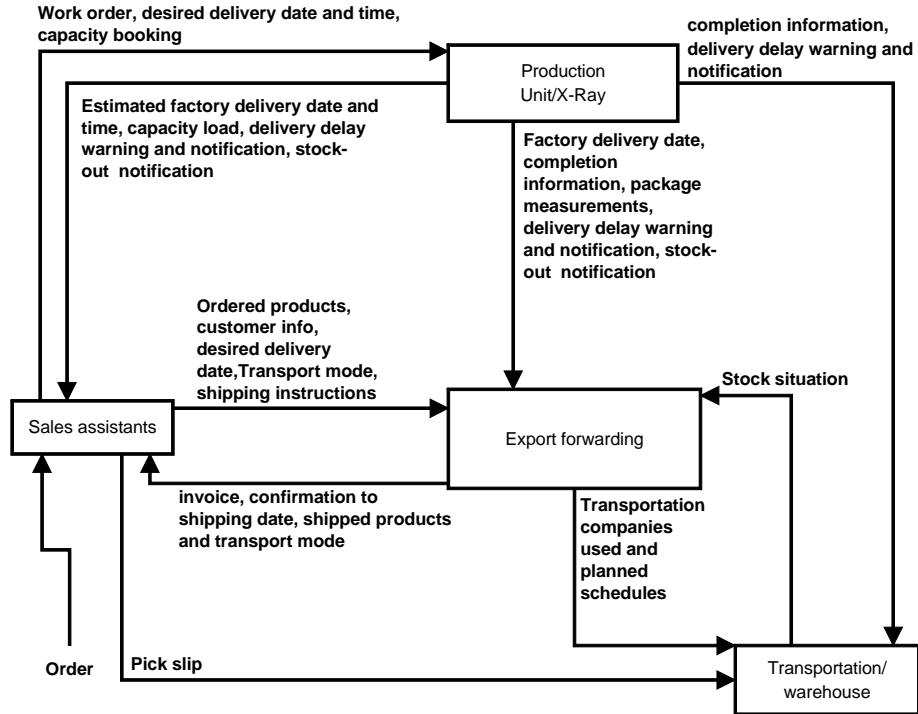


Figure 10: Possible future information flow

The figure 10 presents a possible scenario of how the information could be transmitted in the future. This scenario includes a more efficient use of the ERP and a more automated system of delivering information.

#### Sales assistants

Instead of receiving the information on paper or phone, the sales assistants could receive the information in an electronic form. An order generator or order form could be used, where the customers could already specify what they needed and where the customers would be forced to use the company item numbers. If the orders could be received in standard form, the export assistants would not need to spend time on interpreting incomplete information.

After the order has been received, the export assistants would make the capacity booking by themselves, based on the current situation of the production. The production planner would still do the final adjustments in the production planning, but the situation would be visible in real time for everyone. In addition to the product specifications the order information would include the delivery date

and time therefore assigning the order of production more accurately.

The planned delivery date, time, transport mode and transport company should be inputted for the order in the system by the sales assistant. Consequently, the order information could automatically create a pick list which would be visible for the warehouse. The pick list could serve as a preliminary plan of what is to be shipped and could be updated by the export-forwarding if needed.

**Production** The production should have an automated system to generate notifications in case the time needed for completing the production before the estimated factory delivery date is too short. The system should also issue a notification/warning in case a product could not be completed because of a stock-out.

The item codes for each product should already include the measurements of the package needed. Consequently the production would only need to input the weight for each product and the system could automatically calculate the combined sizes and weights of the packages. The identification of each package should happen through order number, item code and row number.

#### Export forwarding

The export forwarding should receive the order from the export forwarders in an electronic form. The instructions could be saved electronically and attached to each order in the system. Since the instructions are in most cases electronic in the first place, the only challenge is to create enough space in the database for the documents. This would also ease the checking of the orders in a later point of time. Since the papers would not need to be searched from a folder but each employee would have access to them from their computer, the material would always be available.

The export forwarding should not need to check the completion of each product but they should be able to trust the estimated factory delivery dates, unless otherwise informed by a notification or a warning issued by the ERP system. In case no warnings were issued the export forwarder should be able to create a delivery by picking ready made packages to the delivery based on the order number, item code and row number.

**Warehouse** The warehouse should receive a pick list at the moment when an order is created. This would ensure that the warehouse would have the information needed for better warehouse planning as early as possible. The production should include bar codes on the packages in order to facilitate the easier identification of each package.

