Change of organizational structure and replenishment processes for increased customer service and profitability

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Executive Summary

This case study is based on Company XY’s Paper division and aims to present a new organizational structure and best practices for the processes involved in replenishing. Furthermore, proposals for future actions to be executed by Company XY to increase the customer service and profitability will be proposed. The results of the study will be based on a thorough analysis done on the three mills' and eight sales offices' organizational structures and processes. The analysis has a supply chain management perspective with the aim of increasing the customer service and profitability of Company XY.

Company XY is a world leader paper and board producing company with the Paper division having customers located worldwide and paper producing mills as well as board producing plants located in Europe. Company X and Company Y were two different companies that merged in 2005 which has led to there being three different virgin mills in the Company XY group. At the moment the three mills and eight sales offices all work in different ways and different systems which has led to sub-optimization of the resources available. To increase the customer service and profitability of the Paper division, which the mills and sales offices belong to, a project has started to increase agility, transparency and establish standardized processes.

The study is of both a qualitative and quantitative character and is based on a literature study, observations, data and interviews conducted at Company XY. Processes regarding replenishing, information and forecasting at Company XY have been identified as areas where there is room for improvement. Problem areas of the organizational structure that Company XY have today have been identified.

Company XY is recommended to adopt a hybrid virtual organizational structure to enable them to reach their goals of being agile, transparent and standardized. This structure will enable Company XY to utilize the knowledge of sales offices to be responsive while still having the central units macro view to enable visibility and therefore be able to divide the resources in a better manner than today. This structure, since it demands common practices, will make Company XY work according to standardized processes which in turn has the effect of reducing misalignment and duplication of work.

It is concluded that a centralized unit will be responsible for generating standardized reports to be distributed to mill and sales offices before 2020. After the implementation of SAP this will no longer be part of the central unit's tasks since it will be done by the system, this will decrease the information sharing issues present today. Furthermore, it is concluded that this central unit will be responsible for the allocation distribution therefore preventing the sub optimization of allocation distributions. Moreover, it is suggested that all mills work with allocations to enable more reliable production cycles.

Through standardizing the processes so that all the sales offices correct the forecasts on a weekly basis the forecast deviation average can be decreased to 2,45% from 4,98% therefore decreasing the wrongly produced products or non-produced products worth 23 239 042 € a year.

It is recommended that the replenishing of service stocks should be done by the sales offices. Suggested effects will be stock out costs to be lowered by 26 686 € a year.

By adopting the suggested structure and change of processes it is believed that Company XY can become more agile, transparent and standardized leading them to increase their profitability and customer service.
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1 Introduction

1.1 Background

Company XY represent the whole paper industry from raw material source to mills to plants that produce paper-based solutions. They are one of the leading providers of paper-based solutions and are located in 33 countries and had year 2014 a revenue of 8.1 billion euros. (CompanyXY, 2015)

Company XY have six main product sectors, for two of these sectors they are the number one on the European market and number two on the world market. The corrugated sheets that corrugated packaging are based on consists of an inner Testliner paper, recycled fluting and an outer Kraftliner paper. (CompanyXY, 2015)

This master thesis will focus on the organization around the production of Kraftliner paper.

Company XY’s production of Product A is located at three different mills in Europe:

- Mill 1 in Country 1
- Mill 2 in Country 2
- Mill 3 in Country 3

To these mills there are eight sales offices sited in Europe which are connected to several customers and together they supply customers all over the world. The customer can be divided into intra group- and external customers. The intra group customers can have both products that they place direct orders for and products that they order a lot of can be classified as VMI-products. The direct orders are produced as Make To Order and the VMI-products are produced as Make To Stock since the mills keep a service stock of those products that a customer have as VMI-products.

The different sales offices can supply from all the mills but, as can be seen in Figure 1, the connections can be divided into head- and spare connections. A head connection indicates that the sales office in question has at least one customer which has VMI-products that are supplied from that mill. A spare connection indicates that the sales office can in cases when the mill that supplies a customer’s VMI-product for some reason cannot produce enough to supply the customer, can be shift to a spare mill.

The replenishing processes for these mills are important to enable having the right products in stock at the right time for the sales offices to be able to provide high service levels. The fact that all mills have different methods of planning the replenishing of the service stock makes a problem occur in Company XY’s organization for Kraftliner. Because the mills have different methods for planning the replenishing of the service stocks the sales offices have to work in different ways depending on which mill they are supplying from. It is not only the different ways of planning the replenishing of the service stock that creates problems. The fact that decisions of what to produce and which customer to prioritize are made locally and with incomplete information can for example lead to reduced profitability for the mills and lowered service levels.
The problem of sub optimizing processes is not a problem that only Company XY is affected of. Saharidis, et al., 2006 states that parties in a supply chain have a tendency to sub optimize their production without taking in consideration how it will affect the whole supply chain and the optimal solution of the whole. This strengthen and gives further reasons to investigate the specific problem with contact between sales offices and production mills for the sales and replenishing the stock of Kraftliner paper.

Company XY has started a project with the objective of trying to standardize the process for sales offices of supplying paper from different mills. Company XY aims to standardize the way the mills and sales offices are working, become more transparent and more agile. They want to achieve this through changing the organizational structure and working procedures.

Handfield et al (2011) states that a big challenge today is to decide which tasks, processes and activities to control centrally and which to control locally. This gives further reason to study the organizational structure of Company XY’s Kraftliner.

![Diagram](image)

*Figure 1: Illustration of connections between sales offices and mills.*
1 Introduction

1.2 Purpose of the study

The purpose of this study is to suggest how Company XY should change their organizational structure and replenishment processes to reduce the sub optimizing of the service stocks to enable better customer service while not increasing the costs.

1.3 Directives

Company XY has narrowed down this study by some directives. Company XY only want focus on the organization and procedures regarding the Kraftliner paper. This because according to the capacity manager the procedure and organization for the production of other paper are in comparison quite effective. Furthermore, Company XY are only interested in investigating and analyzing methods and strategies for planning of the inventory and not how the different mills should plan their production runs. This directive does not have any other reason than that Company XY in this stage is not interested in changing the mills way of producing Kraftliner. It is also given that, for any proposal of solutions, Company XY would like to get recommendations for pre 2020 and post 2020. Before year 2020 the mills in the organization are not using the same business system and these systems are not compatible with each other. After year 2020 the plan is that the whole organization will have implemented the business system SAP which will enable easier communication between all parties in the organization. Since it has been decided that SAP will be implemented at Company XY this study will not cover any recommendations for information technology systems. Lastly Company XY have given the directive that all production runs are in set intervals. The main goals of the project that Company XY has initiated is to standardize, become more transparent and agile.

1.4 Requirements of an academic study

When writing an academic report credibility is expected, to achieve credibility in a study it is widely accepted that validity, reliability and objectivity is needed (Björklund & Paulsson, 2003). Therefore, in the method chapter it will be described how validity, reliability and objectivity was achieved in this report.

Reliability is strived for to ensure that influences from different outside factors are resisted within an interview situation (Arbnor & Bjerke, 2009). This is also agreed upon by Patel and Davidson (2011) who means that the measurement method should resist randomized influences. Reliability is achieved if the same results are obtained when repeated measurements are conducted, Arbnor and Bjerke (2009) as well as Lekvall and Wahlbin (2001) agrees on this. They further suggest that to check reliability either a retest of a person can be made or a parallel tests can be done. Reliability can be checked directly by repeating or doubling the measurement. Lekvall and Wahlbin (2001) suggest that the more the questions and measurements methods are standardized the larger is the probability for obtaining reliable results. Furthermore, Björklund and Paulsson (2003) suggest using control questions during interviews as well as triangulation.
Validity is according to Arnbor and Bjerke (2009) the most important factor when assessing the quality of what has been measured. When the measurements are close to reality means that the measurement instrument has validity (Arnbor and Bjerke, 2009). This is further agreed upon by Lekvall and Wahlbin (2001) who claims that validity address whether the measurement actually measure what is set out to measure. Furthermore, validity demands reliability but reliability does not demand validity. Validity is harder than reliability to check since it can only be checked indirectly meaning the only way to directly check it is to compare it to the truth but if the truth was known there would be no reason to measure. According to Arnbor and Bjerke (2009) validity in a systems approach can revolve around the perceived importance and relevance to the writers conducting the study. Therefore, the writers have the ability to decide if the results are correct and reasonable. A way to achieve validity when using a systems approach is by reflecting the system from, as many as possible, point of views. Both Arnbor and Bjerke (2009) as well as Lekvall and Wahlbin (2001) agrees that this can be done for instance by speaking to as many people as possible, with knowledge about the system, within the studied system and study as much secondary data as possible. Another way of increasing validity is according to Björklund and Paulsson (2003) through triangulation and during questionnaires and interviews use clear non angled questions.

