IT/IS IN SCM—A Necessity Or Strategic Advantage?

A case study of an electrical components distributor

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Abstract

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Title: IT/IS IN SCM—A Necessity Or Strategic Advantage? A Case Study Of An Electrical Components Distributor

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Research Questions: Is the usage of existing IT/IS in SCM just a necessity or a key factor contributing to their success for Company BETA?

Purpose: The purpose of our thesis is to describe how a successful distributor like Company BETA manages their supply chain activities, then to analyze and discuss their performances as well as the IT support on their operations.

Method: We conducted qualitative research. Our main primary data came from the interviews with employees of Company BETA while our secondary data was collected from literature books, websites, and database. The data was gathered and analyzed in the light of our literature review.

Conclusion: Company BETA’s existing IT/IS is not the main factor contributing to their success. There are more possibilities in the markets nowadays and more importantly, Company BETA could have considered and leveraged their IT/IS better.

Supervisor: Liljefors, Ole, (Mälardalen University, School of Sustainable Development of Society and Technology)

Key words: IT/IS, Supply Chain Management, Strategic advantage, EDI, ERP, logistics
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Västerås, Sweden, June 2009

Thanida Vitthayaprasart and Stasys Virbaitis
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## Abbreviations

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<thead>
<tr>
<th>Abbreviation</th>
<th>Description</th>
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<tbody>
<tr>
<td>APS</td>
<td>Advanced Planning and Scheduling</td>
</tr>
<tr>
<td>B2B</td>
<td>Business to Business</td>
</tr>
<tr>
<td>CEO</td>
<td>Chief Executive Officer</td>
</tr>
<tr>
<td>CNC</td>
<td>Computer Numerical Controlled</td>
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<td>CRM</td>
<td>Customer Relationship Management</td>
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<tr>
<td>ECR</td>
<td>Efficient Consumer Response</td>
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<td>EDI</td>
<td>Electronic Data Interchange</td>
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<td>EFT</td>
<td>Electronic Fund Transfer</td>
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<td>ERP</td>
<td>Enterprise Resource Planning</td>
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<tr>
<td>GUI</td>
<td>Graphical User Interface</td>
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<tr>
<td>IS</td>
<td>Information Systems</td>
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<td>IT</td>
<td>Information Technologies</td>
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<td>JIT</td>
<td>Just-in-Time</td>
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<td>MIS</td>
<td>Management Information Systems</td>
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<tr>
<td>MRP</td>
<td>Material Requirement Planning</td>
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<tr>
<td>NCNR</td>
<td>Non-Cancelable, Non-Returnable</td>
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<tr>
<td>POS</td>
<td>Point of Sales</td>
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<tr>
<td>QR</td>
<td>Quick Response</td>
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<tr>
<td>RFID</td>
<td>Radio Frequency Identification</td>
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<tr>
<td>R&amp;D</td>
<td>Research and Design</td>
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<tr>
<td>SCM</td>
<td>Supply Chain Management</td>
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<tr>
<td>SRM</td>
<td>Supplier Relationship Management</td>
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<tr>
<td>VMI</td>
<td>Vendor Managed Inventory</td>
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<td>VPN</td>
<td>Virtual Private Network</td>
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1. Introduction

In the first chapter, the authors would like to introduce the purpose and scope of the study. We also explain the general background of the selected topic and the company. While at the end of the chapter, the authors present the practitioners and target readers who would have interest in this thesis paper.

1.1 Topic Background

It was mentioned by Neeley (2006, p.1-2) that Forrester was the first researcher who gave the concept that would eventually become Supply Chain Management. Forrester’s theory of distribution management was introduced since late 1950’s. The theory was about an understanding of interorganizational relationships and coordination.

Today, Supply Chain Management has become important in the business world. The main idea is still about the coordination and cooperation between organizations. SCM has raised the interest in the past years as organizations started to realize that the actions taken by one member of the chain actually have an influence on the profitability of other members in the chain. This scheme generated the act of competing as a part of supply chain against the other supply chains instead of competing as a single firm against other individual firms. (Silver, et al. 1998, p.471)

The integration of more than one firm which also include the integration of information flow makes the SCM system more complicated. But at the same time SCM is becoming more and more widely spread as the cooperation between members of the chain gives significant opportunities to the firms involved in terms of costs reductions, revenue enhancement, flexibility, customer satisfaction, speed and economy of time. (Hilmola 2005 cited in Çalipinar 2007, p.90), (Forrester 1958 cited in Neeley, 2006, p.1-2)

For the reason that current business operates in a global economy, companies in the supply chains cannot avoid the fact that technology has emerged as a source of competitive advantage. Firms connect to other players worldwide in the search for product sourcing, markets, lower cost etc. It is significant for them to implement the appropriate technology as such wireless communication devices and their accompanying infrastructure and software in order to manage the goods as well as the information flow across this longer and more complex chain. (Neeley, 2006, p.1-2) Moreover, Venkatraman (1999, p.119) mentions that firms can select to compete in the global market by using sophisticated communication networks and computer software such as SAP, Baan, and Oracle. ERP and SCM are considered as powerful tools to enhance the efficiency and increase productivity.
Supply Chain Management is not a new scheme and the concept has been widely implemented across industries. All parts of the chain are important and have affect on others. Many researchers have also given their focuses on the manufacturing or retailing side of the supply chain. It is for certain that, as suggested by Krajewski et al. (2007, p.380), ‘the upstream members of the supply chain must react to the demands placed on them by downstream members of the supply chain’. However, the authors have given more interest in how a distributor company deals with its supply chain management as they are in the middle between upstream members and the downstream members. How a successful distributor uses IT to support their supply chain activities in order to increase profitability and strengthen the position in the market is interesting for us.

For that reason, the authors have selected a successful distributor who has suppliers and customers worldwide to be an example of how supply chain management in the distribution industry can be operated. The major concern is ethical consideration. We have confidentiality agreements with the research company. We received information, personal files and company internal document from the Company BETA. We had approval to write all information received in our thesis but we had an agreement not to reveal the company name if the thesis will be available to public. The brief information of the company is given below.

### 1.2 Company Background

The Company BETA, one of Europe’s leading distributors of electronic components, provides the customers technical advices on product selection for their specific applications and also support their logistic solutions with customized supply-chain management. *(Personal Experience)*

The company is originally from Germany with 26 branches all around the Europe. It is privately owned company unlike other big players in the market. Company BETA is then more flexible, according to our respondent, compared to the competitors, in reacting with the change in market situation. *(Personal Experience, Field Sales Engineer)*

Company always has to have components which have big demand from the market such as resistors or capacitors on stock also assure fast delivery of not so popular components, or the components, which are produced by request of the customers. Consequently the subdivision in the company, which is responsible for logistics activities, performs the function of a production scheduler. Precise definitions of min/max warehouse stocks of each product are drawn up, improving inventory capacity planning and making deliveries and goods flows more transparent. *(Personal Experience)*

To achieve those goals, good interaction between sales representatives in different countries, inventory managers in companies headquarter who are responsible for the certain group of electronic components and logistics personnel are essential. Sales representatives are responsible for gathering information from local customers in their area and prediction of their
demands. Inventory manager has to combine all the information he/she gets from sales representatives and to order the required demand from the manufacturer. And logistic subdivision is responsible for smooth deliveries to the customer. This means the company is the one-stop suppliers for all aspects of logistics management. *(Personal Experience)*

To fulfil all these aspects, company BETA has implemented ERP system. This system covers all main areas in the company: supply chain management, financials, customer relationship management, human recourses, Data warehouse and access control. It is also connected to ERP systems of certain manufacturers. To assure proper usage of this system and to gain all benefits from it standardized software packages and single email system is used in all offices all around Europe. *(Personal Experience)*

### 1.3 Research Question

*Is the usage of existing IT/IS in SCM just a necessity or strategic advantage for Company BETA?*

### 1.4 Purpose

The purpose of our thesis is to describe how a distributor like Company BETA manages their supply chain activities. Then we will analyze and discuss their performances as well as the IT support on their operation.

### 1.5 Practitioners/Target Readers

This paper was developed with two target audience groups in mind. The first one which is defined as our priority is the academic readers who have interest in supply chain management and/or IT management field. The other group is the executives who can use the paper as the guidance to manage their supply chain management.

For the first group, the scholar, this paper should be a useful tool for both IT and business students. They should be able to gain the knowledge about the implementing of IT/IS in supply chain activities which they can make the further research upon their interests.

For the second audience group, they can be CEO of the researched company or the top management or even MIS managers of any company. They should be able to apply the knowledge from this paper to the real business practice. They will have more understanding about their supply chain management and the possibilities to leverage their IT/IS and be able to improve their system, practices or supply chain process as well as prevent the possible problems.
1.6 Limitations

The main limitations of this paper are the access to companies’ information and the time constraint. As the result we can only analyze the primary data from one company which has concern about their confidential corporate information. The name of the company cannot be exposed.

Secondly, even though we would like to cover more aspects of the supply chain management and the leveraging of IT/IS, we have to narrow down the area of study to only cover the supply chain activities within the Company BETA in accordance to the limited given time.

1.7 Thesis Outline

After the introduction of the topic, we have outlined the remaining parts of our thesis in the following ways. Chapter 2 Literature Review is the collections of the literature about logistics, supply chain management and information technology in which are combined together to build our, chapter 3, Conceptual Framework. The conceptual model illustrates different layers of supply chain subsystems which control the activities occur within the organization. After that, Chapter 4 is devoted to Methodological issue. And in Chapter 5, Empirical Finding, we describe the case study of Company Beta. And in Chapter 6 analysis, we will analyze and discuss the practical information from Chapter 5 based on the literature review and our conceptual framework from Chapter 2 and 3. In Chapter 7 Conclusion, we discuss the case in the reflection of our literature review. Chapter 5 and 6 are also integrated in conclusion of the study. All purposes are fulfilled at this chapter.
2. Literature Review

Our work is related to logistics with the focus on Supply chain activities and IT. The literature review is conducted to cover the scope of our fields of interest as follow.

2.1 The change of business in 21st century and the business model

Business practices are changing overtime. In today’s network economy, new business models keep emerging. (Applegate et al., p.26) Managers are forced to handle the more complex tasks in the more competitive markets. The growth and the profits of the organizations are certainly still the goal of the companies but the way to achieve them has to be transformed and developed. Information technology has played an important roll over the business practice. According to Bradley and Nolan (1998, p.4-5), as a result of the revolutionary change in information technology, the paradigm shift is taking place in the way companies compete and are managed. The traditional ‘make and sell’ strategies are replaced with ‘sense and response’ it is no longer sufficient to plan the year’s production using inventories to match supply and demand. They need to act faster and get closer to the customers. Strategic alliances are formed to reach the goal together. Moreover, Silver, et al., (1998, p.11) also found that the revolution of information technology and computer networking helped manufacturing to capture the demand of their customers which then made it possible to closely match the production with those demands on the daily basis.