## **8 Internal information flow survey**

The survey was designed to collect information about the information flowing between the departments most directly connected with the order-delivery chain, and reveal the biggest problems concerning the flow from the employees' point of view.

### ***8.1 Execution of the survey***

The survey consisted of four multiple-choice questions, four evaluation questions and nine open questions. The multiple choice questions were designed to give an overall idea of the information flow and open question's purpose was to specify that information. The last two open questions gave the respondents a chance to state what they thought was most problematic and suggest ideas for improvement.

The survey was distributed to all the members of the export, export-forwarding and warehouse/transportation departments. In the production departments, the survey was given to all office workers and to ten percent of the production personnel chosen by the department foremen.

67 surveys were handed out and 33 were successfully completed and returned which gives the answering rate of 50%. The average response rate for one department was approximately 64%

## 8.2 Survey result analysis

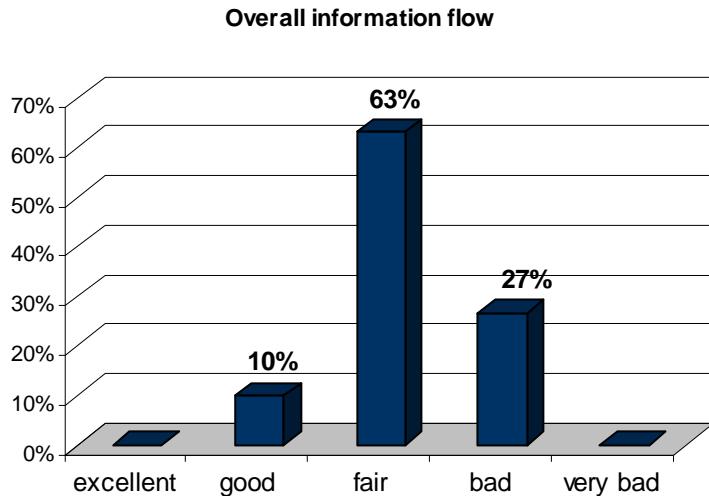


figure 11: Overall opinion about the internal information flow at The Case Company.

According to the respondents the overall information flow at the Case Company is not good and in fact, most respondents rated it as fair or bad. This is a strong sign that something needs to be done about the situation because the poor information flow is affecting the whole order-delivery chain.

The reliability of the result in the overall rating was supported by the rather negative rating of the quality of information (page 43) and the amount of problems listed by the respondents (page 47).

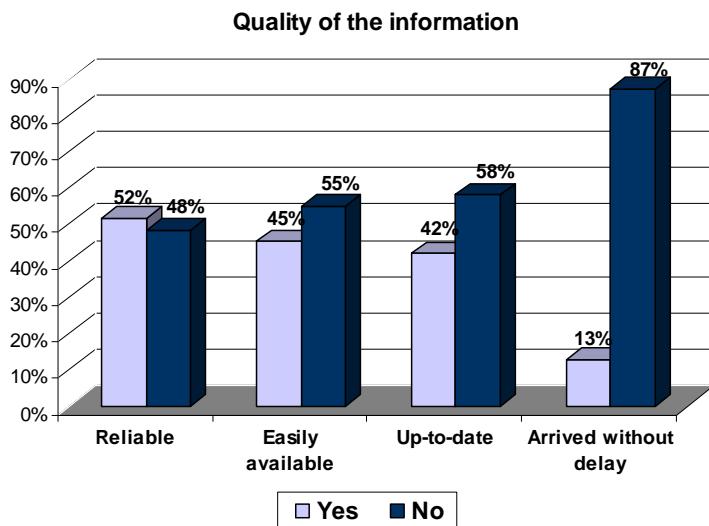


Figure 12: Overall quality of information

The overall quality of the information was also rated as quite mediocre or even bad. Approximately half of the respondents did not consider the information to be reliable, easily available nor up-to-date. This can obviously cause stress among the respondents when the information they receive could not be trusted or found, therefore making it hard for them to perform their work. When asked to specify, which information the respondents did not consider to be reliable, easily available nor up-to-date, most of the respondents pointed out similar cases, for example: the production phases or completion information (kuittaus) is not kept up-to-date by the production. The rush orders are given to production too late. Stock amounts are not in real time. Serial numbers are not correct. Shipping authorization (lähtölupa) is given too late.