Objectivity addresses to what extent different values affect the result of the study (Björklund & Paulsson, 2003). They further suggest that outlining several authors' models as well as accurately reflecting these, to avoid factual errors, should be done to achieve objectivity in the theoretical framework. By clarifying and motivate the choices made in the study the reader is given the possibility to for themselves reflect upon the results of the study which therefore increases the objectivity (Björklund & Paulsson, 2003).

According to Gammelgaard (2004) in logistics there are only two methods that have been frequently used the analytical and the systems approach. She further explains that logistics is too complex for deriving causal-effect relations, analytics approach. Therefore, a systems approach will be used when conducting this study.

When using a systems approach the whole is regarded as more than the sum of its parts, Björklund and Paulsson (2003) as well as Arnbor and Bjerke (2009) all agree on this. Furthermore, they agree on the system consisting of different parts that have been coordinated to achieve a determined goal. Björklund and Paulsson (2003) continues to describe the systems approach having a function of describing the reality objectively and that the different parts of the system affect each other. Therefore, they state that it is important to understand the synergy effects that are present between the parts of the system and to do this the relationship between the different parts have to be understood.

Gammelgaard (2004) and Oskarsson, et al. (2013) agree that it is important to define the studied system and its content to clarify the conditions of the study. According to Arnbor and Bjerke (2009) it is also of importance to study the environment outside of the studied system. It is of great importance to identify what should be included in the studied system before starting to conduct a study (Gammelgaard, 2004). This is in line with Oskarsson, et al’s (2013) first step when conducting changes within logistics. Therefore, before breaking down the purpose of this study, the studied system will be defined further, its contents will also be described and the parts outside of the system that will be affected is defined.
2 Company description

The paper and packaging company, Company X, was founded 1934. In 1970 a paper and packaging company named Company Y was founded, the two companies then merged together and became Company XY in 2005. Company XY produces paper based packaging solutions in form of corrugated packaging, container boards, solid board and solid board packaging. Company XY consist of the entire supply chain from forest to virgin mills to recycled paper mills to pre-printers and packaging plants. They have end customers in markets such as food and drinks, consumer goods and industrial usage. Company XY’s paper can for example be found in trays for the food industry, transport packaging like auto parts, home appliances, hi-tech and also in point of purchase displays. (Company_XY, 2015)

Today Company XY employs 43'000 people throughout 33 countries, 21 of these are European countries. In 2014 they had a revenue of 8.1 billion euro and they currently hold the number one market position in Europe and the second in the world for corrugated packaging. Company XY is divided into three divisions which are the Americas, Paper and Corrugated. The Americas consist of all their functions and activities in South and North America. The Paper division comprises the base paper production in Europe. The Corrugated division is the part of the Company XY group that consist of the board production and the packaging manufacturing in Europe. (Company_XY, 2015)

The Paper division supply the corrugated sheet board production consisting of a wide range of fluting and liner combinations which in turn supply the corrugated packaging manufacturing plants. Within the Paper division there are recycled and virgin paper mills. Hence they offer a wide range of base papers such as recycled and semi chemical fluting as well as brown and white Testliner and Kraftliner. The recycled mills produce paper out of recycled paper. They produce paper such as fluting which is used as the corrugating paper in the boards and Testliner which is used as the inner layer for boards. The virgin mills produce Kraftliner out of virgin fiber and recycled paper, the Kraftliner is used as the outer layer of the boards. (Company_XY, 2015)

This study addresses the issues surrounding the Paper division and Kraftliner therefore Kraftliner and its surroundings is further described below.

2.1 Kraftliner

In Europe Company XY has three virgin mills producing approximately 1.6 million tons of Kraftliner a year. Kraftliner is a base paper that is made from virgin fiber and is used for the manufacturing of high-quality corrugated boards. Company XY’s packaging plants source most of their raw materials from Company XY paper mills thus making a large part of the customers for the paper mills in-house customers. The three mills producing Kraftliner are located in Europe. (CompanyXY, 2015)

Kraftliner can have different substance range which means that it can have different basis weights, for the European market the Kraftliner can vary between 115-430 gsm in basis weight (Company XY Group, 2015). An article is defined as paper with a specific basis weight, width and quality (Claesson, 2015). The paper reels are priced given a specific basis weight, quality and the weight of the reel (Claesson, 2015).
2.2 System

If nothing else is written the following information stems from interviews with Claes Claesson capacity manager at Company XY Paper division.

2.2.1 Supply chain

Company XY buys trees from either their own forest or outsourced, these trees and recycled paper is sold to virgin mills i.e. the Kraftliner paper mills that produce liner paper. This liner paper is then sold to corrugated board plants either their intra group-customers or external customers that combine the liner with fluting paper to produce a corrugated board. The liner can also be sold to intra group pre-printers who print on the liner which then is sold to an intra group or external board producer. The board producers in turn sell the board to either intra or external packaging companies who package the board and sell it to end consumers which is where the supply chain ends for Company XY this supply chain can be seen in Figure 2 below. This master thesis will focus on the organization around the production of Kraftliner paper, hence the functions and working procedures for the customers, paper mills and sales offices connected to the Kraftliner paper mills will be described further.

![Figure 2: Illustration of Company XY's supply chain.](image-url)


2.2.2 Customers

There are two types of customers for the virgin mills which are intra-group customers and external customers. The percentage of tonnages sold distributed on the two types of customers are 55 percent to intra-group customers and 45 percent to external customers. The customers of the paper mills that are intra group customers have consignment for all their stock, meaning that the mills own the reels until they are consumed. For the intra group consignment stock there are two types of stock. The type of stock that they replenish by entering direct orders, which stands for six percent of the total amount of paper sold to the intra-group customers and the type that is replenished by their sales office (VMI-stock), which stands for 94 percent of the total amount of sold paper to the intra-group customers, see elucidative illustration in Figure 3 below.

Figure 3: Illustration of the allocation between external customers and intra-group customers and the intra-group customer’s different types of orders.

The external customers have the type of stock that they replenish themselves by entering direct orders to their sales office. The different types of customers and stock is described in Figure 4 below. For the vendor managed inventory the customer sends its sales office monthly forecasts for their estimated consumption for that month. The monthly forecasts that the customers supply are usually correct on a total quantity basis but can differ quite a lot on an article basis.

Figure 4: Illustration over the different customers, and their different types of stock, a Company XY paper mill has.
2.2.3 Paper mills

The three paper mills producing Kraftliner in Europe are located in city 1, city 2 and city 3. Mill 2 produces 520 000 ton paper a year. They produce brown Kraftliner, Testliner, Royal2000 and Kraftliner White top which all are used for corrugated board production. Mill 3 has produced paper since 1851 and have an annual production of 420 000 tons, in 1994 they became a part of Company X. They produce brown Kraftliner and Deckenpapier. Mill 1 produced its first ton of paper in 1962 and is now Europe's largest Kraftliner mill with an annual capacity of 700 000 tons, in the year 2001 the mill became a part of Company Y. They produce brown Kraftliner, Kraftliner White top and Royal2000 which all are used as the outer layer for corrugated board production. Each mill is connected to different sales offices supplying different markets. In this study the qualities that are further referenced as Kraftliner are brown Kraftliner, Kraftliner White top and Royal2000.

The connections below are for the head connections between sales offices and mills i.e. the connections where there is a service stock for the sales office adjacent to the mill. Three of the sales offices are located at the mill. These sales offices work closely with the mill they are located at and usually cooperate with and buy larger quantities from that mill.

Mill 1 supplies all the sales offices located in Europe as indicated in Figure 5 below. They supply the Market 1, Market 2, Market 3, Market 4, Market 5, Market 6, Market 7 and Market 8, sales offices. The Market 1 sales office is located at Mill 1 and is therefore highlighted in Figure 5.

![Figure 5: Illustration over the sales offices which customers Mill 1 supply.](image)

Mill 2 supplies seven out of the eight sales offices that are located around Europe, the only sales office not having a service stock connected to Mill 2 is the Market 1 sales office. The Market 2 sales office is located at Mill 2 and is therefore highlighted in Figure 6. The sales offices', Market 2, Market 3, Market 4, Market 5, Market 6, Market 7 and Market 8, connections to Mill 2 are described in Figure 6.
Mill 3 supplies the four sales offices Market 3, Market 4, Market 5 and Market 6, the Market 3 sales office is located at Mill 3 and is therefore highlighted, as can be seen in Figure 7 below.