Eventhough the business model is changed over years and is varied by industry types, the main theories such as from Michael Porter are still in use. According to Hedman and Kalling (2002, p.56) Porter developed a framework that still dominates the business world and is used widely by managers and researchers. However, his work was mainly influenced by industrial organization view. The general business model by Hedman and Kalling (2002, p.113) represents the holistic picture of how a business is run by dividing into three main parts, offering, activities and resources. In order to apply the model, one can apply many other theories in each part of the main model including the framework from Porter. For example, Resource based view by Barney (1991) to the resource part, Value chain by Porter (1985) to the activities part and five forces model by Porter (1980) to the external part of the model.

2.2 Definitions

2.2.1 Logistics

We would like to give some brief idea about Logistics as it is interrelated with Supply Chain Management. Logistics is described by Waters (2003, p.17-18) as the flow or movement and storage of materials throughout a supply chain. To be more precisely, Logistics is viewed as the positioning of resource in the time frame. It is also considered as the strategic management of the total supply chain while the supply chain itself is viewed as a sequence of events with the
intension to satisfy the end customers. The aim of logistics is to achieve high customer satisfaction with high-quality service at the low or acceptable cost. According to Jespersen & Skjott-Larsen (2006, p.13-14), logistics is typically based on the individual business with the objective of making this enterprise’s logistics system more efficient through internal and external planning and control.

Christopher (2005, p.4) also states that logistics is the process of the strategically managing the procurement, movement and storage of materials, parts and finished inventory together with related information flow through organization. It has to fulfill the orders in cost-effective way in order to maximize current and future profitability.

Waters (2003, p.13-14) describes the ranges of logistics activities for examples procurement or purchasing, inward transport, receiving, warehousing etc. At the bottom line, Waters concluded that the companies can even add any other activity such as sales forecasting or customer service in their logistics range but the companies has to keep in mind that they must all work together to get the efficient flow of material.

Waters (2003, p.32-34) explains further that there are three main themes in logistics which are Leanness, Agility and integration. Lean Logistics is about removing all the waste from the supply chain. Agile Logistic is about the more flexible and responsive logistics and lastly Integration involves the cooperation between organizations.

2.2.1 SCM

Supply Chain Management is driven from Logistics concept. According to Cortada (2001, p.173-174) the concept of SCM was originally from the attempts of managers to manage the linked processed for an optimized result across the supply chain. The collaboration increased as companies moved towards SCM approach. Cortada (2001, p.182-184) described SCM as moving from raw material through a chain of activities to end in the hands of customers.
For the more broad concept of SCM, Silver, et al., (1998, p.471-472) explains that the term ‘Supply Chain Management’ (SCM) is used to describe the management of materials and information across the entire supply chain. The supply chain in his view starts from the suppliers to component producers to final assembly to warehouses and retailers (distribution) and to the consumer. (See figure 1) Furthermore, after sales service and returns or recycling can also be included in some cases. However, his view is also more emphasizing on the manufacturing parts instead of our focus; distributors. Mentzer et al. (2001 cited in Neeley, 2006, p.1-2) refers to Supply chain management as “the integration of key business processes from end user through original suppliers that provides products, services, and information that add value for customers and other stakeholders” This view is also similar to Seuring’s opinion. Seuring (cited in Çalipinar 2007, p.90) stated that ‘Supply Chain Management can be described as the integration of all components of production and supply processes in the process from obtaining raw materials to delivery of the product to the end user’.

According to the previous research, SCM could be then described as

The management of the chain of activities which occur within the integration of material and information flow across organizations. The integrated key processes starting from the point of origin which is obtaining raw materials to production to supplying process and delivery to the point of consumption; consumer or end user. And in some cases SCM can even include the after sales services as well as the recycling of the goods.
2.3 Generic Value Chain

As pointed out earlier, one theory which can be implemented in the general business within the activity part is Value Chain Model by Porter. (See Figure 2)

According to Hedman & Kalling (2002, p.66-67), value chain can be used to identify all strategically relevant activities which either generate competitive advantage through lower cost or being better than competitors. Those activities are divided into two groups; support activities and primary activities. However the value created in the activities is determined by the customers. The main point is that firms will focus on generating the margin and it can be done through either differentiation strategy or reducing costs by using the low cost strategy.

![Figure 2 Generic value chain (Porter, 1985)](Hedman & Kalling, 2002 p.66)

1) Primary activities

Hedman & Kalling (2002, p.67-68), explained that Primary activities are the direct activities performed in order to produce the products. They consist of Inbound logistics – the receiving and stocking of raw material, Operations – to finalise the products by assembling or packing them, Outbound logistics – the distribution and the storing of the products, Marketing and Sales – the communication with the customers and Service – the support giving to the customers even to supply the spare parts or train the customers how to use the product. Each of those can create competitive advantage.

2) Support activities

Mentioned by Hedman & Kalling (2002, p.68), support activities are the activities needed to organize the primary activities. They are Procurement of raw materials or equipments, technology development (R&D), Human resource management, and Firm infrastructure or the
management of the value chain. Those activities can add value but it is still unclear whether they can directly generate the competitive advantage for the firms.

To achieve competitive advantage, firm can combine logistics with value chain. This view is supported by Christopher (1998 p.10 – 11) and Turban et al (2001, p.116). Christopher (1998 p.12) suggested further that in relevance to value chain and logistics, the philosophy behind the concept is 'to achieve the goal of competitive advantage through both cost reduction and service enhancement.

2.4 Resource based view

According to Porter (1995), competitive advantage can be held by two firms. He had the view that cost leadership and differentiation brings competitive to the firms. However there is another view contradicting his theory. Resource based view is concentrating on the resource of the firms. And resource attributes are considered as the factors that give firms competitive advantage. This view was presented by Barney (994) with the support ideas from other authors such as Dierickx & Cool (1989), Amit & Schoemaker (1993) and Collis (1996). (Hedman & Kalling 2002, p.74)

Clemons & Row (1991, pg 277-278) introduced approach that IT investment in the company can be strategic necessities or the source of competitive advantage which can be called strategic advantage. They argued that there are several factors, which could help to distinguish if IT resource is an advantage or necessity:

- The barriers to duplicating which could be patents, trade secrets or lack of technical expertise in the organizations.

- First-mover effects. This involves high customer switching cost or dynamic economies through learning and continuous innovation in favour of the innovator.

- Enabling changes in the underlying industry characteristics, such as when IT influences costs and differentiation in a unique way for the innovator.

Hedman & Kalling (2002, p.146) mention that at the time those factors were presented, they were based on fairly recent resource-based view theory.

From the two different views, we argue that the view from Barney and Clemons & Row are more suitable for our case. We would like to find out if the firm is using IT as the strategic advantage not to try to determine if the firm in this industry holds a cost leadership or differentiation.
2.5 Supply Chain

Waters (2003, p.32-33) explains that in the past firms usually have large numbers of suppliers while nowadays the firms tend to reduce the number of suppliers and develop long term relationships with them instead. There are certainly more collaborations along the supply chain as organizations realize that they have the same objectives. They consider that it is better to cooperate with each other to get the final customers’ satisfactions instead of competing with each other. Competitors are now moved from other organizations within the same supply chain to other organization from other supply chains. Ballou (2007, p.332) also expresses in his article that 'Collaboration among supply chain members is at the heart of SCM and will be the key to its future success'

Cortada (2001, p.174-175) stated further about the benefits of SCM that it was drawn with the collaborations between trading partners. SCM could reduce operating cost, capture additional market share and more business opportunities emerged. Another similar view on the benefits of the well management in the supply chain is from Knill (1998, p.1). He stated that the improving information flow could result in reduction in inventory, improvement in customer service, improvement in customer satisfaction, and decrease in total costs.

2.5.1 Just in time and Quick response

Blackburn also has the big concern over the time issue. Blackburn (1991, p.24-25) introduced *Just-in–time (JIT)* as the concept of which providing manufacturing with the flexibility and speed essential to meet global competition however managers can also develop similar capabilities in nonmanufacturing functions. Blackburn (1991, p.24-25) claimed that many experts and managers viewed JIT through blinders and perceived it as only the system for inventory reduction and material control. To Blackburn (1991, p.24-25) Just-in-time is the key to entire time-compression process. It can be also used compress the time in other segments of delivery chain. He suggested that the concept is about being on time not the inventory system alone. Blackburn gave many examples of successful companies implementing JIT in their manufacturing. Blackburn suggested some examples of how a company can implement JIT outside the factory. He (1991, p.117-221) mentioned about the shorter distance between the suppliers’ plants and customer firms, reduction in handling movement which involves the handling of shipping and receiving departments, training the personnel to be able to perform multitask, and delivering smaller quantities to more than one customer per day with the certain time schedule.

Kanban techniques is also mentioned by Blackburn (1991, p.222) that from the original containers and Kanban card methods, some companies nowadays have adapted the concept and applied ‘garment on hanger’ where the clothes moved from the containers to the retailers’ shelf without the unpacking, repressing and hanging costs. One important aspect mentioned by Blackburn (1991, p.223) is the partnerships in the quality control circles. The manufacturing firms need to develop circles that include vendor, shipping firm and the customers.
Blackburn (1991, p.248) describes **Quick response** as the concept in relation with basic marketing. QR (Quick response) is a consumer-driven strategy which substitutes the traditional push system with the pull system. The aim is to let the customers decide what they want instead of trying to forecast what they want. This is involved the concept of getting the right product at the right place at the right time and at the right price.

### 2.5.2 Supply Chain Theory

Supply chain shows how partnering organizations are linked together. Simple supply chain links a company that manufactures or assembles a product with its suppliers and its distributors and customers. (See Figure 3).

It involves three parts:

**Upstream supply chain.** This part includes the organization’s first-tier suppliers and their suppliers. Such relationship can be extended, to the left, in several tiers, all the way to origin of materials.

**Internal supply chain.** This part includes all the processes used by an organization in transforming the inputs of the supplier to outputs, from the time materials enters the organization to the time that the products goes to distribution outside organization.