The availability of the information is reflected by the comments made by the respondents about the fact that the information needed is not communicated automatically, but only when asked. For example, production delays or stock-outs are not shared with other departments, but only announced when the export department starts to examine why the products were not completed within the agreed time.

The most alarming fact is, that almost 90 percent of the respondents feel that the information does not generally arrive without a delay. It is important to take into consideration that the time span in which the order is being produced and the delivery is being processed can be counted in hours. Therefore it is crucial that any information concerning orders should reach the parties involved in delivering it as fast as possible, thus leaving enough time to react to possible changes.

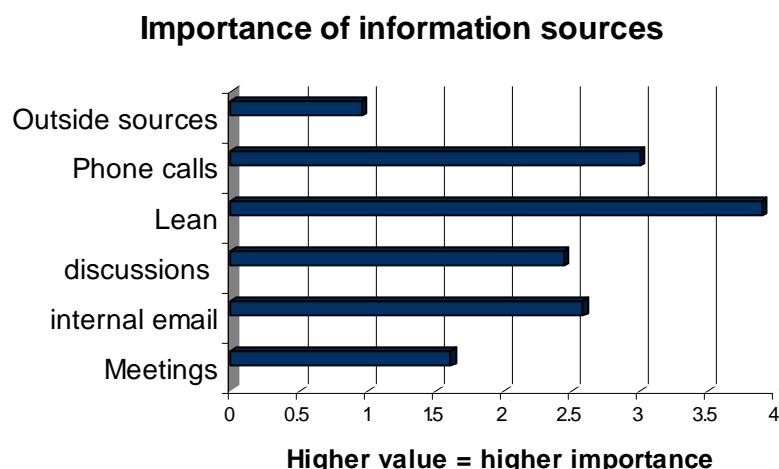


Figure 13: Importance of information sources

The overall opinion at the Case Company is, that most of the information should be shared with the ERP system: LEAN. This is a good notion considering that every modern organization should have an integrated system through which the operations are performed, managed and measured. The ERP system at the Case Company is also utilized daily by almost everyone involved in the order-delivery chain.

Consequently, when asked to rate the importance of the information sources, the ERP system rated the highest therefore most important. Most respondents also answered that they receive the majority or at least half of the information concerning the orders/deliveries from the ERP system.

The second most important was phone calls, which were highly rated in every department and third was the internal email.

Surprisingly, more than one third of the respondents said that they receive most of the information concerning orders/deliveries from their co-workers on paper, through email or by phone.

The quality of the information coming from each source was also examined. The most reliable sources were clearly the ones where the employees were in direct contact, such as meetings, discussions, phone calls and even email. The most easily available were also the person-to-person discussions either face-to-face or on the phone which also according to the respondents provided information that was up-to-date. Phone calls were also rated highest to arrive without delay, which in addition to receiving the information immediately, can mean that the people needed are easy to reach.

On the downside, half of the respondents rated the ERP system as not reliable and most respondents felt that the information in ERP was neither easily available nor arriving without a delay. The respondents also felt that none of the information from meetings, internal email, discussions, ERP or outside sources arrived without delay, which corresponds with the high percentage in the overall rating.

As many of the respondents mentioned, they have problems with receiving the information without needing to request for it. Two of the survey questions were designed so, that the answers would give a clear image of how much of the overall information the respondents estimated to be handing out automatically and how much of it they pass on when requested. Reciprocally they also had to estimate how much they receive automatically and how much on request.

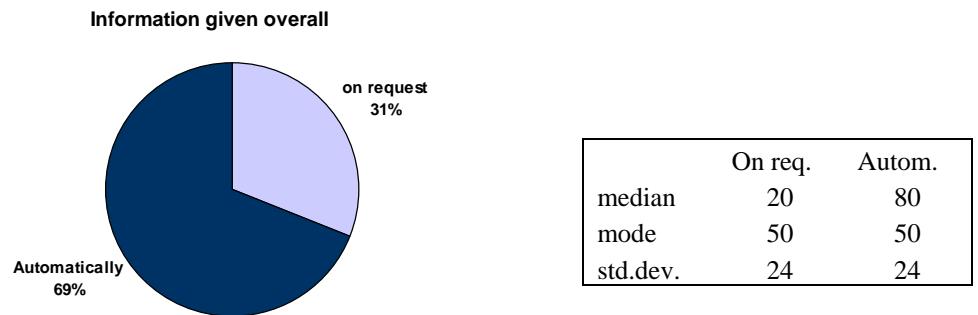


Figure 14: information given

The respondents estimated that on average they are passing on automatically approximately two thirds of information they have about orders/deliveries. On request they said to be giving one third which is a rather large amount considering that the organization is thriving towards automating the processes as much as possible. The statistical information also shows that the variance between the answers was quite substantial. The standard deviation indicates a variance of 24 from the average answer of 63 percent. According to the mode the commonly given answer was 50-50.