Figure 7: Illustration over the sales offices which customers Mill 3 supply.
Make-To-Stock and Make-To-Order

The paper mills produce paper both as make-to-stock and make-to-order. When it is make-to-stock it is for the mills’ intra group customers that have certain articles that for which their inventory is vendor managed. Hence the mill produces paper used for VMI orders for their intra group customers, direct orders for intra group customers and direct orders for external customers. Production in the mill is divided into two different replenishments, the production for replenishing the service stock and production for the replenishment from mill to customer. In Figure 8 below the connection marked 1 is the replenishing of the service stock from the mill, connection number 2 and 3 are the replenishing from mill to customer. Where number 2 is VMI replenishment from the service stock to the customer and number 3 is replenishment of direct orders from the mill to the customer.

![Figure 8: Illustration over the mills product flow.](image)

2.2.4 Warehouses and inventory

Mill 1 has its warehouses at its' terminals, one located at Mill 1, Warehouse 1A, and then external warehouses at the terminals located around Europe, there are no restrictions for maximum stock levels for the warehouses connected to Mill 1. The seven warehouses located around Europe are Warehouse 1B, 1C, 1D, 1E, 1F, 1G and 1H. Warehouse 1E supply Market 8 and is shared with Mill 2. Both Warehouse 1C and Warehouse 1D supply Market 4 and 5. Warehouse 1H supply Market 3 while Warehouse 1F supply Market 6. Warehouse 1B supply parts of Market 1’s customers, while warehouse 1G supply Market 7. It is only Market 1 which has its service stock at Mill 1 i.e. Warehouse 1A.

There is one warehouse at Mill 2, warehouse 2A and there are three warehouses separate from Mill 2 which are warehouse 2B, 2C and 2D which is shared with Mill 1. Warehouse 2C serves Market 5 and Market 4. Warehouse 2B mainly supply Market 2 and Market 7 but also some of Market 5. For the paper in Warehouse 2B which belongs to Market 5 is temporarily warehoused there for widths that are shared with the other markets. In Warehouse 2D it is Market 8 that stock items. For all four warehouses there are set maximum stock levels.
2 Company description

Mill 3 have a warehouse connected to the mill, Warehouse 3A and a small external warehouse located a couple of kilometers away from the mill, Warehouse 3B. The warehouses at Mill 3 supply Market 3, Market 4 and Market 5. In Warehouse 3A and 3B there are maximum stock levels in both warehouses.

A customer’s number of safety days in stock is based on the complexity and the delivery time to that customer.

2.2.5 Sales office

There is currently eight sales offices that are selling liner and recycled paper from Company XY’s mills in Europe. These sales offices stand separately from the mills but are a part of Company XY and they act as the link between the customers and the mills which means there is no communication between the mill and the customer. Communication are in other words only present between the customer and the sales office and the sales office and mill. Which makes the only direct connection between the customer and the mill the actual product transportation. An illustration of the communication between the three parts are presented in Figure 9 below.

![Diagram](image)

*Figure 9: Illustration over information and product flow between a sales office, customers and mills in the Kraftliner organization.*

The distribution of where the sales offices are supplied from is based on a market plan that is made once a year. This market plan in turn is based on an optimization of tonnages, transport costs and the mills’ and customers’ production possibilities. Should there be no considerate difference between two mills then it is based on where it is more preferable to trim in the reels given the widths of the machines.
All sales offices are in charge of evaluating and correcting forecasts from customers and replenishing from service stocks to the customers. They release orders, create deliveries for orders and solve issues that arise regarding orders, system issues, deliveries and delays. Each sales office that has a head connection to a mill has a service stock at its disposal at that mill or one of the mill's warehouses. The replenishing of this service stock differs between the mills which will be further explained in 2.2.6.

There are some requirements for the communication between the sales office and a customer with VMI-articles namely:

- Each month the customers have to supply a monthly forecast for their estimated consumption for the coming three months
- Each day the sales office gets a list of the customer’s actual inventory level of the VMI articles
- Each week the sales office gets a summary of customer’s consumption of VMI articles for the four previous weeks.

### 2.2.6 Replenishment VMI

The three different mills work in three different ways when it comes to the replenishment of the service stock. For Mill 1 each sales office has an allocation and within this allocation they are free to decide how they want to use the allocation i.e. how much of the allocation should be used to replenish the service stock and how much will be used for direct orders to intra group as well as external customers. The replenishing flows for Mill 1 is displayed in Figure 10.

![Figure 10: Illustration of the process of replenishing the service stocks and placing direct orders to Mill 1.](image-url)
For Mill 2 the sales offices get an allocation for their direct orders within which they can decide who to produce direct orders to. Mill 2 is in charge of replenishing service stock for their sales offices' customers, the sales offices sends a forecast to the mill which in turn, based on this forecast, replenish the service stock. An illustration of the process of replenishing the service stock in Mill 2 can be seen in Figure 11.

Figure 11: Illustration of the process of replenishing the service stocks and placing direct orders to Mill 2.
For Mill 3 the sales offices give the production planner a need that they want to have replenished which then the production planner enters into the system made possible by a framework order. The sales offices are in charge of replenishing the VMI stock and direct orders. Mill 3 differ from the other mills since there is no allocations for neither the direct orders nor the service stock. The replenishing flow for Mill 3 is displayed in Figure 12.

Different mills have different sales offices that sell paper from them. Should one mill not be able to meet its' sales offices demand the production of these orders could be moved to be produced at another mill. Moving orders between mills is triggered either by the mill itself or a sales office. It is the capacity manager who is in charge of moving orders between mills. The orders that are moved from one mill to another when there is a capacity issue are mostly VMI orders but should all VMI orders for one customer be moved the direct orders for that customer would also be moved to ease transport coordination.

Allocations are based on a sales office's total customer forecast and is regulated monthly and revised every second week.
Pros and cons of replenishing methods

With the way the replenishing is made today for the mills the capacity manager considers there being pros and cons to the different methods.

Mill replenishing the service stock

Pros

When the mill is conducting replenishment of the service stock they have an overview of the different markets and customers. Therefore, they can prioritize customers and markets with low stock levels and vice versa.

Cons

The mill does not have an overview of what the sales office has in total stock i.e. the stock for one sales office from all the mills put together. Since many of the sales offices source from more than one mill and the mills do not have an overview of what the total demand and stock is for the sales offices wrongful prioritizations can be made. For example, not prioritizing a sales office with target levels in their service stock since the mill does not know that the sales office is low for their total stock and should be prioritized.

Mill 2 do not take into consideration the length of the production runs when replenishing. They replenish so that all direct orders are produced as well as replenishing the VMI stock to target levels thus making run length unpredictable. This in turn makes it hard to predict when the next time replenishing is possible. Working like this has made it hard to predict how much to replenish and making the replenishing calculations very difficult to make accurate.

Sales office replenishing the service stock

Pros

When sales offices conduct both replenishment of service stock as well as replenishment of VMI and direct orders within their allocations they are able to make prioritizations for their customer base.

Since the sales offices have to work within their allocations which are adapted to the production runs the time of the production runs is not affected by the replenishing decisions made.

Cons

Since the sales offices are in charge of the replenishing they do not have the knowledge of what the other sales offices stock levels are and what their customers’ stock levels are. This makes it possible for one sales office having a low stock and the other sales office is on their target levels yet they still get the same allocations as before. This makes it possible for wrongful decisions being made for prioritizing tonnages for production.
2.2.7 Measurements

On a country basis and sometimes customer basis there is a set agreement for flexibility, depending on complexity and lead time, which the mill should be able to handle to supply i.e. how much more or less than the forecasted consumption should the mill be able to supply a certain customer or country. Which is used when evaluating stock-out claims, if the customer has exceeded the agreed flexibility level the mill has the right to refuse the claim.

The main measurement that is monitored and controlled is the number of stock-outs that have been claimed. It is continually monitored because should the number of stock-outs increase generally something is wrong. They actually want to have some stock-out claims to know that their inventory levels cover the demand in most of the cases but that it is not too high. Therefore, testing the limits of stock levels that should be adopted at customers. An average of a couple of euro cents per ton has to be paid out due to stock-out claims that are granted which is not a big sum for the company.

Another measurement that is monitored and followed up on is the forecasts and how well they match the actual consumption of the customers. They do not measure customer service level in any other way than the number of stock-outs.

A monthly report is distributed both to the customer and the Paper division that shows how well the Paper division has been able to deliver paper, how well the customers forecast accuracy was and how many stock-out claims that have been granted. The stock levels for VMI and direct orders are also compared to a set goal level to evaluate if there has been too much or too little in stock at the customers.
3 Theoretical framework

Since the Paper division is part of the Company XY supply chain the theoretical framework will begin by describing how supply chains compete.