**Downstream supply chain.** This part includes all the processes involved in delivering the product to final customers. *(Turban et al 2001, p.115-116)*
2.5.3 Supply Chain Subsystems

Supply chain can consist of four subsystems. The first is the "Decision System," which is responsible for making managerial choices. The second is the "Information System," which includes groups of procedures, people and machines to collect, process, store and disseminate information from all companies’ subsystems. The third is called "Operating System" and is responsible for a set of planned activities involving many human and physical resources to perform various actions, allowing the supply chain system to function and to produce its outcomes, i.e., products and/or services. Finally, the fourth is the "System Environment," which represents the sum of the existing surrounding conditions and forces by which the other subsystems are influenced. Note that it is important here to distinguish the "system environment" from the "object environment." The former represents involving conditions where the supply chain system exists, while the latter represents inclosing conditions where the object to be simulated operates. These subsystems interact with each other. (Santa-Eulalia, et al., 2008 p.106)

As suggested by Figure 4, each layer can be seen as a continuum between human-based and machine-based elements. On the left side, managers, accountants and manual operators are examples of pure human-based decision system, information system and operating system respectively, while APS, ERP and CNC machines are examples of pure machine-based. In reality, most of the activities in a supply chain are done by both machines and humans. (Santa-Eulalia, et al., 2008 p.106)

These systems may simply represent an internal supply chain (e.g., only one company with all its production sites and distribution centers) or part of a given supply chain (e.g., the Original Equipment Manufacturer, its first tier suppliers and its first tier clients) or even the whole
supply chain (e.g., from the source of raw-material to the final consumer). Besides, these systems can also be used to study various supply chains together, as for example concurrent or linked supply chains. (Santa-Eulalia, et al., 2008 p.106)

### 2.5.4 Problems along the Supply Chain

The problems along the supply chain system mainly occur from uncertainties and from the need to coordinate several activities, internal units and business partners. (Turban et al 2001, p.118-119)

The major source of supply chain uncertainties is the demand forecast, which may be influenced by several factors such as competition, prices, weather conditions, technological development, customers’ general confidence, and more. Other uncertainties exist in delivery times which depend on many factors ranging from machine failures to road conditions and traffic jams that may interfere with shipments. Quality problems of materials and parts may also create production delays. (Turban et al 2001, p.118-119)

A major symptom of poor SCM is poor customer service, which hinders people from getting the product or service when and where needed, or gives them the product of poor quality. Other symptoms are high inventory costs, loss of revenues, extra cost of expediting shipments, and more. (Turban et al 2001, p.118-119)

Waters (2003, p.31) mentions that companies are striving for lower cost so that they will be competitive in the market while they have to also maintain their service level. The key factor to offering the features that the customers want at the level of service they are willing to pay for is to minimize the lead time; the total time between ordering the material until it is available for use, as close to zero as possible. One approach suggested by Waters (2003, p.31) to solve the problem is *synchronised material movement* where all parts of the supply chain have the access to the information at the same time. Waters (2003, p.31) states that Direct Delivery is also help to shorten the lead time as well as reduce the costs at the same time.

### 2.5.5 Demand management

The importance of demand management is being increasingly recognized in the wider operations management and supply chain management literature. A number of authors treat demand management as an activity essentially carried out by individual firms. They emphasize that an important component of demand management is finding ways to reduce demand variability and improve operational flexibility, in order to facilitate consistent planning and cost reduction. Authors define its scope as including activities, which range from forecasting, through converting customer orders to promised delivery dates and as the mechanism for balancing supply and demand. (Taylor, D.H., 2006)
2.5.6 Inventory control

The ideas of inventory control are varied. Boylan et al. (2008) mentioned that different kinds of stock require different methods of forecasting and stock control. However; from their point of view, the previous research could not reveal how the managers should forecast their inventory management. But according to Weil, M (2000), it is possible for the managers to make the forecast with the software solution. He mentioned also further about the benefits that the company will get from better planning and forecasting of inventory. Those benefits are as such the improvement of its operational efficiencies as well as the increasing customer satisfaction.

Moreover, Nowlan (2008, p.26) wrote about the struggles of business owners in order to save cost under the downturn of economy. Some companies try to save cost through looking for the holes in their inventory system, while the others are trying to increase the efficiency of their inventory system by inputting as up-to-date information as possible. Parry, T (2006, p.50) purposed another idea of how the company could have gained more profits. The term used is phantom demand which represents the orders that the customers could have taken if the company had kept those products in stock. According to him, some software solution can handle with this issue.

There is also a strategy called ‘cross-docking’ mentioned by Sumner (2004, p.134) in which the goods are moved from inbound trucks to outbound trucks directly. This means the company does not need to store the goods at the distribution centre. This approach can increase the cash flow in the retailer’s end and reduce the handling cost.

2.6 SCM and Information Technology

Nowadays since IT is involved in every step of operation in each company, it is not a surprise that the Supply Chain Management with IT support is widely adopted by the organizations. Talluri (2000, p.221) makes the comment that the advances in IT/IS systems have given the organization opportunities to transform the way they manage their business. Internet has allowed organizations to share information regardless the geographical boundaries.

According to Simchi-Levi et al. (2003 cited in Auramo et al. 2005, p.82), the objectives of IT in SCM are; for example, to provide the information availability and visibility to supply chain partners, to enable the collaboration with organizations in the supply chain and to allow the decision making based on the total supply chain information. In addition, according to Cortada (2001, p.172), both large and small companies could participate in SCM with minimal capital investments; however the larger firms usually spent millions of dollars and many years of work on SCM and ERP projects in order to implement those offered packages like SAP. The big business management change in fact started since 1990s in which the organizations applied the business process based electronic commerce as well as the ERP system to their operation. (Zmud 2000, p.147) The view also is supported by Auramo et al. (2005, p.82) as the authors state that the most common information technology for SCM are ERP, EDI, (system to system integration, internet, extranet, electronic B2B marketplaces (web portals).
2.6.1 ERP System

According to Somers and Nelson (cited in Sumner 2004, p.3), ERP is evolved from reorder point systems since 1960s to MRP (material requirement planning) during 1970s to 1990s. And since late 1990s, the present ERP was released. It is the integrated system between manufacturing and supply chain process across the firms that allows information flow between suppliers, manufacturing, distribution and customers.

ERP systems are designed to revolve around a single comprehensive database. This database is made to be available across the enterprise and passwords are usually issued to allow certain access to some parts or all parts of database for the concerned personnel only. The real-time system generated by the ERP system function, eliminates many cross functional coordination problems. Figure 5 shows the typical application of ERP systems which support both the back office process as such manufacturing and front office operation as such customer service. The biggest suppliers of ERP packages are SAP AG, Oracle and Baan. (Krajewski et al. 2007, p.624-626)

Sumner (2004, p.4-5) explained that ERP system gives a lot of business benefits. After implementing ERP system, the company can achieve integrated information system, integrated database, and common interface across the system, consistent real-time information. For supply chain management, ERP offers the linkages with suppliers and customers. ERP integrates
information throughout the supply chain which means the company can achieve cost reduction, inventory reduction and improved operating performance.

<table>
<thead>
<tr>
<th>Primary Activities</th>
<th>Inbound Logistics</th>
<th>Operations</th>
<th>Outbound Logistics</th>
<th>Marketing and Sales</th>
<th>Service</th>
</tr>
</thead>
<tbody>
<tr>
<td>Function</td>
<td>Material Handling; Delivery</td>
<td>Manufacturing: Parts assembly</td>
<td>Order processing; Shipping</td>
<td>Advertising; promotion</td>
<td>Service; Repair</td>
</tr>
<tr>
<td>Information system supporting primary activities</td>
<td>Automated warehousing system</td>
<td>Manufacturing control system</td>
<td>On-line order entry systems</td>
<td>Marketing analysis system</td>
<td>Remote machine diagnostics</td>
</tr>
</tbody>
</table>

Table 1: The Value Chain Primary Activities

(Sumner, M 2004 p.18)

Sumner (2004, p.18) also explains how ERP can provide value-added feature to the product or service. See table 1. This view is related to Generic Value Chain by Porter and explains how information system, ERP, can support the activities throughout the value chain. With ERP system, the company can plan and control all tasks along the business value chain. Suppliers can link directly to manufacturers, manufacturers to retailers and retailers link to the customers.

It is mentioned by Sumner (2004, p.132-134) that in the old supply chain, companies supplied the products to the customers from stock they had on hand while in the new demand chain, the companies manufacture and supply the products according to the customers’ needs. In regard to the new supply chain relationship, manufacturer can maintain the retailer’s inventory through POS system as such in Wal-mart case.

2.6.2 Integration of SCM and ERP

SCM systems are integrating operational data about suppliers, inventory production capacity, warehouses, distribution centers, products and the components of products, delivery terms, prices and orders, and According to Hedman & Kalling (2002, p.170-172) SCM systems are solving the two major business requirements: global inventory visibility and available-to-promise. Global inventory visibility shows how company can track and trace all materials and available-to-promise shows the ability to know when it can deliver. To be able perform these actions SCM systems have to be integrated with other IT resources in the company. In nowadays the main information resource in the company is ERP system. In Table 2 is shown the classification of the different degrees of “maturity” within SCM.
### Early stages of SCM
- MRP II systems in production planning
- No EDI links to external cooperation partners
- Low/poor degree of system integration
- Barcoding only on final products
- Intranet/Extranet used primarily for correspondence

### Advanced stages of SCM
- ERP system implemented
- APS system used as decision support
- EDI links to important cooperation partners
- Use of barcodes to track-and-trace throughout the supply chain
- ECR with important customers
- Intranet/Extranet used in purchasing and sales
- VMI with selected customers
- CRM/SRM for management of customer/vendor base

### Information Exchange
- Ordering by fax, phone, or e-mail
- Access to customer/supplier warehouse status
- Harmonizing of warehouse stocks in the supply chain

### Information Exchange
- Ordering by Internet/extranet
- Production planes and sales prognoses accessible for suppliers
- Vendors influenced in product development
- Mutual access to cost calculations

<table>
<thead>
<tr>
<th>Information Systems</th>
<th>Early stages of SCM</th>
<th>Advanced stages of SCM</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>• MRPII systems in production planning</td>
<td>• ERP system implemented</td>
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<td></td>
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</tr>
<tr>
<td></td>
<td>• Intranet/Extranet used primarily for correspondence</td>
<td>• ECR with important customers</td>
</tr>
</tbody>
</table>

Table 2: Stages of ‘maturity’ in implementation of SCM
(Jespersen & Skjott-Larsen 2006, p.39-40)

Koh et al. (2006, p.455) suggests that the aim of ERP is to improve internal efficiency while the aim or SCM is to improve and manage the external relationships with the supply chain partners. As ERP allows the information flow within and between organizations, the integration between ERP and SCM should be considered necessary. SCM and ERP both rely on the similar framework as such intranet, extranet and electronic data interchange and in this case it was even said that ‘ERP is the backbone of SCM’. Most ERP system providers nowadays have already provided their products with sales-force automation, data warehousing, document management, after-sales service as well as the integration with SCM. In this view, the integration between SCM and ERP should increase both internal and external operational efficiency.

#### 2.6.3 Electronic Data Interchange (EDI)

Blackburn (1991, p.224) explained that telecommunication technology as satellite communication systems, bar code scanners and transmitters, and EDI offered the opportunities for improved performance in supply chain management. This view is also expressed by other authors as follow.

According to Cortada (2001, p.172), EDI or electronic data interchange was helping the business by allowing the information shared across multiple enterprises particularly in manufacturing industries. Waters (2003, p.30) explains that the early users of EDI were supermarkets where
they linked their stock control systems to their suppliers’ order processing system. When the stock was low, the system sent the message requesting for another delivery automatically.

According to Leonard & Davis (2006, p.225) EDI have wide ranges of benefits. EDI can be a tool to gain competitive advantage as of its speed of transmission. It reduces the paper flow between organizations which result in the cost reduction, increased speed, improved information accuracy and reduction in the clerical errors. Order entry becomes faster, more cost efficient and without any error from the manual re-entry. EDI should also reduce inventory and inventory cost by the lead time reduction.