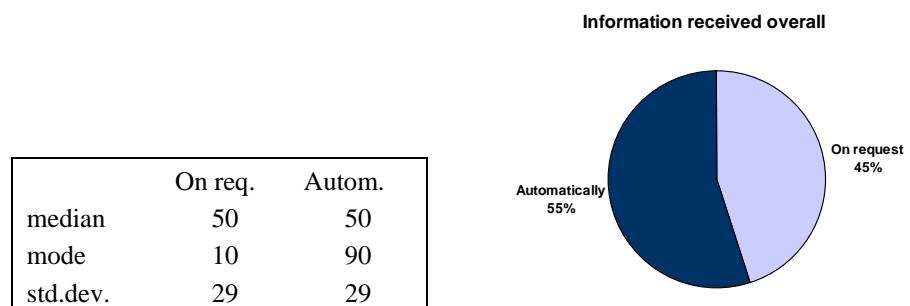


Figure: 15 information received

The information received was divided into 54 percent received automatically and 46 percent received on request. The variance from the average was even higher than in the results of the information

given. This indicates that the respondents had very different opinions about on how they give and receive information.

On average, the amount of information that needs to be requested is remarkably high, and indicates that the information is not shared enough. This result is supported by the amount of respondents mentioning the need to request for information in question 11. as a problem which they encounter frequently.

The person who the information is asked from is chosen in most cases because of position, because of the tasks for which the person is responsible for or what kind of attitude the person has towards work and/or colleagues.

In production, the information is mainly shared with colleagues and in exporting and warehouse the information is shared between departments.

### **Most frequently mentioned problems (administrative departments)**

In one of the open questions the respondents were asked to mention situations where they felt that the information did not flow in a way they hoped. The following issues came up in several answers.

- Completion information (kuittaus) not up-to-date
- Factory delivery date is not correct in the ERP system
- Lacking part (osapuute) problems are not communicated in time, or only when asked.
- Product completion delays are not communicated.
- Information is not available when needed, and too often needs to be asked
- Stock amounts are not in real time.
- Serial numbers are not correct
- Shipping authorization (lähtölupa) is given too late
- Production personnel are sometimes hard to reach.
- Incorrect customer information in the ERP system

### **Most frequently mentioned problems (production and warehouse):**

- Urgent orders are communicated too late.
- Lacking part (osapuute) problems communicated too slowly.
- Defective parts problems are not communicated.
- Delivery dates in the ERP system are not reliable.
- Stock amounts are not correct

- Suppliers have problems with delivery or too long delivery times.
- Supplier delivery problems not communicated efficiently
- Project orders (projektitoimitukset) change frequently
- Pick lists (keräilylista) arrive too late and are not up to date
- Capacity changes not communicated to purchasing
- Same order given many times or to several people

### **Suggestions for improvement:**

In the last question the respondents were asked to make suggestions or write down ideas how to improve the information flow.

- A bulletin board between production, export, and export-forwarding where missing parts and production problems can be communicated easily to everyone at once.
- More personnel to update completion information (kuittaus) in the ERP system
- Adding more loading days (kuormauspäivä) to production planning
- Generating ready emailing lists in order to quickly inform many people of a certain issue.

### **8.3 Survey conclusions**

The result of this survey was as expected, and it confirmed the impression which the employees and management already had of the situation. The results can be regarded as reliable enough to be used as a basis for conclusions, since the questionnaire was filled anonymously and therefore the answers can be assumed to be truthful. However, the low response rate of one department may have an impact on the overall amount and nature of the mentioned problems, and it lowered the overall response rate significantly.

The overall tone of the answers in this survey was rather negative. As was expected, all of the respondents found flaws in the information flow. The survey proved that the problem with the information is not that there is too much information or repetition in it, but that it is not available when needed and not up-to-date.

The problems listed by the respondents did not offer any surprises to what was expected, but what can be said is that the results indicate that the problems are not limited to communication between some departments, but concern the communication between all the

departments and the employees within the departments. If the information is not shared even between colleagues within a department, it is unlikely that the information would flow effortlessly and quickly to other departments.