3.1 Competing as a supply chain

Unavailability of the product, defects and late deliveries are all symptoms of quality problems in supply chain processes. According to Harrison and van Hoek (2002) when it comes to competitive logistics there are five ways to compete these are quality, dependability, cost, speed and flexibility. Oskarsson, et al. (2013) present instead six elements that builds the competitive advantage of the logistics in a supply chain namely delivery time, delivery reliability, delivery accuracy, stock availability, information and flexibility.

Harrison and van Hoek (2002) describes the quality aspect as doing the right thing. The customers notices if the supply chain’s processes does not live up to the expected quality since it is shown in for example unavailability of the product, defects in the product and late deliveries (Harrison & van Hoek, 2002). This makes it important for the supply chain to working towards doing the right thing.

The speed advantage, that Harrison and van Hoek (2002) talks about, is measured as how long time it takes for the customer to get its product from that it is ordered. This can be compared with Oskarsson, et al’s (2013) element delivery time. Depending on what kind of product it is this time can vary from seconds to years (Harrison and van Hoek, 2002). It is also important for the supply chain to meet the expected delivery time. The customer has to be able to trust that the product will be delivered not only in the given time but also in complete. This is what Harrison and van Hoek (2002) calls dependability. This can be compared with Oskarsson, et al. (2013) elements delivery reliability and delivery accuracy. Oskarsson, et al (2013) divides the aspect of delivering at the right time, delivery reliability, and delivering the right product in the right amount and with the right quality, delivery accuracy.

Harrison and van Hoek (2002) divides their flexibility in to four forms namely product flexibility, mix flexibility, volume flexibility and delivery flexibility. Product flexibility measure the time it takes to introduce a new product on the market, mix flexibility is a measurement of how fast the supply chain can change from one product to another. The third form of flexibility that Harrison and van Hoek (2002) presents is the volume flexibility which is a measurement of how fast the supply chain can respond to an increase or decrease in the overall demand. The fourth form, delivery flexibility, applies the supply chain’s capacity of intentionally bringing deliveries forward or pushing them back.

Oskarsson, et al (2013) does not divide their element flexibility into different forms. However, they talk about the ability to change the delivery as request of the customer. It can for example concern shorter delivery time, which corresponds to Harrison and van Hoek’s (2002) delivery flexibility. Other aspects that Oskarsson, et al (2013) discusses is faster transports and the ability to make changes in the labeling of a product.

Oskarsson, et al (2013) also discuss the ability to deliver stock items at once, stock availability, this is only possible to measure if the product is a stock item. Lastly Oskarsson, et al (2013) presents the information element which in this case is about the company's ability to give the customer the right information at the right time, according to what the customer wants.
Lastly Harrison and van Hoek (2002) discusses the cost aspect as a part of the supply chain's goal, to keep the costs down. This to be able to provide the customer a good price and in the same time earn a profit. Oskarsson, et al (2013) discusses the cost aspect as the ability to provide the desired delivery service at as low as possible logistics costs and the delivery service is a combination of the six elements presented above.

Oskarsson, et al (2013) mentions a total cost model to evaluate how changes in logistics affect different costs. In logistics it is important to consider the total cost of a change, savings in one aspect can introduce costs in another aspect or lead to decrease in quality (Oskarsson, et al., 2013). Grant et al (2006) also states that it is important to minimize the total logistic costs instead of trying to minimize the cost of individual activities. Oskarsson, et al (2013) present four specific categories of costs and an additional category for other costs. These four categories are costs for inventory carrying, inventory handling and holding, transports and lastly administration (Oskarsson, et al., 2013).

The costs for inventory carrying includes all costs that storage brings like risk and capital costs. Risk costs can for example be associated with obsolescence, cassations, waste and insurance. Further on the cost of invested capital can be measured as an alternative cost for not investing the capital in something better. (Oskarsson, et al., 2013)

The inventory handling and holding costs includes all costs that can be associated with operating a warehouse. Costs that are associated with operating a warehouse are for example premises rent, staff costs and costs for equipment. (Oskarsson, et al., 2013)

The transport costs include all costs that is associated to transports both internal and external, however not transports inside the same building which is included in the handling and holding costs. (Oskarsson, et al., 2013)

The administrative costs includes the costs that is associated with logistics administrative work, such as handling an order, planning of transports and delivering notifications. (Oskarsson, et al., 2013)

### 3.2 Inventory control

Inventory control is described as one aspect to consider when competing as a supply chain therefore is inventory control further described.

From the definition of Company XY's customer service it could be easy to think that only Oskarsson, et al's (2013) element of stock availability and Harrison and van Hoek's (2002) quality aspect is what is important for this study but also the cost aspect is important. According to Axsäter (2006) inventory control is a constant struggle between different goals in a company. On one hand the goal can be to keep the stock levels low to make cash available and on the other hand it can be desirable to keep a high stock to be able to satisfy all customers at once (Axsäter, 2006). With good inventory control the supply chain can get a competitive advantage since investment and tied up capital in inventories are huge in a supply chain (Axsäter, 2006).
According to Brewer, et al. (2001) there are three questions that organizations have to answer when it comes to managing inventory namely: What items to stock, when an order should be placed and how much to order. If the organization is able to answer these questions issues as average stock levels, service levels, inventory costs and the likelihood of shortage are resolved (Brewer, et al., 2001). Oskarsson, et al. (2013) also discuss three questions that have to be answered when managing an inventory namely: When to order, How much to order and How to protect yourself form uncertainty.

The questions of when to order and how much to order can be answered with the help of different methods depending on whether the periodicity for ordering varies or is fixed and if the order quantity is fixed or can vary (Oskarsson, et al., 2013). However, Oskarsson, et al. (2013) emphasizes that the theory of both fixed quantity and periodicity is not possible to use in practice since it is in need of a smooth and fully known demand which does not exist. In this study the situation is that the order quantity varies and the ordering periodicity is somewhat fixed since the sales office themselves cannot decide when to order.

### 3.2.1 Order quantity

Oskarsson, et al. (2013) present two different methods to decide the order quantity in this situation. The first one uses either information of the last period's consumption and orders the same amount that’s been consumed or checks the inventory level and places an order so that a replenishment level is reached. The result of this two ways to decide the order quantity is the same if the demand is even. However, if the demand is slightly varying it is better to base the order quantity on the last period’s consumption. This because the replenishment level is based on an average of the demand but it can be fixed if the average is based on a shorter period and is updated more frequently. The information that is considered in this method is:

- consumption since the last order
- stock levels
- lead time (Oskarsson, et al., 2013)

The other method to decide the order quantity is based on the forecast for the next period instead. This method is suitable when the demand is more varying but it takes more effort for each ordering. The information that is taken into account in this method is forecasted demand until next delivery. (Oskarsson, et al., 2013)
3.2.2 Forecasting

Axsäter (2006) explains that one important part of inventory control is to create a good forecast of the customers demand. Also Lambert et al (1998) discusses conducting of forecast as a necessary way to be able to, among other things, lower the number of stock outs and increase customer service.

Since, cost and delivery performance are typically correlated with forecast error, increasing forecast accuracy leads to improved cost and delivery performance (Danese & Kalchschmidt, 2011). Oskarsson, et al. (2013) states that the forecast most important purpose is to predict the future so that the right product are available at the right place at the right time.

Bernard Trustrum, et al. (1987) present the purpose of forecasting to aid logistics decision making and according to Lambert, et al. (1998) it is important to predict the future, forecast, for logistics executives to be able to be proactive and not reactive. Oskarsson, et al (2013) states that for the company to be able to make decisions of strategic, tactical and operational nature the company is in need of information of how the customers demand is going to change in the future. They emphasize that it is difficult to predict the future but companies do their best using forecasting. Blackburn, et al. (2015) states that in a process industry where the capacity utilization is high it is critical to anticipate demand changes.

Lambert, et al. (1998) further suggest that forecasting “attempts to predict the future through quantitative or qualitative methods, or some combination of both” (Lambert, et al., 1998, p. 189).

To manage supply chains forecasting demand is a critical capability, since both tactical and operational decisions regarding inventory levels, production planning, transportation and scheduling all use the anticipated demand development as a base. One of the main challenges when it comes to managing of forecasts is the selection of which information to include in the forecasting and choosing a forecasting method that is appropriate. (Blackburn, et al., 2015)

Danese and Kalchschmidt (2011) suggest that forecasting techniques by themselves do not necessarily improve forecast accuracy. They further suggest that the adoption of forecasting techniques, usage of different information sources and usage of a common forecast all play a role in forecasting accuracy. Proper usage and combining of correct information is also an important aspect when improving forecast accuracy (Danese & Kalchschmidt, 2011). Data about the economic market, sales and customer forecasts from customers and specific market sectors are according to Davis and Mentzer (2007) relevant to consider when conducting a forecast. Axsäter (2006) emphasizes the desire to in forecasting demand use historical demand but because in general only sales are recorded considerable errors can occur in the forecast if shortage caused lost in sales.