But not all the companies are successful in EDI implementation and even many of them do not want to implement it. It is suggested by Mossinkoff & Stockert (2008, p.90) that smaller companies tend to be reluctant to implement EDI as they have the perception that the bigger companies will gain most of the benefit eventhough in reality the whole chain would gain the benefits from EDI. Another case which organizations do not succeed in EDI implementation is that they lack of technological readiness both of the systems themselves and as of employees. Moreover the managerial commitment is also playing an important role in the success of EDI implementation.

Waters (2003, p.30) explains further that there are two others technologies supporting EDI. The first one is the item coding which is the tagging on each package. It can be in the forms of bar code or magnetic stripe. The other one is EFT (electronic fund transfer) in which the system will automatically debit the customer’s bank account and credits the suppliers once the delivery of ordered material is acknowledged.

Bichescu & Fry (2007) mention in their article that EDI helped to emerge Vendor-managed inventory (VMI), which takes the collaborative efforts beyond information sharing and allows the supplier to exercise some amount of control on the actual inventory levels at the retailer. Under a typical VMI agreement, the supplier controls the order quantities delivered to the retailer, possibly subject to contractual limitations specifying minimum service level requirements. Both partners can agree on more precise guidelines for minimum and maximum inventory levels also when to transfer the ownership and to make the payments. This solution helps to eliminate duplicate functions between vendor and customer, delays in deliveries and etc. (Jespersen & Skjott-Larsen 2005, p.95)

2.6.4 From Barcode to RFID

Attaran (2007, p.250) mentioned that Barcode has been used since mid-1970s and it has become important for all industries. The barcodes has proven to help improve product tracking over multiple retailers, reduce labour costs, and shorten the speed of product replenishment. According to Suzanne (1992, p.58), Bar coding already became the technology for fixed asset physical inventories since 1992. Suzanne (1992, p.58-59), pointed out that the benefits drawn from bar coding system over the manual inventories can range from improved efficiency,
improved quality of data to easier reconciliation. The improved efficiency is because Bar code technology can be conducted two to three times faster than a manual inventory. Moreover, bar-coding system can eliminate manual entry errors which occur approximately one out of 300 characters recorded in the system. And due to the fewer errors, reconciliation process becomes more easily to manage and handle. It was even suggested by Suzanne (1992, p.61), that if the company regarding any size and industry has more than 1,000 assets, it should consider barcodes system seriously.

It was mentioned by Attaran (2007, p.250) that radio frequency identification or RFID was evolved from barcodes. Anyway, RFID was first used in the 2nd world war hence it is definitely not a new technology. But RFID application for supply chain management is still new. For the present day, RFID tag is to be attached to the product since the initial stages of manufacturing. This enables to possibilities to follow the product down the supply chain. The tag can be scanned even when the product is in a box and the same tag can also be used as the price tag at the retailing store. For the consumers, the tag can be used to verify the origin of it in order to claim the warranty after purchase. RFID does not require the optically scanning the barcodes as it uses radio waves to capture the data from tags. So instead of the label and scanner, RFIS requires three primary components the tag or transponder, the reader and the computer.

Attaran (2007, p.252) explains more about the benefits of RFID that compared to barcodes, RFID infrastructure provides the organizations the better access to real-time data. In addition, since RFID increases supply chain and inventory visibility, it offers the greater operational efficiency, reduced inventory and out-of-stocks. The major benefit should be the reduced supply chain cost in relevance to the more effectiveness in managing the receiving process, inventory control, distribution, logistics delays, and out-of-stock items. For The benefits of RFID technology to warehousing, Drake & Schlachter (2008, p.857) gives the similar views to Attaran. Drake & Schlachter (2008, p.857) mention that RFID’s major benefits are the real-time inventory control, more efficient receiving operations, and the reduction in distribution cycle time.

However, Wailgum (2004, p.1) states that there are some negative sides of RFID technology as well. Firstly, the tag is expensive. This additional cost along with the labour cost for attaching the tags and the programming are not fond by the suppliers even though they will gain the benefits from the RFID as well especially for the low-cost products. Secondly, the current technology is not suitable for some products such as baby wipes and the liquids and moisture products because they absorb the radio frequency signal.

### 2.6.5 APS

According to Jespersen & Skjott-Larsen (2005, p.111) forecast is an expression of the company’s expected volume and value of sales, and is the basis for all material planning in the company. ERP system can help to create for products in groups, so that instead of having the forecast for individual items, a broader perspective can be developed. But APS systems, which have the same
functionality as ERP, are more flexible with regard to how the hierarchy of a forecast is structured, and how amounts are aggregated and disaggregated between levels.

Jonsson et al (2007, p.816) are also discussing about advanced planning systems (APS), as the recent software development that supports planning of the supply chain. According to the authors, unlike traditional enterprise resource planning systems (ERP), APS try to find feasible, near optimal plans across the supply chain as a whole, while potential bottlenecks are considered explicitly. In terms of software, APS means a broad group of software applications developed by various software vendors. During the last decade, the use of APS for design, integration, and control of supply chain processes have increased. Especially, the interest among industrial companies has increased, some have invested in the software, but only few use them in practice on strategic and tactical planning levels.

### 2.6.6 Internet Intranet and Extranet

Internet transformed the ways in which supply chain members can connect to each other. According to Christopher (2005, p.180-181), extranets revolutionised supply chain management, in the way that organizations with different internal information systems can now access data from customers on sales or product usage. This information could be used for managing the replenishment and to alert their suppliers for forthcoming requirements.

The same author states that intranet enables information sharing between the branches and facilitates information between the businesses. In Figure 6 is shown more clear information, about the influence of intranet and extranet on supply chain management.

![Figure 6: Internet application and the supply chain](Christopher 2005, p.182)
3. Conceptual Framework

In this part, we would like to introduce the selected conceptual framework for our research which is combined from different theories presented earlier in Chapter 2. We have chosen Value Chain, Supply Chain theory, Resource based view and Supply Chain Subsystems theories for our research.

From the selected theories, we have developed our framework which combines the relevant parts of each theory to our research topic. We will analyze our findings in three parts which are upstream, internal and downstream. Support activities are not included in the framework as we focus on the supply chain activities within the company themselves not the activities needed to organize them. Moreover, we have implemented Supply Chain subsystem to the framework which can give better understanding as it gives a clear idea about the combinations between human-based and machine based system. (See Figure 7)

![Conceptual Framework](image_url)

**Figure 7 : Conceptual Framework adapted for Company BETA case study**

**Upstream Supply Chain.** This part of the framework is related to the suppliers of Company BETA. We focus mainly on the activities and the linkage between Company BETA and the main first-tier suppliers. We are not covering the second-tire suppliers all the way back to the source.
of raw material as Company BETA is the distributing company not the manufacturing company and our topic area is only about the supply chain activities conducting by Company BETA.

**Internal Supply Chain.** This part is combined with Value Chain model which extends the focus to cover inbound logistics, operation and sales and marketing of Company BETA. *Inbound logistics* involves the process of how Company BETA plans orders, receives and stocks the components. *Operation* is about the modifying the products, and packing of the electronic components. *Marketing and sales* is about how the representatives of the company contacts the customers in regards to price negotiating, delivery term, distribution channel, products and services offering etc.

**Downstream Supply Chain.** This part is focusing on the customers of Company BETA. It includes outbound logistics and after sales service. This is about the processes which Company BETA performs in order to deliver the products to final customers as agreed as well as the support the company gives to the customers.

Apart from three perspective Upstream, Internal and Downstream logistics, the whole activities are controlled by three subsystems which are Decision system, Information system and Operating system. Those three systems are interrelated and interact to each other.

**Decision system** This is about the executives of Company BETA making the strategic decision regarding the direction of the company. The human based is concerning the owner of Beta as well as branch managers and logistic manager of the Company BETA while the machine based is the IT/IS used to connect between them and other parts of the company.

**Information system.** This system stands in the middle between Decision system or the top management and operating system or the resources of the company. The information system refers to the technology or ERP system used to collect, store and share the information through out the Company BETA.

**Operating system** every company perform different activities in order to reach the same result. This part is about the common practice and procedure within the Company BETA. This part involves the personnel of the company who is performing the activities within the value chain and the resources needed in order to perform them.

**Strategic Advantage** This part is placed at the end of all process as it is the aim of the implementation of IT on all activities. This is because the analysis will be based on the mapping of IT/IS implementation effort of Company BETA to their supply chain management. This is where we can determine if Company BETA uses their IT/IS as a strategic advantage or Company BETA has to have those IT/IS as the necessities for their operation.
4. Methods

In this chapter, the research method of this thesis is discussed. This chapter includes the information about what data we have collected, how we collected it, when did we collect it and from which source. Afterwards, we have explained how the data was analyzed and how we have made the conclusion. The progress of our thesis is based on Fisher (2007, p.4-5) which is explained in sequential order as follow.

4.1 Choosing a topic and designing the project

This is the first step of our thesis. The authors, as suggested by Fisher (2007, p.31), would like to write a thesis which is of interest to the authors as well as the audiences and is relevance to IT management. After the discussion, we decided to choose Supply Chain Management with IT focus as our topic and make a case study from a company.

The reason why we selected this area, Supply Chain Management and IT support, was from the personal interest and work experiences. Both authors have related work experience in logistics field and realized that information technology was involved and had impact on the work practice within organizations. As the authors are studying in IT Management program, Supply Chain Management with IT focus should also be interesting for other scholars and tutors who are the main audiences as well.

We selected Company Beta as the research company for two main reasons. First of all, it was because Company Beta is one of the leading distributors in its industry. The company ranked no. 3 in Europe. Company Beta should be a good example of how a distributor manages its supply chain. Second of all, we had the concern over the access to the information to ensure that we would be able to get the necessary information under the limited time. The problem was not then too great as one of the authors was working in Company BETA and was certain about the information availability. (Fisher, 2007 p.32) To be able to reach the required information and gain cooperation from the company is really important as it has an affect on the depth of the paper and usefulness for the target readers and practitioners.

However, after we had done the literature review, we decided to narrow down the topic from supply chain management and IT focus to supply chain activities and strategic advantage. This is because of the knowledge that supply chain management is too broad and we did not have the access to the in-depth information from manufacturing companies, suppliers and customers of Company Beta.

4.2 Writing Literature review

After we had decided the topic of our thesis, we started to make literature review. The sources of literature review are from books, dissertations and journals from database. The material covers
supply chain management and information technology in relevance to SCM. We present the literature by describing them into different groups and end with the summary of literature review for the better understanding before we present the conceptual framework.

### 4.3 Developing Conceptual Framework

We have selected several theories from several authors and framed our conceptual framework for our research. The chosen theories are based on the research topic and are developed from the literature review. The conceptual framework is combined from several theories to be the structure of our study. The main theories are Value chain by Porter, Supply chain by Turban et al., and Supply Chain Sub system by Santa-Eulalia, et al.

### 4.4 Collecting and analysing research material

The validity and reliability of the source are significant for us. We realize that the appropriate research techniques affect the validity and reliability of the results we present. More discussion about the research techniques is presented as follow.