Several barriers for improving communication could be found. Sometimes the information needs to be passed on faster than it is possible due to the hectic delivery timetable. Most employees simply have too much work as it is, and they cannot dedicate time on developing the old ways. The management has not indicated rules or sufficient channels for different situations.

Almost all recipients were quick to find fault in other departments or employees. No suggestions were made on how one him/herself or one's department could make changes for better. This can be an indication of the lack of enthusiasm concerning taking responsibility of one's own work. It is important that each employee would understand the impact he/she has on the overall operations of the organization, since some information such as supplier delivery delay can cause a wave of problems throughout the order-delivery chain if not communicated fast and efficiently.

Possibilities for improvement are at least as many as the barriers. People have obviously recognized the need for change and are likely to be willing to bring about that change. It could be said that the first step of the emotional change has been reached. The employees also recognize the importance of ERP in the daily processes and for most parts are motivated to use the system.

Providing more training, emphasizing the importance of sharing information and creating more standardized rules for communicational procedures could aid the employees to understand how they could personally make the process chain more efficient and easier for everyone.

## 9 Future development suggestions

### 9.1 *Technological development suggestions*

The following recommendations were inspired by the discussions with the employees and the observations made by an export forwarder. They are a list of small suggestions intended to improve the current situation without bringing about a bigger operational change.

### *1. Electronic pick slip for the warehouse/transportation*

Currently the pick list is passed on on a paper, and it has proved to be somewhat unreliable and difficult to update. Therefore, the pick slip should be done electronically reducing the amount of paper and time spent on delivering the list to the warehouse. The process of creating the pick slip could be as simple as creating a delivery.

1. creating pick slip,
2. choosing lines from an order and adding them to the list.
3. adding a text field to indicate delivery time and mode
4. updating the status of the pick list as the situation progresses  
(for example: in-progress, ready for picking, picked)

The warehouse employees could print out the pick slip when the export forwarding has indicated it to be ready. This would reduce the amount of paper used, and make the information easily readable when more information could be fitted into one page. It would also give the export-forwarders more visibility to which orders have already been assigned for picking.

### *2. Using the “work (työt)” window in the export-forwarding department and improving usage of it in production.*

In the current situation, where the production is running late on a regular basis, the more information is available for everyone, the better. The work(työt) window gives an insight of what is going on in the production and can be a useful tool for the export-forwarding department. If the production could be trusted to keep the status of the production phases up-to-date and writing down possible problems with each product in the information field, the export forwarders could automatically receive some information to what is going on with the orders.

### *3. Keeping order/work (tilaukset/työt) window updated all times.*

Keeping the information up-to-date is crucial when talking about a company where the delivery process progresses very quickly towards the end. More emphasis should be put on the completion signing (kuittaus) since it is the most important information for the later parts of the process. If the current system does not yet support faster operations, then more personnel should be assigned to do the completion signing in order to speed up the process.

### *4. Delivery date and time on work card (työkkortti)*

The exact transportation time of a product can be an important factor in the timely delivery of a product to a customer. To improve the prioritizing of the production, the work card should also have a mention of the desired completion deadline. For most customers, the delivery times are the same each week, and therefore could be mentioned to the production.

## **9.2 Operational development suggestions**

The following recommendations were inspired by the discussions with the employees and the observations made by an export forwarder.

### *1. Assigning clearer responsibilities*

In order to have a better information flow, the employees need to be aware of who's responsibility is it to communicate about the issue in question. If no clear policy has been made and enforced, no one will clearly see the issue as his or her responsibility and therefore nothing is done to improve the matter. This problem realizes especially in the production, where the production personnel do not have a way to quickly inform the superiors about a lacking part or production problem and therefore the products, which have problems, are just put aside and no progress is made. Since the superiors are not aware of any problems, no other departments are informed either.

### *2. Calculating factory delivery time estimations based on real production times instead of desired production times.*

Even though the delivery time is an important competition advantage, it should be calculated realistically. Currently, the production times for most products are too short, and therefore the production seems to be constantly dragging behind. This makes the job very difficult for the departments depended on the delivery time, since it can never be completely relied on. The possibilities for improving the situation are either to extend estimated production time, reduce actual production time effectively or use separate delivery times in and outside the company.

### *3. Improving new employee orientation*

The employee orientation and introduction should be dramatically improved. The emphasis, in addition to one's own activities, should be put on the impact one's work has on other departments. The organization should be introduced as a whole right from the beginning in order to create the feeling of responsibility.