According to Moon and Mentzer (1998) there is a phenomenon called "islands of analysis" which refers to when a company has individuals or groups that based on their own information develop a sales forecast which, information and forecast, they do not share with the rest of the company. Which in turn affect the level of forecast accuracy (Danese & Kalchschmidt, 2011). Especially in the process of decision making where islands of analysis creates misinformation, excess inventory and inefficiency by not aligning plans and actions. Aligning activities to a single forecast is not enough to maintain a cost advantage, information needs to be collected and used in an adequate way (Danese & Kalchschmidt, 2011). The same applies should the information and usage of information be adequate but there is no aligned single forecast (Danese & Kalchschmidt, 2011).
The two main areas of managing forecasting processes are the identification of relevant information and their correlated resources as well as selecting methods that are appropriate to be able to compute the information to project the demand (Danese & Kalchschmidt, 2011). Lambert et al. (1998) present the forecasting processes as the following steps: developing or conducting forecasts, providing information to be used in forecasting or receiving forecasting results and implementing necessary actions. Lambert, et al. (1998) also gives multiple reasons for conducting forecasts namely:

- increase customer satisfaction
- stock out reduction
- efficiently schedule production
- safety stock requirements lowering
- reduction of product obsolescence cost
- better management of shipping
- improving management of promotion and pricing
- negotiating superior terms with suppliers
- making pricing decisions that are more informed.

### Methods

Axsäter (2006) present two typical approaches when conducting a demand forecast in connection with inventory control. The first one is use of historical data which is the most common approach when conducting a forecast for a short horizon (Axsäter, 2006). The other approach is use of other factor, this factors can for example be dependencies to other products or to for example weather (Axsäter, 2006). Oskarsson, et al (2013) mentions three different data that forecasts can be based on namely: cause connection, assessments from experts and historical data. Oskarsson, et al’s (2013) cause connection can be compared to Axsäter’s (2006) other factors, historical data is the same for both and Oskarsson, et al’s (2013) assessments from experts uses for example a vendor that has good knowledge of the product that the forecast is for.

Axsäter (2006) present three different demand patterns that historical data can indicate which helps to conduct a demand forecast namely: constant model, trend model and trend-seasonal model. However, the time and effort it takes to analyse the historical data to determine which of this types of pattern the product belongs to seldom seems to be worth it (Axsäter, 2006). Oskarsson, et al (2013) presents four models namely: even demand, cyclic demand, trends and random variations. Oskarsson, et al’s (2013) even- and cyclic demand can be compared to Axsäter’s (2006) constant-and trend-seasonal model respectively. Where the trend-seasonal model is a part of Oskarsson, et al’s (2013) cyclic demand.

A product whose historical data indicates to a constant or even demand is probably a product in the mature stage of the product life cycle (Axsäter, 2006). Typical products are for example a normal consumer product, like toothpaste (Axsäter, 2006). Historical data that indicates a trend pattern is probably data from a product in the life cycles growth or phase-out stage (Axsäter, 2006). Products that have a cyclic demand follows some kind of cycle, it can for example be an economic situation (high or low cyclical) or, as the trend-seasonal model, a season cycle (Oskarsson, et al., 2013). Random variation products are products whose demand pattern is not able to predict (Oskarsson, et al., 2013). This makes it impossible to predict what quantity and when the demand will appear but with the knowledge that there are random variations you can prepare to be on standby (Oskarsson, et al., 2013).
3 Theoretical framework

All demand has variation independently of demand pattern, except from random variations (Axsäter, 2006). This variation has to be estimated and Axsäter (2006) mentions moving average and exponential smoothing.

Uncertainty

Forecasting techniques need to be able to adapt to a changing environment which is the primary challenge in demand forecasting Blackburn, et al. (2015). Lack of data which is often used as an excuse for wrongful demand forecasting is according to Blackburn, et al. (2015) not the problem the actual issue is the inability to properly use the data when demand forecasting.

The two dimensions of demand uncertainty are firstly the handling of variability in demand and the identification of relevant data, secondly inadequate demand forecasting techniques resulting in uncertainty. (Blackburn, et al., 2015)

3.3 Information sharing

As previous discussed an important part of producing a good and reliable demand forecast is to have the right information available. This chapter will therefore treat information sharing in a supply chain.

Li and Zhang (2015) have analyzed the impact of information sharing in a case where a make to stock manufacturer is concerned. They analyzed whether it is profitable for the supply chain that the retailer shares information about the demand when the manufacturer decides both the wholesale price and the inventory levels. Li and Zhang (2015) concludes that the supply chain can benefit from sharing information because it prevents the supply chain missing out on sales because the manufacturer does not have enough in stock.

Costantino, et al. (2014) also investigate the impact of information sharing of a supply chains performance but they, compared to Li and Zhang (2015), include the whole chain: customer, retailer, wholesaler, distributor and factory. Costantino, et al. (2014) further analyzed six different scenarios with various levels of information sharing and collaboration in the supply chain.

Costantino, et al. (2014) analyses and evaluates the scenarios with three different measurements namely: bullwhip effect, inventory variance and service level to end customer. In their analysis Costantino, et al. (2014) reaches the conclusion that the best scenario is when all partners in the supply chain have access to the end customers’ demand. It lowers the average bullwhip effect and the variance in inventory levels in the whole supply chain and it increases the average service level to the end customer (Costantino, et al., 2014).

Singh and Garg (2015) analyze what impact information integration has on decision making in a supply chain network and measures the result in the two parameters inventory levels and bullwhip effect. In their study Singh and Garg (2015) conclude that both the inventory levels and the bullwhip effect, caused of uncertainty in demand, decreases when information is share widely in the supply chain network, which corresponds to what both Costantino, et al. (2014) and Li and Zhang (2015) concludes in their studies.
3.3.1 Production planning and decision making

Datta and Christopher (2011) investigates how different levels of information sharing combined with different ways of coordination of material flow and decision making in a supply chain can reduce the effects of demand uncertainty. The structure of the supply network that Datta and Christopher (2011) have used in their investigation consists of a central planning unit (CP), a production factory (PF), a central warehouse (CW), two distribution centers (DC) and four markets. The information connections between the different units varies depending on the combination of information sharing and coordination and material flow and decision making, however, the product flow remain the same see Figure 13 below.

![Figure 13: The product flow in the network. (Inspired by Datta & Christopher, 2011, p. 778)](image1.png)

Datta and Christopher (2011) presents five different combinations of information sharing and coordination of material flow and decision making, see Table 1 below.

Table 1: Combinations of information sharing and coordination of material flow and decision making. (Inspired by Datta & Christopher, 2011, p. 782)

<table>
<thead>
<tr>
<th>Case</th>
<th>Coordination of</th>
<th>Information</th>
<th>Sharing among partners</th>
<th>flow</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Centrally</td>
<td>Centrally</td>
<td>None</td>
<td>Monthly for production planning</td>
</tr>
<tr>
<td>2</td>
<td>Centrally</td>
<td>Centrally</td>
<td>None</td>
<td>Weekly for production planning</td>
</tr>
<tr>
<td>3</td>
<td>Centrally</td>
<td>Decentralized</td>
<td>Partial</td>
<td>Daily for production planning &amp; safety stock adjustment</td>
</tr>
<tr>
<td>4</td>
<td>Joint between RDCs</td>
<td>Joint between RDCs</td>
<td>Partial</td>
<td>Daily for production planning &amp; safety stock adjustment</td>
</tr>
<tr>
<td>5</td>
<td>Centrally</td>
<td>Decentralized</td>
<td>Full</td>
<td>Daily for production planning &amp; safety stock adjustment</td>
</tr>
</tbody>
</table>
3 Theoretical framework

Case 1
In case 1 the CP have full visibility over all the operations in the network and generates monthly production plans based on information of number of average production days for the month, stock levels in CW and the network's total sales forecast for the next month. The PF then makes a production priority list for the products that are planned for production. This list is based on the total inventory levels at CW. The DCs check the inventory daily and places orders to CW if the stock levels fall below the target stock level. However, if there occur lack of the ordered product in CW, CW randomly delivers material to the DCs that have ordered that product. (Datta & Christopher, 2011)

Case 2
Case 2 is essentially the same as case 1 except for that the PF can chose to produce more of a product on a weekly basis if the PF decides that it is necessary, but CP has the overall control over every decision. (Datta & Christopher, 2011)