As our main goal is to describe how a distributor like Company BETA manages their supply chain activities, analyze and discuss their performances as well as the IT support on their operations, the information should be taken from the interviews with the employees on the base of literature review. We conducted the qualitative research and collected both primary and secondary data from different sources. The data collected is based on the conceptual framework from Chapter 3 in order to cover the required information we needed.

To increase the validity of the thesis, we have attached the lists of interview questions in the appendix parts. The links between the conceptual framework and each question is described. The sources of all material used are presented clearly apart from the name of Company BETA which we cannot present here in the thesis. As the research material is kept archived, others have possibilities to re-analyze the material.

#### 4.4.1 Primary data

The primary data was from personal interview, telephone interview, e-mail correspondence and self experience. For the interview, we conducted the personal and telephone interviews with personnel of Company BETA who are responsible in supply chain management. We used different communication channels to reach those interviewees in order to gather information from employees who had different responsibilities in Company BETA. For the reliability, we selected the interviewees according to their positions and responsibilities. They have the knowledge about organization structure, work practice, as well as the problem occurring in the organization. We did not want to ask one employee about every issue in the company, as we might get the wrong information from him/her.
We used semi-structured interviews with all interviewees. This is because we realized that it would be more appropriate to let them feel free to describe what happened in the company. We also understood that there could be other interesting issues coming up during the interview apart from our scripts. And since one of the authors was working in the Company BETA, we did not have problem contacting the interviewees. The authors prepared to main questions which were based on the conceptual framework. During the interview, apart from asking the prepared questions, the authors also let the interviewees express their opinion towards each issue and their work experiences.

More details are stated as follow:

**Personal experience**

a) One of the author as Former Internal sales assistant (branch employee)

Methods used: Own source. Information taken since 10th March

The information was from one of the author who was working as an internal sales assistant. The data from this source was about company background, market position, general organization structure, business model, supply chain system. Those are mainly connected with Internal Supply system, and Downstream Supply Chain system.

**Interviews**

a) Personal interview with Field Sales Engineer (Branch Manager In Lithuania) and Internal sales assistant (branch employee in Lithuania)

Methods used: Personal interview on 22th April 2009 at Lithuania branch in Kaunas.

The authors visited Company BETA’s sales office in Lithuania for the personal interview. During the interview, interviewees, field Sales Engineer and Internal sales assistant were answering our questions together. (See appendix A for interview questions)

The interview covered whole Supply chain Sub system model (Question no. 5), upstream supply chain (Question 1-2), internal supply chain (Question 3-6) and downstream supply chain (Question 7-8) from the management and users’ perspective. The questions were about the structure of Beta’s supply chain system. We also asked about the suppliers of the company, the relationship with the suppliers and how the company managed its inbound logistics, operation, marketing & sales, outbound logistics as well as the after sales service.

We intended to find out how Company BETA kept the stock, made an order, and made the forecasting for the customers’ demand and how they managed the relationship with the customers and how they delivered the products to them. Also we intended to see in which extent that ERP as well other information technology were involved in their SCM. It was also important.
and interesting for us to know what kind of problems occurring regarding the procedures and support system? And how did they solve the problem and what are the reactions from the customer’s side?

b) Logistics manager (headquarter employee in Germany)

Methods used: Phone interview on 22th April 2009 from Lithuanian branch in Kaunas.

The author made a telephone called to the interviewee after the interview with filed engineer and internal sales assistant. The interview covered mainly the machine based from Supply chain Sub system model. The questions, however, covered all part of our conceptual framework; upstream (Question 1), internal (Question 2-5), and downstream supply chain (Question 6-7). (See appendix B for interview questions)

We intended to find out about the ERP system which was implemented and the problems occurred in the system. We tried to find out how ERP system was linked throughout the organization as well as to the suppliers and customers. And also we tried to find out about other IT/IS involved in the Supply Chain Management of the Company.

Email

For the email correspondence, the authors contacted the personnels of Company BETA to get additional information which was related to the interviews conducted earlier. The authors sent the email to the Branch Manager in order to get the information about organization structure, chart, and logistics procedure chart. And the author also contacted the logistics manager via email in order to get more explanation about ERP and logistics system.

4.4.2 Secondary data

We have had access to Mälardalen University Library and online database. For the library, we use several keywords to search for the books and dissertations about supply chain management, and IT. The keywords were SCM, ERP, Logistics, Information Technology, Supply Chain Management, and Inventory Management, Operation Management.

For the database, we chose ABI/inform global and ELIN@ Mälardalen as they cover Business Administration & Political economics as well as Innovation Technology, Entrepreneurship (including patent search) contents. Several keywords were used to find the relevant articles for examples supply chain management, demand management, logistics, Information technology management, SCM, quick response, Electronic data interchange (EDI), barcodes etc. Those are mainly for the general knowledge about supply chain management. We also gathered information from the company Beta website to introduce the company background, products range and the company mission and vision.
4.5 Interpreting research material and drawing conclusion

We have analyzed the case study in the reflection to the theories and conceptual model from Chapter 2 and 3. We have also discussed the relations between Company Beta and its suppliers and customers. The discussion also includes how the chosen IT/IS infrastructure influenced the performance of the company. We have discussed the problems occurring in their operation. At the end, we have drawn the conclusion based on the analysis of our empirical findings.
5. **Empirical findings**

As it was mentioned in introduction part, the company is originally from Germany and is privately held. Company “BETA” introduces themselves to the public that they are committed to Excellence. Company BETA’s customers are mainly European companies from high-tech industries that are operating in different industries such as automotive, consumer and telecommunications.

![Company BETA's branch location](Company BETA webpage)

Company BETA is mainly focusing on European market, but since year 2008, it has entered to Mexico and Turkey. At the moment, the company operates in 26 countries and according to the information published on companies webpage had sales of over 565 million euro in fiscal 2007, and over 1,200 staff throughout Europe. (Company BETA webpage).
5.1 Milestones of Company BETA:

<table>
<thead>
<tr>
<th>Year</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>1973</td>
<td>Establishment of the company</td>
</tr>
<tr>
<td>1980</td>
<td>Acquisition of the joint venture company Silec/RSC-Halbleiter GmbH</td>
</tr>
<tr>
<td>1991</td>
<td>Establishment of distribution branches in France and the Czech Republic</td>
</tr>
<tr>
<td>1994</td>
<td>Takeover of BIT-Electronic AG, entry to the “Displays and Systems” market</td>
</tr>
<tr>
<td></td>
<td>Establishment of distribution branches in the UK and Spain</td>
</tr>
<tr>
<td>1996</td>
<td>Acquisition of DISCOMP GmbH</td>
</tr>
<tr>
<td>1997</td>
<td>Acquisition of DIMACEL COMPOSANTS in France</td>
</tr>
<tr>
<td></td>
<td>Establishment of Swiss and Austrian companies and branches in Poland and Belgium</td>
</tr>
<tr>
<td>1999</td>
<td>Acquisition of CED Ditronic in Germany and IEC Distribution S. A. in France</td>
</tr>
<tr>
<td>2000</td>
<td>Establishment of a branch in the Netherlands and companies in Hungary and Poland</td>
</tr>
<tr>
<td>2001</td>
<td>Acquisition of TTS in Ireland</td>
</tr>
<tr>
<td>2002</td>
<td>Establishment of distribution branches in Denmark, Bulgaria and Romania</td>
</tr>
<tr>
<td>2004</td>
<td>New sales offices in Russia and Lithuania</td>
</tr>
<tr>
<td>2005</td>
<td>New sales offices in Norway, Finland, Slovenia and Portugal</td>
</tr>
<tr>
<td></td>
<td>Extension of the sales force in Denmark, Belgium and Netherlands</td>
</tr>
<tr>
<td>2007</td>
<td>Establishment of sales offices in Estonia and Serbia</td>
</tr>
<tr>
<td>2008</td>
<td>Establishment of a sales office in Mexico and of a sales cooperation in Turkey</td>
</tr>
</tbody>
</table>

Table 3: Milestone of Company BETA.
(Company BETA webpage)

As it is possible to see in Figure 9 Company BETA was growing significantly fast. The growth of number of employs and turnover stopped for a while only during the economic crisis in 1999-2002.

Figure 9: Development of employment and turnover up to 2008 in Company BETA.
(Company BETA webpage)
5.2 Product and Service Range

Company BETA is focusing on four main types of products and services: Consulting, Components, Logistics and Support.

5.2.1 Consulting

Company BETA builds European network of consultants comprising sales engineers, application engineers and product specialists. All these specialists should support the customers with the full range of technical and commercial issues regarding to the business. As it was mentioned in the beginning, Company BETA has 26 branches and tries to enter to new markets outside the Europe. (Company BETA webpage)

If the customers want to get information, they can send inquiries to the center, which would redirect them to the branches in their own countries or the branches in other countries, which take responsible for the area. For technical information, they can contact directly with the specialists from the headquarters in Germany. (Company BETA webpage, Personal experience)

Company BETA also has webg@te application on their webpage, there the customers can access product catalogue and to see the prices for small quantities. The application is connected to the ERP system to show up to date information. Customers have to register in the webg@te and have to leave the information about their company in order to get password for login. All activities of the customer in webg@te portal are tracked by the system and the sales personnel can see the report about what kind of components the customer was interested in. This information helps for sales personnel to prepare for visits also customers are provided with all information they need. (Company BETA webpage, Personal experience)

All new employees have to take two-week courses in the company headquarters in Germany. During the training period, employees are introduced with the structure and policies of the company. They get background knowledge about all the components which Company BETA is selling and gets better to know the persons who are responsible for those components in the company. During the second week, trainees are working together with sales persons in order to get more experience and learn how the system works. Also all the people who are participating in the courses are required to work in the warehouse for one day. The tasks include sorting the components, packing them, and preparing for storing or delivery. (Personal experience)

From the personal experience of the authors is known that the Company BETA created tool in intranet for faster search of the components according to given description by the customer. The application is based on a "Windows like" GUI making it easy to use. The developers of this application told that the main idea is that every person in the company even the cleaner could use the component search without any problems. The search engine is connected directly to the ERP system and provides real time information about the stock and price.
5.2.2 Components

The product portfolio is really wide: semiconductors, passive components, electromechanical components, storage technologies, displays and embedded boards and wireless technologies. (Company BETA webpage)

Every group of components have the department, which deals with all activities related to them. In Figure 10 shows the structure of passive components department in Company BETA. Department consists of certain number divisions according to the type of components. In the case passive components department it is separated to six divisions: fixed resistors, variable resistors, electrolytic capacitors, film/tantalum capacitors, ceramic capacitors and inductors. Every division has the senior manager, which is responsible to the head of department. Division also have Field Application Engineer, Product Sales Managers and Materials Administration Managers. (Interview with field sales engineer)

Field Application Engineer gives solutions for the customers. He offers which components to use, gives technical information. Also during the visits to the customers introduces new technologies offered by suppliers of Company BETA. (Interview with field sales engineer, Personal experience)

![Diagram showing divisions and personnel in Passive Components Department in Company BETA](image)

Product Sales Managers are responsible for pricing of the components and for putting of that information in ERP system. They can get better price from suppliers if the customer is buying in bigger quantities. Interview with field sales engineer, Personal experience)
Materials Administration Managers are responsible for ordering and deliveries of the components.