### *4. Assigning different improvement projects to selected persons or groups and supervising the progress.*

The organization should assign a fixed group of people to pursue the improvement goals, if not full time, but at least part time. A development team is needed when bigger changes are planned, but the planning, organizing and supervising an extra project can be too heavy addition to an employee's normal duties and therefore can lead to poor results or to the failure of the whole project. The organization could consider hiring outside assistance, or rearranging responsibilities to free more management manpower for the project.

*5. Collecting constant feedback from employees and informing them about the improvement progress.*

Collecting feedback should be done on a regular basis to measure the development or changes in the working environment and processes. This way the employees are more likely to make suggestions in order to improve the organization and they get a feeling that their opinions are being taken seriously and that they have an opportunity to affect their work.

Informing the employees about the current improvement projects and especially their progress is also an important method to give the employees an assurance that their problems are being addressed and changes are on the way.

## 10 Conclusion

Internal communication is an important factor of a company's operations. Without constant and well-organized information flow the company is likely to suffer from operational problems, mediocre customer service and dissatisfied employees

Improving the flow of information can take place after a thorough research of the quality of the information, the efficiency of the flow and the problems with it. It is important to find the root cause of the problems to be able to fix the problem where they are originated.

The improvement process can be different for problems of different multitude. Training the employees, or offering them different tools or aids to facilitate the information sharing can resolve some troubles. Bigger problems usually need a more profound look on the overall operations and cannot be solved through little changed but through radical changes in the business processes and operational customs.

The process of improving the operational ways of working is a long process and should be carried out carefully. Rushing through big changes can lead to an unwanted end-result or even the failure of the improvement project if not planned properly and implemented cautiously.

This case study suggests that the best solution for improving the sharing of information and information flow is to rethink some of the current business processes. Striving towards better operational efficiency through constant upgrading of the ERP system and modifying the processes to better fit the system can ultimately lead to the utilization of the industry best practices. The ERP system may also need some modifications to match better with some of the

unique business processes of the organization. The keys for a successful change process are realistic goals, detailed planning, sufficient resources and a motivated development team that can see the current weaknesses as future possibilities. The part of the employees should not be forgotten during the process since each change will require efficient reporting of the progress of the process, and necessary training for all parties involved.

No major changes took place during the making of this thesis, but as a result can be counted the awareness that was created about the information flow problem that affects the entire order-deliver chain. The future results will remain to be seen but this thesis can be used as an aid in the planning of the processes changes, since it offers information about the critical problems within the order-delivery chain.

## 11 References

- Miller, Katherine (2003) *Organizational Communication*,  
Wadsworth/Thomson Learning, Belmont.
- Naylor, John (2002) *Introduction to Operations Management*,  
Pearson Education, Essex.
- Heizer, Jay, Render, Barry (2005) *Operations Management*,  
*seventh edition*. Pearson Education, New Jersey
- Peppard, Joe. Rowland, Philip (1995) *The essence of business process re-engineering*, Prentice Hall international,  
Hertfordshire.
- Bozarth C.Cecil, Handfield, B. Robert (2006) *Introduction to operations and supply chain management*. Pearson education,  
New Jersey.
- Laamanen, Kai (2001) *Johda liiketoimintaa prosessien verkkona – ideasta käytäntöön*, Otavan kirjapaino, Keuruu
- Sumner, Mary (2005) *Enterprise resource planning*. Pearson education, New Jersey.
- Deming, W.E. (1986) *Out of crisis*, Massachusetts institute of technology, Massachusetts
- Sakki, Jouni (2003) *Tilaus-toimitusketjun hallinta, logistinen B-to-B prosessi*, Jouni Sakki oy, Espoo
- The Case Company (2004) *Prosessikaavio, tilaus-toimitusprosessi, laitteet*.
- Heath, Vicky (2006) *Employee communication: the Secret to business success*. [online] [referred 30.1.2008 from  
<http://www.ezinearticles.com/?Employee-Communication:-The-Secret-to-Business-Success&id=1470491>]
- Wikipedia, the free encyclopedia (2008) *Information systems* [online] [referred 3.1.2008  
[http://en.wikipedia.org/wiki/Information\\_systems](http://en.wikipedia.org/wiki/Information_systems)]