Case 3
In case 3 the PF itself decides which products to produce and how much to produce, however the smallest batch of production of a product is one day of production. The amount and what product to produce is based on the information of stock levels that CW feeds PF. In this constellation the DCs decides what orders that is given to the PF and those are based on the difference of the target stock levels and their actual stock levels. However, what is sent to the DCs is still centrally controlled. (Datta & Christopher, 2011)

Case 4
In this constellation both the control over material flow and decision making is jointly controlled by the DCs. This means that the DCs share their ordering information between each other and in cases when a lack of products occurs in the CW the DCs decides together which amount each DC should get delivered. This also means that the CW have no control over the network's material flow. (Datta & Christopher, 2011)

Case 5
For the last case the material flow is once again controlled centrally by the CW and the decision making is decentralized, which means that the DCs no longer share information between each other. However, the PF have access to all units’ information. The DCs places orders to CW and CW decides what amount of products that can be delivered depending on the availability. (Datta & Christopher, 2011)
3 Theoretical framework

Effects

The overall conclusion that Datta and Christopher (2011) comes to is that case 5 is the overall best constellation. This is based on seven performance measures that Datta and Christopher (2011) decided to evaluate the constellations on. The seven measures are:

- network customer service level (CSLN)
- average production run-length (APR)
- total average network inventory (NAVI)
- average response time to disturbances (ART)
- number of Stock Outs (SO)
- number of Change Overs (CO)
- bullwhip effect (BE)

In the graphs that can be seen in appendix 1 the performance measurements are presented for each case.

As said before the overall best performance is the result of constellation 5. In the appendix it can be seen that case 5 compared to case 1 has a significant higher CSLN, shorter ART and higher APR. And the increase in CSLN is not the result of a higher NAVI, it is actually lower than in case 1. Cases 3 and 4 also decreases the NAVI and results in higher APR compared to case 1. Overall it can also be seen that case 2 does not have any significant change in performance compared to case 1. They have the worst performance of the cases which indicates that centrally coordination of material flow and decision making without any information sharing amongst partners in the supply chain is not a winning concept. And to change the information flow from monthly to weekly updates does not improve the performance either. (Datta & Christopher, 2011)

What can be seen however is that when in case 3 the decision making is decentralized with full independency it results in significant changes for the better in NAVI, CSLN, number of CO and APR. However, there are no change in number of SO and the ART actually increases. This occurs due to that the DCs themselves decides what to order but the CW still decides what and when material is delivered to the DCs. (Datta & Christopher, 2011)

For case 4 the number of SO and CSLN improves significantly compared to case 3 without having to increase the NAVI. This shows that communication and coordination between partners in the supply network is essential to improve the supply network. However, both case 3 and 4 have higher ART than case 1, so the conclusion is that although the DCs are collaborating both in decision making and material flow the system is not able to respond to disturbances. This can be explained with that the PF does not have information of the total stock levels for the network and that makes it hard to produce the right product at the right time which increases the ART. (Datta & Christopher, 2011)

Finally, in case 5 full information sharing is introduced and all performance measures but one improves or stays the same compared to all other cases. The only performance measure that does not improve is the NAVI compared to cases 1 and 2. Regardless case 5 is concluded to have the best combination of coordination of material flow and decision making and information sharing to deal with uncertainty in total demand. (Datta & Christopher, 2011)
The conclusion that Datta and Christopher (2011) reaches is that a combination of centrally coordination of material flow and availability to both local and global information for the decision makers is the best way for the supply network to tackle the problem with uncertainty in demand.

3.4 Collaboration methods within supply chains

Collaboration within a supply chain has been described as important for supply chains to become competitive therefore will different methods for collaboration between supply chains be further described below.

3.4.1 Efficient Consumer Response

Efficient consumer response, ECR, can be different depending on the company and individuals adopting the approach, it can be an attempt to streamline logistics, a way of planning assortments in a consumer-oriented way, a forum for shared development to standardize standards and practices or bilateral development processes. The wide and different definitions of ECR is due to it being a set of management disciplines put into a framework. (Finne & Sivonen, 2009)

The original definition suggests that "the ECR approach is a strategy for the grocery retail industry, involving close collaboration between retailers and suppliers in order to add value to the consumer" (Finne & Sivonen, 2009, p. 112)

Seifert (2003) states "ECR is a comprehensive management concept based on vertical collaboration in manufacturing and retailing with the objective of an efficient satisfaction of consumer needs. The main components of ECR are supply chain management and category management". (Seifert, 2003, p. 3)

Typical characteristics for ECR are, operating principles suited for grocery retailing, focus on the entire supply chain not individual firms and their operations, close collaboration between parties in the supply chain and the final customers’ behavior and needs is the starting point for planning. (Finne & Sivonen, 2009)

The purpose of ECR adaption is to become responsive and have a consumer oriented operation where manufacturers and retailers cooperate for customer value maximization and cost minimization. This is achieved ideally through supply chain integration and optimization where availability of products is high and inventories as low as possible. (Finne & Sivonen, 2009)

ECR is built on two main parts which are supply chain management and category management. Under supply chain management emphasis is on strategies like efficient replenishment, efficient administration and efficient operating standards. For category management more effort is put on efficient store assortment, efficient promotion and efficient product introduction. The objective of ECR is to reduce or eliminate wasteful activities and concentrate on value and productivity factors. The main goal of ECR is to transform individual solutions that create sub optimal links in the supply chain into a solution that is more comprehensive. Hence, combining the goals with the objective, a more concrete goal for supply chain management in ECR is elimination of inefficiencies due to an uncoordinated supply chain. Inefficiencies such as unnecessary safety stock and information or inventory that is unused for long periods. For cooperative marketing the goal is to rectify false trends in promotional activities, decisions regarding assortments and introduction of products. (Seifert, 2003)
3 Theoretical framework

Principles
The principles that guide the ECR implementation are presented below:

- The needs of the customers have to consistently be fulfilled faster and better to enable wider assortments, higher quality products, higher service levels and convenience at prices that are lower.
- Implementing ECR demands leaders that are committed and strive to eliminate barriers that are based on traditional interactions between parties and engage in win-win partnerships.
- Logistics, production and marketing are in need of information that is up to date and supplied electronically between partners.
- The product flow from production line to consumer should flow in the most efficient way possible hence making sure that the right product is in the right place at the right time.
- Metrics and rewards systems that are uniform and common is needed for the whole supply chain to be able to ensure that savings and wins achieved are fairly distributed. (Finne & Sivonen, 2009)

3.4.2 Collaborative planning, forecasting and replenishment
Collaborative planning, forecasting and replenishment, further referred to as CPFR, is built upon ECR and is an extension of the supply chain management side of the concept (Seifert, 2003). CPFR was initiated by Wal-Mart and Warner-Lambert but the first description and publication of CPFR was by the voluntary interindustry commerce standards, VICS. (Seifert, 2003)

Fliedner (2003) puts forward driving forces that have led to the need to exchanging reliable information which CPFR does. Driving forces such as international sourcing, global market and more competitors have led to the need of visibility tools such as CPFR in the supply chain to be able to meet volatile demands and market signals without increasing costs.

CPFR can be described as a collaborative process that engages the entire supply chain, partners shares and manages information together hence improving the relationship between them, increases forecast accuracy, reduces inventory and increases customer satisfaction (Montreuil, et al., 2000). Skjoett-Larsen, et al. (2003) describes CPFR as a collaboration between two or more parties in a supply chain who together plan promotional activities and develop synchronized forecasts. These forecasts is then the base of the decisions that is made for production and replenishment processes (Skjoett-Larsen, et al., 2003). According to Fliedner (2003) CPFR is used to coordinate activities such as production and purchase planning, inventory replenishment and demand forecasting between partners in a supply chain in a web-based manner. Seifert (2003) present that the aim of CPFR is to set up a set of business processes that can be used for collaboration between manufacturer and retailer functions to enable an overall efficiency in the supply chain. Through the integration of both supply and demand processes CPFR will improve efficiency, reduce fixed assets and working capital, increase sales and reduce inventory while still satisfying consumer needs (Seifert, 2003).
Seifert (2003) states that "CPFR is an initiative among all participants in the supply chain intended to improve the relationship among them through jointly managed planning processes and shared information" (Seifert, 2003, p. 30). Seifert (2003) also emphasizes that a strong commitment to cooperating is needed between the partners to enable a qualitative and intensive information exchange.