### 5.2.3 Support
According to the information from Company BETA webpage, they also provide customers with on-site support, online services, newsletters, data books, PCNs and many other tools during evaluation and design phase. (Company BETA webpage)

### 5.2.4 Logistics
The Logistic Department in Company BETA covers two activities: Logistic and Courier Control. Courier Control is dealing with curriers, who are delivering components in and out of the company. They are solving the problems, when there are delays in delivery or components are lost on the way. (Interview with Logistic manager and Company BETA webpage)

Logistic activities in Company BETA are supported by five divisions: Order Entering, Logistic Systems, Supply Chain Solutions, Logistic Centers and Import/Export. (See Figure 11) (Interview with Logistic manager and Company BETA webpage)

Order-entering division is responsible for entering the orders for components, which were sent by sales personnel from all the branches of the company. Not all the companies are using EDI format with possibility to put the order directly to the ERP system company BETA. It is time consuming procedure and in order not to hold additional personnel in branches was created Order Entering Division. (Interview with Logistic manager and Company BETA webpage)

The division of Logistic Systems is working with replenishment systems, which are coordinated directly to customer’s production workflow. Company is taking responsibility for continuous goods supply. At the moment Company BETA is offering three types of such systems: Consignment Stock, Kanban and Ship to line. (Interview with Logistic manager and Company BETA webpage)

**Consignment Stock.** Components are delivered according to the time plan of the customer and stored in his warehouse. Inventory items remain the property of Company BETA until call-off, so that components supplied are only invoiced when actually withdrawn from stock. The customers also do not need to make the payment every time the products are delivered which can be many times a month but only make the payment once a month according to the items used. (Interview with Logistic manager and Company BETA webpage)

**Kanban.** Components are ordered and reserved in the warehouse for the customer, which uses this Kanban system. Customer has only to request for the component in required quantity. KANBAN enable the shipment of smaller quantities, which are really in need for the production. (Interview with Logistic manager and Company BETA webpage)
**Ship to line.** Company BETA is delivering components not to the warehouse of the customer, but directly to specific address at department level, or the work place. (Interview with Logistic manager and Company BETA webpage)

Company BETA is using Min/Max tool for control of Consignment Stock. For every type of components according to the information from the customers are set minimum and maximum limits for the quantity in the warehouse. Then comes the time to send the components for the customer, the ERP system of company BETA is checking if the amount in the Consignment Stock is lower than minimum limit. If yes, then is generated the order to increase amount till maximum limit, if not – the order is not generated. To make the system work efficiently, customers have to give the information about how much did they take from Consignment stock. (Interview with Logistic manager and Company BETA webpage)

**Supply Chain Solutions Division** is consulting customers in order to offer best suitable individual solution. It is analyzing corporate processes in order to eliminate cost drivers and increase efficiency. (Interview with Logistic manager and Company BETA webpage)

**Import/Export Division** is responsible for delivery of the components to the company and sending them to the customers. They are dealing with suppliers and customers in order to offer best ways for delivery. (Interview with Logistic manager and Company BETA webpage)

**Logistic Centers Division** combines all the warehouses of the Company BETA and is responsible for proper function of them. Almost all logistics activities are performed in and around main headquarters of Company BETA in Germany. Company has one big distribution point and 3 warehouses. Only one warehouse A is at the same area as company's headquarters. In this warehouse expensive components, such as displays, memory cards and etc., are stored.
All other warehouses and distribution point are in 10-15 km distance. See Figure 12. Company BETA is preparing to build one big warehouse, which would combine all the functions of the present ones, but this will happen only in two or three years. (Interview with Logistic manager and Company BETA webpage)

![Figure 12: Locations of the warehouses and distribution point.](Company BETA webpage)

Suppliers from all around the world are delivering components to the distribution point. Depending on the quantity and location of the supplier there are possible ways of delivery: trucks, planes or containers. Trucks are mainly used by European suppliers, plains for fast deliveries and containers are coming from Asian countries such as Taiwan, South Korea and China there big partners of company BETA such as Samsung or Yageo have they factories. (Personal Experience)

The biggest suppliers of Company BETA are getting orders with the help of Electronic Data Interchange (EDI). Company BETA has connected its own ERP system to the systems of the suppliers. But there are different routines inside the company how to send the order for supplier, because components are classified in three categories A, B and C: (Interview with Logistic manager)
**A category components.** Fast moving and inexpensive components that have big demand on the market. It can be resistors, capacitors and other small components, which are mainly used in electronic industry. These components must be always available on stock and it has to be 80% of the total number of the components in the warehouse. (Interview with Field Sales Engineer)

**B category components.** Components, which have not so big demand on the market. Mainly ordered by request of the customers, small amount of these components could be hold in the warehouse. It has to be 15% of these components from the total amount of the components in the warehouse. (Interview with Field Sales Engineer)

**C category components.** Specific components, made only by request of the customers. Also known as Non-Cancelable, Non-Returnable (NCNR) Products. These products refers to a product purchased under a written contract that specifies once the order is placed, the purchaser is not allowed to make any cancellations or reductions to the order, nor are they allowed to return product, except for warranty resulting from product defects (NEDA n. d.). It has only to be only 5% of these components from the total amount of the components in the warehouse.
warehouse. (All material flow inside the company is shown if Figure 13.) (Interview with Field Sales Engineer)

The average lead-time of the components from the suppliers is about 10 – 16 weeks. But depending on the component it can be 2-3 weeks for switches or 30 weeks for specific capacitors. In these days during the economical crisis, suppliers improved their lead times, because the demand for components has decreased. But also of the crisis Japanese manufacturers had to increase the sales prices, because the rate of YEN has changed. Branch manager mentioned one manufacturer “Murata” as an example of that. Lead times for the components have improved, but the prices have been increased and the customers do not want to purchase the production of that supplier anymore. (Interview with Field Sales Engineer)

Then the order or the forecast for A category components is placed by the sales department in the system, at the end of the day it is sent automatically with all other orders in EDI format directly for the supplier. Supplier places the delivery schedule for the components according to his possibilities. The order for B and C category components has to be approved by the person who is responsible for distribution that component and send with the help of EDI or via email, because not all the suppliers have possibility to use EDI. Some big customers have also connected their ERP systems to the system of company BETA and uses EDI format for entering the orders. (Interview with Field Sales Engineer)

At the end of the year, the balance in the warehouses is checked. The amount of the components in the warehouses should not be bigger then the amount which is placed in orders and forecasts. So the person who is responsible for the certain group of components changes delivery dates or moves the orders for the next year. At the same time branches of the company BETA who reached the yearly plan of turnover and do not want to place new orders, because they are afraid that turnover plan is going to be increased too much, are waiting to place the orders in the first days of January. Because the demand for the components was unpredicted, around the February and March there are uncovered gaps in delivery schedule. Because the delivery time for big part of A category components is about 15 weeks, big amounts in containers are coming to the distribution point of the company BETA at the beginning of April. This situation causes “jam” at distribution point. The personnel do not have additional resources to deal in this situation, so the components are waiting in the row for 3-4 days before they are going to be unpacked and sorted. Such situation causes dissatisfaction between the customers, because they don’t know the precise delivery time. According to the data from interviews this year situation has improved, because not so big amounts of components are ordered also the rules inside the company there changed. (Interview with Field Sales Engineer, and internal sales assistant)

It was mentioned during the interview with the branch manager, what some product sales managers, who are responsible for B category components, in order to have good balance results in the warehouse, are making orders only by request of the customer. They do not want to have any additional amounts on stock. And then the customers are asking for that type of components, sales person can only give information about the lead-time. Mainly the customers do not want to wait for a long time, so they the same components from other distributor.
When the components come to the distribution point, they have to be unpacked, sorted and counted. (See Figure 14) All operations are done by hands, no scanners are used to read the barcodes and store the information in system. After all necessary operations the components are ready to be transported to the warehouses by company’s trucks. It takes about one day before the box with components is placed on its shelf in the warehouse. The ERP system does not show any information when the components are coming to the distribution point, the information is shown when they reach the distribution point only. Also no information is given then the components are on the way to the warehouse, it is updated then the components are placed in their shelf and only when sales personnel can see the information that the components finally have arrived. This information is necessary for the customers because they have to plan, when the components are coming to them. In this case the only solution is to call to the Logistic department and to find out the situation about the components. (Personal experience, interview with the logistic manager)

Figure 14: Material flow and activities inside of Distribution Point in Company BETA
(Email correspondence with Logistic Manager)
In urgent cases it is possible to fill the form in Lotus Notes email system. It is necessary to show the order number, the customer and the component. All this information comes to the distribution point to one person who is responsible for priority shipments. Then the components arrives he takes the necessary quantity and sends them out with express courier. (Internal sales assistant)

From the distribution point components are sent to the Warehouses A, B or C. Warehouse A has additional security, because expensive components are stored in it. Warehouse B is the main warehouse of the company BETA and Warehouse C is additional warehouse also called “Pallet Warehouse”, because big quantities of some components are stored in it. (Interview with Field Sales Engineer, and internal sales assistant)

All the information about the components in the warehouses is stored in the ERP system. It is possible to see the quantity, in which warehouse and in which location it is stored. Then the storing time is to the end system gives notification to give priority for those components. (Interview with Field Sales Engineer)

From the personal experience, which was gained during the training period in the company, is known that the company does not use scanners in the Distribution Point. It was one attempt to use them there, but they had not enough memory, and it was necessary to interrupt the necessary procedures quit oft, in order to place the information in to the ERP system. The scanners are used only in the warehouses then it is necessary to prepare the shipment for the customer. The necessary amount of the components is taken from the storing place, scanned and placed to the package. This information is shown directly in the ERP system.

Sometimes ERP system can give wrong information about the quantities on stock. It shows, that the certain amount is on stock, but then is time to send it, it is not possible to find it. This can happen if the workers in warehouse made mistakes and forgot to update information in ERP system. (Interview with Field Sales Engineer, personal experience)

![Figure 15: Linear resistor](Company BETA webpage)

In Warehouse B not only components are stored, but also additional services are implemented. Company BETA separates customers in two types: Normal Customers and Logistic Customers.
Normal Customers are those who are buying components in not big quantities and not regularly. Almost all new customers gets this category and only after some time, they status can be changed to Logistic customer. Logistic Customers are buying components in big quantities, they have signed the contracts with company BETA. These customers get additional services such as labeling and kitting for free. Labeling means that the components get the stickers with the barcodes and the codes of those components in customer system. In kitting entire sets of components are assembled to customer order specifications and delivered as a complete set or kit. Also by request of the customer and for additional cost some components can be formed according to the requirements of the customer. Good example of such components could be linear resistor (See Figure 15). Legs can be formed in required angle and length. (Personal experience, interview with logistic manager)

To send out the components for the customers is possible in two ways: manually or automatically. It depends on the command, which was entered. Where are two types of delivery: normal and fast. Normal delivery takes about 3-4 working days, depending on location of the customer. And fast delivery, which is operated by DHL Express takes 1 day. Depending on the case, sales personnel can order the request to send the components the same day or tomorrow. But adding the request to send the components at the same day is only tolerated in urgent cases, because it is additional task for workers in the warehouses. (Personal experience)

Sometimes when there is not enough components in the warehouses or someone entered the order or forecast for some additional quantity before, sale personnel gets the notification that it is not possible to send that amount of components for the time which was requested by the customer. But it is possible to ignore that notification by just simply entering the command OK, even if the Product Sales Manager normally should perform this action. Some sales persons enter their orders not paying attention to those notifications and send out components. During the interview with the branch manager in Lithuania he told about the case from his personal experience. One company from Lithuania was ordering specially produced and customised displays from Sharp. The order was for 155 units and then it is fulfilled Sharp would not produce this type of displays anymore. But sales person from other branch of Company BETA managed to take 15 of these displays and to send them to the customer in his own country. There was the bug in the system before, which also helped to erase the notification mentioned above, but it was fixed after some time. (Personal experience and interview with field sales engineer)

During the interview with field sales engineer, there was mentioned another bug in ERP system, which helps for sales persons to see the information about the buying price of the component, when they enter certain command, even if this information should not be accessible to them. The official information about the selling price is shown with margin, which is necessary for the company, but the sales persons are also using the information about the real buying price, then they prepare the offer for the customer.