- Aiken, Peter (2002) *Enterprise Resource Planning (ERP) Considerations*. VCU/Institute for Data Research [online][referred 14.2.2008 from [http://www.sei.cmu.edu/plp/EI\\_IRAD/ERP-Solutions.pdf](http://www.sei.cmu.edu/plp/EI_IRAD/ERP-Solutions.pdf)]
- Aberdeen Group (2007) *ERP Lends Visibility to Increase Efficiencies for Best-in-Class Manufacturers*. [Online] [Referred 14.2.2008 from [http://findarticles.com/p/articles/mi\\_pwwi/is\\_200708/ai\\_n19429321](http://findarticles.com/p/articles/mi_pwwi/is_200708/ai_n19429321)]
- American Society for Quality, Tague, Nancy (2004) *Project planning and improvement tools* [Online][Referred 20.2.2008 <http://www.asq.org/learn-about-quality/project-planning-tools/overview/pdca-cycle.html>]

## 12 Appendices

### 12.1 Appendix A:Internal information flow questionnaire in Finnish

#### KYSELY TILAUS-TOIMITUSKETJUN SISÄISESTÄ TIEDONKULUSTA

1. Mikä on tehtäväni mukkiesi yrityksessä?

2. Mitä tehtäviä työntkuvaasi kuuluu?

3. Mitä tietoa tarvitset päävittääni edistääkseni tilausten ajallaan toimittamista? (listaa mahdollisimman yksityiskohtaisesti, esim. mitä tietoja asiakkaasta, tilauksesta, toimituksesta, tuotteesta, aikatauluista jne.)

b. Mistä saat tiedot?

c. mistä sinun kuuluiisi saada tietoa, jos eri kuin kohdassa 3b?

d. Onko saamasi tieto mielestäsi riittäväni

- |                          |                                |                             |
|--------------------------|--------------------------------|-----------------------------|
| i. Luotettavaa           | Kyllä <input type="checkbox"/> | Ei <input type="checkbox"/> |
| ii. Ajan tasalla         | Kyllä <input type="checkbox"/> | Ei <input type="checkbox"/> |
| iii. Helposti saatavilla | Kyllä <input type="checkbox"/> | Ei <input type="checkbox"/> |
| iv. Viiveettä saapunut   | Kyllä <input type="checkbox"/> | Ei <input type="checkbox"/> |

e. Jos vastasit ei kohdassa d, anna esimerkkejä tie dosta joka ei mielestäsi ole riittäväni

- |                          |       |
|--------------------------|-------|
| i. Luotettavaa           | _____ |
| ii. Ajan tasalla         | _____ |
| iii. Helposti saatavilla | _____ |
| iv. Viiveettä saapunut   | _____ |

4. Mikä mielestäsi on tärkein tie donlähteesi koskien tilaus-toimitusketjua, (asteikolla 1-6, 1=tärkein, 6=vähiten tärkeää) ja miten arvioit saamasi tiedon laatua yleisesti?

1 - 6	Tieto on yleensä luotettavaa	Tieto on yleensä ajan tasalla	Tieto on yleensä helposti saatavilla	Tieto saapuu yleensä vii vettä
i. Palaverit	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>
ii. Yrityksen sisäinen sähköposti	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>
iii. Hen.koht.keskustelut johdon/työtovereiden kanssa	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>
iv. LEAN	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>
v. Yrityksen sisäiset puhelinkeskustelut	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>
vi. Yrityksen ulkopuoliset lähteet	<input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>	Kyllä <input type="checkbox"/> Ei <input type="checkbox"/>

5. Miten suuren osan tilauksia/toimituksia käsittelevästä tiedostasi saat LEANista? (Ympyröi yksi vaihtoehtoista)

- Kaiken
- Suurimman osan
- Noin puolet
- Melko vähän
- En mitään

**6. Miten suuren osan tilauksia/toimituksia käsittelevästä tiedostasi saat työtovereilta suullisena tietona, paperilla, sähköpostitse tai puhelimitse? (Ympyröi yksi vaihtoehdosta)**

- Kaiken
- Suurimman osan
- Noin puolet
- Melko vähän
- En mitään

**7. Mitä tietoa annat/jaat muille, joka auttaa muita edistämään tilausten ajallaan toimittamista? (listaa mahdollisimman yksityiskohtaisesti, esim. mitä tietoja asiakasta, tilauksesta, toimituksesta, tuotteesta, aikatauluista jne)**