**Process model**

CPFR can be divided into three large sub-processes which are planning, forecasting and replenishment. Each process is divided into steps with a total of nine steps, where the first step is agreeing on the guidelines for the collaboration, step two regards forming a joint business plan. By using consumption data a common sales forecast is generated which is step three. The identification of exceptions and resolving of exceptions, such as forecast inaccuracies and over and under stock situations in sales forecast, is step four and five. Through combining sales forecasts, inventory strategies and information an order forecast is generated which is step six. Identification and resolution of exceptions for the order forecast is step seven and eight. The last step is transforming the order forecast into an order. (VICS as cited in Seifert, 2003)

Fliedner (2003) discusses that regardless of the steps in CPFR it is an iterative and cyclic process for achieving common forecasts. He further divides the CPFR process into five steps which are:

- Step one is setting up a front end agreement
- Step two is creating a joint business plan
- Step three is developing a demand forecast
- Step four is setting up forecast sharing to handle exceptions
- Step five is replenishment of inventories.

Fliedners (2003) steps involve the same processes as VICS steps but step four to eight in VICS model is lumped together into step four in Fliedners (2003) model. Verity (1996) further suggests that for step four a rules-based response should be set up to handle the exceptions messages to accommodate the large number of exceptions that might arise. According to Fliedner (2003) these five steps are then at intervals, decided upon by the partners, repeated in an integrated and cyclical manner. Schenck (1998) as cited in Fliedner (2003) suggests that step one should be reviewed annually, step two quarterly, step three and four weekly to monthly and step five daily.

**Aim**

Fliedner (2003) discusses the reliable, long term future views of demand as the aim for exchanging internal information on a shared server, meaning CPFR.

The purpose of CPFR is to improve collaboration between suppliers and buyer to improve customer service and make inventory management more efficient and improve profitability by making replenishment of products more accurate and timely. It focuses on forecasting supply and demand through synchronizing plans and projections from the supplier and buyer. CPFR demands capabilities in information systems to be able to be implemented. (Harrison & van Hoek, 2002)

According to Shu, et al. (2006) CPFR is a set of working flows that aim to increase customer value through collaborating between enterprises, sharing standardized information and common plans. They further discuss that CPFR makes suppliers, manufacturers and retailers to combine forecasts, plans and share information.
Theoretical framework

Danese (2007) suggests that the two main reasons for implementing CPFR which are cost reduction without decreasing service levels or making the supply chain more reactive to demand changes hence more responsive. She also states that the level of collaboration meaning level of integration and the amount of processes involved is dependent on the CPFR goals i.e. is there only information sharing between partners or plan synchronization and exception solving. When efficiency, reducing cost without decreasing service levels, is wanted there is a tendency to limit the collaboration to communication, data exchange. When responsiveness to demand change is wanted a higher level of collaboration is applied, synchronization of plans and exception management. (Danese, 2007)

Benefits

The benefits from exchanging information early between partners has enabled reliable and long term views of demand in the supply chain. Benefits experienced from pilot projects of using CPFR has been higher service levels, faster order response time, lower inventory levels for retailers. Further benefits for the manufacturers have been increased sales, higher order fill rates, lowering of product inventories, decrease of cycle time and reduction of capacity requirements. The supply chain benefits have been a more direct material flow, higher accuracy for forecasts and lowering of the system expenses. (Fliedner, 2003)

Example: Graphic packaging international a large producer of paperboard and packaging product has established collaborative forecasting relationships with customers therefore decreasing the risks involved in making production scheduling and inventory control. This was attempted in order to balance the need of inventory to meet sudden demand surges, with the knowing that decomposition of paper starts after 90 days. (Steadman 1998 as cited in Fliedner, 2003)

Through collaborating on a higher level and communicating information in a timelier manner stability and accuracy can be achieved for production scheduling and a higher accuracy can be achieved for inventory planning. The more accurate the production schedules reflect the actual need of the retailer the more reductions in capacity can be made (Fliedner, 2003)

Obstacles

There are some obstacles that hinder the implementation of CPFR, some of these obstacles are:

- Lack of trust between partners in sharing information that is sensitive
- Internal forecast collaboration is lacking
- Cost and availability of expertise and technology
- Lack of standards for information sharing
- Concerns regarding aggregation, the number of forecasts and frequency for generating them
- Fear of collusion occurring (Fliedner, 2003)
3.4.3 Supplier development

High levels of integration with upstream suppliers is one of the keys to increasing responsiveness for a supply chain. Supplier development is a concept of improving supplier management and can for example be done by integrating processes or synchronizing production i.e. coordination of flows made possible by transparency in sharing information. The key focus of supplier development should be process alignment for processes involved in new product development, material replenishment and payments. These ideas should be based on a collaborative strategy development and planning platform. Process integration can be made by a supplier development team where the aim of this team is to find ways to align the suppliers with the buyers. (Harrison & van Hoek, 2002)

3.4.4 Coordination mechanisms

Because companies today work in complex environments, multidimensional organizational structures are built upon the basic structures previously mentioned to enable companies to maximize effectiveness. For these multidimensional organizations to maximize effectiveness coordination is needed. (Axelsson, et al., 2005)

Mintzberg, H. and Quinn, J.B. (1991), as cited by Axelsson, et al. (2005) has defined six coordination mechanisms which are direct mutual adjustment, direct supervision, standardization of work processes, standardization of knowledge and skills, standardization of output of the work and standardization of norms, these are further described below according to Axelsson, et al's (2005) definition:

Mintzberg, H. and Quinn, J.B., (1991) has defined six coordination mechanisms which are:

- **Direct mutual adjustment** - coordination through informal communication such as through a liaison position, integrating managers, temporary taskforce.
- **Direct supervision** - coordination through one person giving orders which is usually implemented when a certain number of people need coordination. Direct mutual adjustment is usually not an option when 15 people are involved and need coordination then direct supervision is implemented.

Through standardization coordination can be achieved, through standardizing what people do coordination is then automatically followed.

- **Standardization of work processes**, standardizing the processes conducted, like an assembly instruction for IKEA furniture, the process of building the furniture involves the same activities no matter who assembles it.
- **Standardization of knowledge and skills**, this aims to standardize the worker not the work. By knowing what to expect from each other it is known what the other will do and can therefore accordingly be coordinated.
- **Standardization of output of the work**, specify and standardize the result of a work process.
- **Standardization of norms**, by sharing a common belief coordination these beliefs lead to coordination. By all believing in improving quality, then all will work towards reaching that goal, hence coordination is achieved (Axelsson, et al., 2005)
3.5 Organizational structures

In the previous section treating Information sharing in supply chains indicates that it is not only the information sharing that is important. The result of Datta and Christopher (2011) study implies that organizational structure is also an important part of how well the supply chain can use the information sharing to make the right decisions. Therefore, this next chapter presents general organizational structures, virtual organizational structures and purchasing organizational structures.

3.5.1 General organizational structures

Axelsson, et al. (2005) presents five main general organizational structures which departments are usually structured in which are in a functional, product, market segment, geographical area or process way.

Functional structure

In a functional structure, where people in the same function work together as one unit, there are advantages in purchasing such as a single front towards vendors, greater potential for specialization and eases the transfer of ideas, contacts and knowledge. Having a functional organization reduces duplication and promotes standardization. A functional structure creates barriers for cross-functional processes such as product development and hinders speed in innovation, new markets and products. (Axelsson, et al., 2005)

Product structure

In a product structure people from each function in the company functions are in a department where the people in the department are picked to enable a shortened product development cycle. Weaknesses of a product structure are duplication and lack of knowledge transfer. Through adopting central functions or lateral processes these weaknesses can be mitigated. (Axelsson, et al., 2005)

Market segment structure

A market structure is when a department is dedicated to a certain market. Disadvantages such as duplication of activities and development of incompatible information and communications technology as well as having difficulties in sharing services and products that may be common between markets can arise. (Axelsson, et al., 2005)

Geographical structure

Geographical structures are based on geographical location to be close to customer and therefore decreasing costs attributed to travel and distribution. In some industries this has become less important due to the evolvement of information technology. For purchasing there is a difference between international and global purchasing where international purchasing often is lacking coordination between business units. In global sourcing, integration between units is required to identify common processes, suppliers, technology and purchases to take part of the benefits of coordinated sourcing. Usually this is done through commodity teams that work globally and information systems that are globally implemented. (Axelsson, et al., 2005)
Process structure

The process structure is based on the complete flow of work, a process could for example be the purchase-to-pay process. The department should consist of people from different functions that are involved in the specific process who then are given the responsibility for the process from end-to-end. The main advantage of a process structure versus a functional structure is the end-to-end view of the entire process making redesigning the process easier. (Axelsson, et al., 2005)

3.5.2 Virtual organization

A virtual organization is according to DeSanctis and Monge (1999) an assemblage of functionally and/or culturally diverse entities that are geographically distributed and linked together thru electronic forms of communication and the entities are relaying on lateral, dynamic relationships for coordination. Harrison and van Hoek (2002) states that a virtual organization is characterized as a group of separate organizations operating as a single entity. Wang and Chan (2008) refers instead to virtual enterprises and defines it as independent enterprises in a production system that, depending on market demand, can be dynamically insourced or outsourced. Harrison and van Hoek (2002) also mentions that a virtual organization reconfigure itself depending on the demand, if necessary new partners are included while others leave when their resources is no longer needed to provide the market. A consequence of a virtual organization is that a customer often are unaware that they are dealing with different companies (Harrison & van Hoek, 2002).