Branch manager (Field sales engineer), during the interview, also mentioned about negative aspects of having few components storing places instead of one. The same components can be stored both in Warehouse B and Warehouse C. And then there is the request to send the
components for the customer and there are not enough of them in Warehouse B, rest of the order has to be sent from Warehouse C. In this case the components are not reaching the customer in one package and even with delay of one or two days. At the same time customers are getting two invoices for covering the cost of delivery. This situation is topical for Normal Customers, because Logistic Customers do not have to cover the cost of delivery.

In such cases, when customers want to get money back for double charging or also then the wrong components were delivered, In case if the customer has complaints about additional costs of delivery, wrong components and etc., sales person has to fill the form in Lotus Notes email system and to wait for decision what to do in certain situation. The permission for returning of the money is coming quite fast and the customer gets notification about that. In case of returning back the components it takes more time, because at first has to be found the reason for the failure if it was not the mistake of sales personnel by entering the order. The component-storing place has to be checked in order to fix the failure and to protect other customers from similar mistake and only after that Product Sales Manager gives the final decision what to do. (Personal experience, interview with internal sales assistant)

5.3 IT and IS Infrastructure

In Company BETA, centralized IT infrastructure is used. Main server based on IBM architecture is placed in the headquarters in Germany. All other branches are connected to it through VPN. Some countries such as France or Italy with few sales offices inside the countries have their own local servers, because they have all the programs running in their native language, but they are also connected to the main server for real-time information updates. (Interview with Logistic manager, Personal experience)

Dell personal computers and laptops are used in all branches of the company. All computers and laptops are customized with standard Windows XP operation system and Lotus Notes email system. (Interview with Logistic manager, Personal experience)

Company BETA’s logistic manager expressed during the interview that Company BETA is using alpha.px2 ERP system offered by Bison Schweiz AG (Bison Group n. d.). This system was chosen because Company BETA is mainly working on IT and IS solutions offered by IBM, which is the partner of Bison Schweiz AG. The implementation of the ERP system started in 1996, then the company begun the expansion. (Interview with Logistic manager)

According to the information from IBM webpage, Alpha.px2, is ERP Solution software targeted towards Wholesalers, Retailers, Logistics and Industrial concerns. It is part of the IBM/Partner family of NEW AGE Software solutions. Alpha.px2 can function over an intranet or the Internet and is equipped with a "Windows like" GUI developed using Java. This means it can be accessed and operated through Internet browsers (IBM n. d.,)
Alpha.px2 provides Company BETA with the Advanced Planning and Scheduling (APS) software, which should help forecast the inventory and capture the demand for certain components. But as it is known from the interview with the logistic manager, they are not so satisfied with this solution. It is working with the data which ware added during the night, after the working day and the forecasts are not so correct. It was mentioned, what the similar solution provided by SAP, gives more accurate information because it is working with up to date data, which are renewed during the day. (Interview with Logistic manager)
6. Analysis

In this section, we would like to analyze the Company BETA’s supply chain management. This is answer our research question ‘Is the usage of existing IT/IS in SCM just a necessity or a key factor contributing to their success for Company BETA?’ Here we have described their supply chain management activities in regards to our conceptual framework. We have also discussed if their IT/IS are strategic advantage or just necessity for the company. We focus on the existing IT system in their supply chain management and how they have implemented it by looking through their activities.

6.1 Business model of company BETA

First of all, we would like to start with introducing the nature of Company BETA business model. The Company BETA is a distributor who buys and sells components. Company BETA is managing their SCM by applying Just-in-time strategy according to Blackburn. However, Quick Response concept is not applicable to a distributor company like BETA. According to our literature review, Quick Response (QR) is more suitable for manufacturing company as it is customer-driving strategy where the customer demands determine the production. Company Beta already has their supplier base and they offer the products according to the products range from each supplier.

From the case, this is one example of how JIT can be applied to other types of companies apart from the manufacturer, which is in relation with the view from Blackburn. Company BETA understands the need of the customers in terms of increased flexibility and speed in their operation. As Just-in-time is the key to entire time-compression process, a distributor company like company BETA can use different techniques with information technology supporting their SCM to response to the customers need for example, KANBAN, EDI system linking with their suppliers and customers, intranet, extranet, ERP system etc.

For Company BETA, they introduce their services in relation with JIT in 3 different approaches; consignment stock, Kanban, and Ship to line.

**Consignment Stock** – As stated in the findings, Company BETA will deliver the components according to the time plan from the customer. And the components will be stored in the customers’ warehouses while the items are only invoiced when actually withdrawn from stock. This system actually gives flexibility and speed both in financial and production to the customers as they can reduce their inventory cost, and have confidence that they will have the material needed at the time they need. The customers also do not need to make the payment everytime the products are delivered which can be many times a month but only make the payment once a month according to the items used.

**Kanban** – Company BETA cooperates with its customers who would like to use KANBAN system and it offers the customers flexibility as they have better control over their inventory.
KANBAN enable the shipment of smaller quantities which are really in need for the production line.

**Ship to line** – Company BETA offers the options to deliver the components to every destination required by customers. This helps to increase speed and flexibility as the customers can even have the components delivered to their production site without going through all the procedure as such receiving the products, unpacking it, register in the system, etc.

### 6.2 Company BETA’s Supply Chain

In this section, we divided the supply chain into upstream supply chain, internal supply chain and downstream supply chain.

#### 6.2.1 Upstream Supply Chain

All activities in upstream supply chain of Company BETA are controlled and operated with the help of information system, in this case ERP. Upper management is not involved and important decisions are not necessary, because only deliveries from manufacturers have to be fulfilled.

Company BETA offers their products from 155 different suppliers. Even if nowadays companies tend to reduce the number of suppliers according to Waters (2003, p.32-33), the Company BETA is not following this trend and the number of partners stays stable. This situation is more suitable for the end users of the of supply chain, and in this case Company BETA is the link between the suppliers and the end customers. They have to have big product portfolio in order to offer wide range of components in competitive price. And depending only on few suppliers would not be so good for the business, because it could not be possible to have all necessary components always on stock, in case if something happens for the supplier. Also supplier can increase the price for components, as it happened with “Murata”, one of the suppliers of capacitors for Company BETA. The value of YEN increased and they have been forced to increase the sale prices.

Despite of the big number of suppliers, Company BETA is trying to develop long term relationships with them in order to get the final customer satisfaction. Without the collaboration between these two parts it would not be possible to offer good lead times or specific components, made only by request of the customers, which are classified as C category components in company BETA.

In order to reach reduction in inventory, improvement in customer service, improvement in customer satisfaction, and decrease in total costs it is necessary to have fast information flow Knill (1998, p.1). To assure that company BETA linked its own ERP system with ERP systems of suppliers and uses EDI to send customer orders automatically in case of A category or manually in case of B and C category components. The suppliers are using the same system for order confirmation and placing of the delivery schedules. With the help of EDI suppliers are also
placing the component codes, which are used in the ERP system of Company BETA. This helps with sorting of delivered components in Distribution Point and decreases delivery time.

6.2.2 Internal Supply Chain

In the internal supply chain, we analyze company BETA from its inbound logistics, operation and marketing and sales marketing with the existing IT/IS they are using. All three subsystems: Decision, Information and Operation are involved in control over the internal supply chain. The ERP system serves as the background, which shares the information between the rests of the subsystems. It gives necessary information for APS, also combines all necessary information from the warehouses retrieved manually or with the help of scanners.

a) Inbound logistics

It seems to be problems occurring in Inbound Logistics in relevance to the usage of existing IT/IS. Company BETA have invested and therefore have the opportunities to leverage their IT/IS to gain more advantages. They could have leveraged their APS, ERP and tag coding in the more proper ways.

Starting from the material planning scheduling and ordering, in company BETA, they use APS system for their inventory management. Normally APS system can be used as decision support in the advanced stage of SCM, according to Jespersen & Skjott-Larsen. As mentioned in the literature review, many companies bought and implemented APS to their systems but most of them have not used APS in practice on strategic and tactical planning levels. For company BETA, APS is not well implemented either. It is not well integrated with their ERP system and does not give even real time data. The affect of this implementation is that the company cannot capture the phantom demand and lose the profits they could have gained if they have had the products on hand. Managers, who are supposed to have a helping tool to plan the supply chain, have to use their own initiative instead. This leads to the problem with shortage in stock during certain time of each year in order to decrease exceed stock level of some components.

And when the products are ordered and arrived, during the products receiving process, Company BETA uses their ERP system. There are also possibilities for a distributor like Company BETA to invest and leverage in bar coding or even RFID in order to have smoother and more synchronized allocation of inventory. According to Suzanne (1992, p.58), Bar coding already became the technology inventory control since 1992. This technology is not new and it can give a lot of benefits to Company BETA which are the improved efficiency and the improved quality of data.

The interesting point is that the suppliers have already placed the barcodes (tag coding) on each component according to the requirement from Company BETA. This should have allowed Company BETA to use scanner and register the components to the system easily with faster speed and less error. However, at the distribution point where all the components are sent from the suppliers, the personnel unpack, sort and count the products and then register the received items to ERP system manually. If they would invest in RFID, according Attaran (2007, p.252)
Company BETA would even gain more benefits as RFID provides better access to real-time data. It offers the greater operational efficiency, reduced inventory and out-of-stocks.

In this process, the company should have also leveraged their ERP system better by registering the items movement when they are transferred from the distribution point to the warehouses. The gap between registering the components until they are delivered to warehouses and are available on the shelf is about one day. To register it in the ERP system and give the information about the product movement during that period, the Company BETA will not have to waste the time waiting until the products are arrived at the warehouse to start informing the customers and planning their delivery to those end users.