---

---

---

---

**b. Kenelle annat/jaat tietoa ja miksi se on mielestäsi tärkeää?**

---

---

---

---

**8. Arvioi prosentteina minkä osan päivittäisestä tilauksiin/toimituksiin liittyvästä tiedosta saat työtovereiden pyynnöstä ja minkä automaattisesti. (esim. 60% tiedosta annettu pyydettäessä, 40% tiedosta jaettu automatisesti = 100%)**  
Pyydettäessä \_\_\_\_\_%  
automaattisesti \_\_\_\_\_%

**9. Arvioi prosentteina minkä osan päivittäisestä tilauksiin/toimituksiin liittyvästä tiedosta joudut pyytämään, ja minkä saat automaattisesti. (esim. 60% tiedosta saatu pyydettäessä, 40% tiedosta saatu automatisesti = 100%)**  
Pyydettäessä \_\_\_\_\_%  
automaattisesti \_\_\_\_\_%

**b. Millä perusteella valitset työtoverin jolta pyydät tietoa?**

---

---

**10. Miten arvoisit tilaus-toimitusketjun sisäisen tiedonkulun tehokkuutta yrityksessä? (Ympyröi yksi vaihtoehdosta)**

- Erinomainen
- Hyvä
- Kohtalainen
- Huono
- Erittäin huono

**11. Minkälaisia tilanteita olet työssäsi kohdannut, joissa tieto ei ole kulkenut toi vomallasi tavalla/nopeudella?**

---

---

**12. Onko sinulla erityisiä ajatuksia, iideoita tai toiveita tiedonkulun parantamisen suhteen?**

## **12.2 Appendix B:Internal information flow questionnaire in English**

### **QUESTIONNAIRE ABOUT THE INTERNAL INFORMATION FLOW**

**1. What is your position at the Case Company?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**2. What tasks do you perform?**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**3. What information do you require to advance the delivery of an order? (List as detailed as possible, e.g. what information about the customer, order, delivery, products, timetables etc.)**

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

\_\_\_\_\_

**b. From where do you get the information?**

**c. From where are you supposed to get the information, if different than 3b?**

**d. Is the information you receive sufficiently...**

- |                            |                              |                             |
|----------------------------|------------------------------|-----------------------------|
| i. Reliable                | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| ii. Up-to-date             | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| iii. Easily available      | Yes <input type="checkbox"/> | No <input type="checkbox"/> |
| iv. Arriving without delay | Yes <input type="checkbox"/> | No <input type="checkbox"/> |

**e. If you answered no in 3d, list examples of information that you consider not to be**

- i. Reliable \_\_\_\_\_
- ii. Up-to-date \_\_\_\_\_
- iii. Easily available \_\_\_\_\_
- iv. Arriving without delay \_\_\_\_\_

**4. What do you consider to be your most important source of information concerning the order-delivery chain? (On a scale from 1 to 6, 1=most important, 6=least important ) And how would you evaluate the quality of the information?**

1 - 6	Information received is usually...			
	Reliable	Up-to-date	Easily available	Arriving without delay
i. Meetings	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
ii. Internal email	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iii. Discussions with colleagues/management	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
iv. LEAN	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
v. Internal phone calls	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
vi. Outside sources	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

**5. How much of the information concerning orders/deliveries do you get from LEAN**

- All
- Most
- half
- Not much
- Nothing

**6. How much of the information concerning orders/deliveries to you receive from colleagues as written on paper or email or by phone.**

- All
- Most
- half
- Not much
- Nothing

**7. What information do you give/share to others that aids in delivering an order. (List as detailed as possible, e.g. what information about the customer, order, delivery, products, timetables etc..)**

---

---

---

**b. To who do you give/share information and why do you think it's important?**

---

---

---

**8. Estimated in percentages, how much of the daily information concerning orders/deliveries do you share when requested and how much you share automatically. (e.g. 60% of information given on request, 40% of information given automatically = 100%)**

On request \_\_\_\_\_ %  
Automatically \_\_\_\_\_ %

**8. Estimated in percentages, how much of the daily information concerning orders/deliveries do you have to request and how much you receive automatically. (e.g. 60% of information requested, 40% of information received automatically = 100%)**

On request \_\_\_\_\_ %  
Automatically \_\_\_\_\_ %

**b. How do you choose the person you request information from?**

---

---

**10. How would you evaluate the overall efficiency of the information flow in the order-delivery chain?**

- Excellent
- Good
- Fair
- Bad
- Very bad

**11. What kind of situations have you experienced, where the information did now flow as you would have wanted it?**

**12. Do you have any additional thoughts, ideas or hopes concerning the improvement of the information flow?**