Now that those items are in the stock, Company BETA uses EDI which links with their main suppliers to control and maintain the level of stock. For A category components, Company BETA links EDI to all the suppliers. In this case, the EDI seems to be a suitable tool to manage the inventory level as they have high and constant demand from the customers. But for B and C category components, which do not have high demand from the market or are the specific components, human based and machine based are equally important as only some suppliers are linked with Company BETA through EDI. In case that they use EDI, the purchasing managers of each component type have to approve the orders generated by EDI before actually placing them to the suppliers. For the rest of suppliers that Company BETA is not linking its EDI with, Company BETA has to place an order via email after receiving purchasing order from the customers, then wait for confirmation for the price and delivery time etc. Therefore, EDI is a useful system for Company BETA and they are implementing it quite well. It could even be a tool to gain competitive advantage, according to Leonard & Davis (2006, p.225), for Company BETA as it increases the speed of transmission.

b) Operation

Operations in Internal Supply Chain of company BETA involves planned activities, which need many human and physical resources to perform various actions, allowing the supply chain system to function and offer services. These activities could be divided into usual routine activities and performed by request of customers.

Usual activities are unpacking of the components in the distribution point, counting and preparing for storing in one of the warehouses of company BETA. At this point no scanners for capturing the information from the barcodes on the packages are used.

All procedures are made by hand and are time consuming and more than that it can create a lot of errors as suggested by Suzanne (1992, p.58-59) that manual entry errors which occur approximately one out of 300 characters recorded in the system. The information cannot be placed directly to the ERP system and is not accessible for the sales personnel. This necessary data is entered by hand only in the warehouse. The scanners are used then the components it is necessary to prepare the shipment for the customer. The necessary amount of the components is
taken from the storing place scanned and placed to the package. This information is shown directly in the ERP system.

The activities performed by request of the customers are labeling, kitting and forming of the components. The requests to perform all these operations come through ERP system and are placed by sales personnel which deals with the customers. Label with all necessary information such as barcode and component code is printed out automatically, then the package for the logistic customer, which requested for such service, is formed and necessary components are scanned. The request for forming of the components with all necessary data is generated with ERP system and send via email in Lotus Notes system.

c) Marketing and Sales

As it was mentioned before, marketing and sales is about how the representatives of the company contacts the customers in regards to price negotiating, delivery term, distribution channel, products and services offering. In company BETA all these activities are closely related with support of information system, which refers to ERP system used to collect, store and share the information through out the company.

The webpage of company BETA provides customers with a lot of information, they could need. They can contact with technical consultants, get necessary technical information or data sheets. In order to get closer to the customers Company BETA created webg@te application on their webpage, there the customers can access product catalogue and to see the prices for small quantities. The application is connected to the ERP system to show up to date information. Customers have to register in the webg@te and have to leave the information about their company in order to get password for login. All activities of the customer in webg@te portal are tracked by the system and the sales personnel can see the report about in what kind of components the customer was interested in. This information helps for sales personnel to prepare for visits also customers are provided with all information they need.

The work of sales personnel is closely related with ERP system of Company BETA, because it is the main information source at their workplace. They have the access to the information about the components, the lead times and quantities on stock. They can enter the orders into the system manually or send them to the Order Entering Division in the headquarters of the company. Sometimes ERP system can give wrong information about the quantities on stock. It shows, that the certain amount is on stock, but then is time to send it, it is not possible to find the components. This can happen if the workers in warehouse make mistakes and forget to update information in ERP system.

Because of the bug in the program of ERP system, sales persons can see the information about the buying price of the component, when they enter certain command, even if this information should not be accessible to them. The official information about the selling price is shown with margin, which is necessary for the company.
In order to full-fill the whishes of the customers and to give them quick response, company developed the search tool in intranet which is connected directly to ERP system, but a "Windows like" GUI making it easy to use and to give back the information for customer as soon as possible.

### 6.2.3 Downstream supply chain

This section is about the delivery of the products to the customers; outbound logistics, as well as the after sales service including the returning of components, consulting and training. This part is emphasizing mostly on mostly the information system, which involves how Company BETA manages the delivery of components with their IT support.

#### a) Outbound logistics

First of all, after sales persons receive the purchasing orders from the customers by any means, the sales person can check the availability of the components through ERP system. However, there is some bug in the system, which decreases its reliability and security. In this regards, the sales persons can enter specific command to relocate the reserved components of other sales persons and then deliver them to their own customers. This creates problem for the sales persons but most of all it can have an effect on customer satisfaction. This is because the customers have to wait longer until the next lots of component come and in some cases the suppliers will not even produce those specific components again. Time is always a big issue and instead of building stronger relationship with the customers, Company BETA is at risk of losing them.

This problem is directly related to their existing ERP system from Bison and the programmers of Company BETA. Although the programmers who are supposed to be aware of the bug have not managed to fix the problem, it is not only them to be blamed. The decision layers, the managers, are supposed to give importance to this problem and try to find the solution for this as well. Overall it seems that the users which are sales persons and the customers have to suffer from the ERP malfunction eventhough this problem could have been fixed without too much effort.

There are more problems caused by the management of ERP system in Company BETA. As they have separate warehouses, the centralized system should connect to financial department and issue the invoices as well as the tracking no. of the components to the customers automatically at ease. But in this case, the system does not synchronize well enough as the customers could receive duplicate bills from two warehouses or two bills from the same lot of products. And instead of sending the tracking no. directly through system, sales persons have to check and send them manually to their customers via email. This is both the waste of time, capital and the resource that they have.
However, Company BETA links their ERP to the big customers. Company BETA has been using KANBAN, and EDI to satisfy the customers with just-in-time delivery strategy. ERP system works well in this case as there are no concern about the delivery problem in this area.

If we take a look at the operation level, we can see that they use scanner in only some of their warehouses. It is linked to ERP system. The concern is the fact that they could have invested more and use scanners in both the distribution points and warehouses which should give them the smoother operation flow in general.

b) After sales Services

After sales services activities in Company BETA are controlled by Information subsystem. The sales personnel are providing the customers with necessary information or helping to solve the problems occurred.

As it is possible to see from information in Company BETA webpage, they are providing customers with so-called consult and support services. Customers can contact the technical personnel or search for necessary technical information about the components in company webpage if some problems occur during the exploitation. Sales personnel can access technical information in the intranet and send it to the customer also. In this case the customer is provided with many information channels.

In case if the customer has complaints about additional costs of delivery, wrong components and etc., sales person has to fill the form in Lotus Notes email system and to wait for decision what to do in certain situation. The system links together all the parts of the company who are responsible for solving the problem and helps to give fast answer for the customer.

6.3 IT/IS As A Factor Contributing To the Success

If we take a look at IT/IS from the resource based view of Clemons & Row, it seems that Company BETA is using their IT/IS only to run the business not to be a strategic tool as it could have been.

First of all, they have been implementing standard ERP system from Bison which every other company can have the same of even better from other vendors who are more well-known and recognized in the market such as SAP, Oracle or Baan. For other kinds of IT/IS, they have been also using EDI, scanners, barcodes internet, intranet and extranet. However, those are also really common in the market and the usage has already been spread widely within different organizations. Keeping the implementation in mind as it can gives the advantage when you can implement the standard program better than other, Company BETA shows lack of technical expertise as they ignore some serious problems in the program as mentioned above.
Second of all, Company BETA certainly does not have any privilege to enjoy the benefits of being first mover for those mentioned application and solutions. The main IT/IS is the ERP system which they began to implement it in 1996 but ERP system had already been widely available long time before that. There are some new technology and other possibilities such as RFID, or developing the software in-house but Company BETA has not paid any interest in that matter. At least Company links their ERP with the customers through their EDI system. This gives them the benefits in term of high customer switching cost.

Lastly, considering costs and differentiation advantage, Company BETA can save cost through their investment in IT/IS however the company does not seem to have any differentiation from it. The cost saving is according to the fact that organization needs to at some point restructure the procedure to match the ERP (SCM) system. But there is still no prove of distinguished cost saving from IT in this case.
7. Conclusion

In the distributing industry, we can see that an organization can manage their supply chain with a wide range of IT support. However, it was suggested by many researchers that IT/IS itself does not necessary give the competitive advantage. The way a company implement and leverage them is more important. One of the most common IT/IS which plays an important role on the operation seems to be ERP system which allows the information flow within and between organizations.

For company BETA, our case, they are one of the leading distributors in Europe in which in terms of their core business we can say that they are successful. But the question is if their existing IT/IS in the supply chain management is actually a key factor contributing to their success. The main IT/IS solution for their SCM are ERP system, APS, EDI, barcodes and scanners, lotus notes email system, internet, intranet and extranet. Company BETA certainly has problems in using and managing its current IT/IS system.

For ERP system, the company has implemented ERP from Bison system since 1996. The implementation of ERP can definitely gives a lot of advantages in term of supply chain management. Even though it has been over a decade, they are still facing a lot of problems regarding the ERP system implementation and management. For Barcodes and Scanners, they ignore the fact that they could have leveraged them in distribution point and all warehouses. Managers cannot rely on APS for the holistic resource and schedule planning.

In general, Company BETA does have IT/IS for the sake of necessities. All IT IS infrastructure is based on the standard solutions. Nothing was created especially for Company BETA. Competitors can buy the same or better solutions from a wide range of vendors. They were not the first mover. It seems that they play the imitator role and only adopt the accepted and well-known system. They could also have increased the speed of their operation as well as reduced more cost from less re-entry error, better inventory control, and even less personnels in order to gain competitive advantage through lower cost or differentiation. But that could occur only if they would manage their existing systems better.

The reasons for the poor management and implementation of their IT/IS might be that the owner of the company does not realize the benefits Company BETA could have gained from the existing IT/IS. They could also be because of the IT department lacking the ability to increase the efficiency of the system either for the reason that they did not see it as the major problem or they do not have to capacity to handle the problems. Among these two factors, managerial support seems to be the key solution for the company. As long as the system is still running and sales persons can manage even with difficulties as it is nowadays to satisfy the customers, it is more likely that Company BETA will continue to work on the same strategy, IT/IS as only the necessity not the main source of competitive advantage.
8. Reference List

Publication source


**Internet source**


**Journal and Articles from Electronic source**


Bichescu B. C., Fry M. J., 2009. Vendor-managed inventory and the effect of channel


Appendix

A. The interview questions with Branch manager and internal sales assistant.

1. Could you explain how the company places the order to your suppliers?
2. How do you /does the company interact with your suppliers?
3. Could you explain about the company structure?
4. Could you explain how do you plan and control your inventory level?
5. What kinds of information system are you using in your work?
6. From Question 4, are you facing any difficulty in using them?
7. Could you explain how do you contact and manage the products delivery to your customers?
8. What kinds of after sales services and support do you offer to our customers?

B. The interview questions with Logistics manager

9. What kind of system do you use in interacting with the suppliers?
10. Can you give us some details about the company’s logistics system?
11. How do you control and manage the logistics activities?
12. What kind of ERP system are you using? Is it developed in-house?
13. Do you use any information system for forecasting, and inventory management?
14. Apart from selling the finished products, are there any additional service you are providing to the end customers?
15. How do you handle the products returning and/or recycling?