Harrison and van Hoek (2002) emphasizes that by going together with other enterprises and creating a virtual organization resources can be adopted and matched to the demand while minimizing waste. Virtual organizations also enable fast responsiveness, high efficiency and flexibility (Hughes, et al., 2001; Lin & Lu, 2005). Hughes, et al. (2001) states that entities in a virtual organization can flexibly achieve their common goal by intelligently allocating resources.

Information, communication and technology are three important enablers to make it possible for a virtual organization to reach its goals (Wang & Chan, 2008). Wang and Chan (2008) also emphasizes that information technology is a major factor in transforming several enterprises into a virtual organization. Harrison and van Hoek (2002) states that for a virtual organization to succeed the participating enterprises should have consistent standards and procedures and common sources for customer data and orders.
Case studies for virtual organizations:

**Bearing partners**

An example of a virtual organization is Bearing Partners. A group of retailers had a relationship developed thru sitting in a committee together and that friendship was then used later on by the retailers by exchanging products when customer orders could not be met by the individual retailers stock. The aim of Bearing partners is to pool purchasing volumes and increase product availability while still lowering inventory levels. Bearing Partners collaboration is a horizontal collaboration with eight companies with 26 locations to secure country-wide service. The different partners supply different geographical areas therefore they only compete in a few areas that are overlapping. They were also able to offer their customers better prices and services. (Franke & Jockel, 2000)

The basic idea for Bearing Partners virtual logistics center is to create a common inventory of all eight partners from which each retailer can use to meet their customer orders. It is used to manage inventory in real time from various organizational locations in real time. Bearing Partners set the following objectives:

- Cost reduction and communication simplification between partners
- Electronically process stock orders between partners
- Obtain visibility of items that are common in order to be more responsive to customer needs
- Reduction of inventory levels at warehouse locations

The virtual logistics center provides access and visibility to the common inventory of all partners (Franke & Jockel, 2000)

**3.5.3 Purchasing organization**

Assessing and selecting the system and structure of communication, coordination, authority, control, division of labor, as well as assessing and selecting responsibilities required to achieve organizational goals and objectives is the process of organizational design. The organizational layout, effective or ineffective, has an effect on how well purchasing is performing and therefore affecting the entire organization. The organizational structure of purchasing and supply management has an effect on where the formal power of the purchasing decision is located, the distribution of activities and tasks, the scope of the tasks within the purchasing function, the communication and workflow patterns, job satisfaction and how effective the purchasing and supply management function is meeting its goals. (Handfield, et al., 2011)
3 Theoretical framework

According to Handfield, et al. (2011) the purchasing and supply management function is grouped into four areas. These areas are:

- **Sourcing and negotiation** - involves the identification of possible suppliers, supplier negotiations and the buying of goods and services.
- **Market analysis and research** - involves producing long-range forecasts for materials, assessing the capabilities of the suppliers, conducting programs for value analysis and analyzing suppliers cost structure.
- **Operational support and order follow-up** - involves for example order expediting and operational follow-up of orders as well as the preparing and transfer of material releases to suppliers.
- **Administration** - involves maintaining and administering the database and information systems for the purchasing unit, develop plans for the department and measurement system development.

Within these areas there are according to Handfield et al (2011) certain tasks related to purchasing and supply management jobs which are listed hereafter:

- **Buying** - purchasing of raw materials, components, finished goods and services
- **Expediting** - communication about soon to be or past-due shipments
- **Inventory control** - monitoring of the day to day management of inventory that is in-process as well as purchased inventory.
- **Transportation** - negotiation, selection and evaluation of transportation services.
- **Insourcing/outsourcing** - analyzing whether to insource or outsource purchase requirements.
- **Value analysis** - method for analyzing an item’s value and cost.
- **Purchasing research and materials forecasting** - anticipating of long and short-term changes in the market.
- **Supply management** - consist of purchasing, engineering, suppliers and other related functions working together to strengthen relationships with suppliers.

Mergers, downsizing and consolidations in combination with global competition and increase in information system visibility has led to organizations adopting a more centralized approach. Centralized purchasing today should have an emphasis on integration, support and coordinating tasks that are common across a business. Therefore the challenge is finding which tasks, processes and activities to centrally control and which not. (Handfield, et al., 2011)
Different purchasing structures
In this section different types of structures for the purchasing organization is presented together with positive and negative aspects of when the different structures are suitable to apply.

Decentralized purchasing structure
According to van Weele (2010) characteristics of decentralized purchasing structure is that each business-unit manager is in charge of its own financial results, therefore each business unit is in charge of its own purchasing activities. Handfield, et al. (2011) define decentralized purchasing as when purchasing is conducted at the divisional, business unit or site level. Similar to Axelsson, et al. (2005) who describes a decentralized purchasing structure as when individual business-units manage the purchases thus creating multiple purchasing departments. An organization with a decentralized purchasing structure is illustrated below in Figure 14.

Centralized purchasing structure
Axelsson, et al. (2005) define a centralized purchasing structure as when a central group is in charge of all or the majority of the purchases conducted. Van Weele (2010) states that in a centralized purchasing structure a corporate level central purchasing department can be found. Lastly Handfield, et al. (2011) states that a centralized purchasing structure is where one person at a headquarter has the authority to conduct most of the organization's purchases. An organization with a centralized purchasing structure is illustrated below in Figure 15.
Hybrid structure

A hybrid structure is a combination of decentralized and centralized structures. Reasons for a hybrid structure is to combine common requirements among units to reduce overall material costs or improve the service provided by the suppliers. (van Weele, 2010)

According to Axelsson, et al. (2005) a hybrid structure should capture the benefits of centralization and decentralization while mitigating the disadvantages of the two approaches. In today’s environment there are two conflicting pressures globalization, which is pushing for standardization and efficiency which in turn push towards centralization, and customization, differentiation and responsiveness which is pushing for decentralization. Hybrid structures supply a solution that combine the two approaches. (Axelsson, et al., 2005)

According to Axelsson, et al. (2005) there are three hybrid structures, which are coordinated purchasing, center-led purchasing and local-led purchasing, where center-led and local-led purchasing units are ways of avoiding centralized rigidity and decentralized fragmentation. An organization with a hybrid purchasing structure is illustrated below in Figure 16.
Coordinated purchasing

Coordinated purchasing is built upon purchasing units that are decentralized which report to a unit at corporate headquarters. The unit at headquarters oversees issues and matters that concern the whole firm and look for opportunities that might benefit the entire firm. The central unit has the macro view that the individual decentralized units do not have. (Axelsson, et al., 2005)

Center-led

In a center-led action network the decentralized purchasing units do the actual purchasing actions but the corporate center lead the functional excellence and accountability. Therefore drawing the benefits from having a centralized mass but still maintaining flexibility and diversity through the decentralized units. The main reason for the central unit is making the decentralized units network between each other. By bridging together the individual units temporarily a coordinated action is achieved when needed. To enable a center-led action network buyers need to adopt best practice techniques and policies, there should be effective systems infrastructure in place, top management support, buyers who are able to perform and internal users who are receptive and want to collaborate. (Axelsson, et al., 2005)

Handfield, et al. (2011) describes a center-led purchasing organizational structure as a combination of a centralized approach for several business units with common purchased items and a decentralized approach to unique requirements. Handfield, et al. (2011) states that organizations benefits from a structure that holds the benefits and expertise of centralized purchasing groups while still being responsive to individual business units.

Local-led

Federal organization of purchasing, FOP local-led, has a central core which is small that supports and coordinate the decentralized units. The decentralized units have facilities and services that they share and are therefore interrelated. The sourcing power in a local-led purchasing organization resides with the decentralized units. The units report to the business head not the central core. There are five principles for the FOP which are subsidiarity, interdependence, common law and language, separation of power and twin citizenship. (Axelsson, et al., 2005)

Subsidiarity

Subsidiarity suggest that the power should lay with the business units. Decisions should be made without bureaucratic procedures by employees with expertise of the local environment who then are accountable. (Axelsson, et al., 2005)

Interdependence

Interdependence suggest that emphasis should be put on the interrelationships between units especially between purchasing units and its management. Risk of fragmentation is the consequence of relationships that are not developed and maintained. The gains of being part of the FOP should be evident to the units otherwise they will likely break free from the collaboration. (Axelsson, et al., 2005)

Common law and language

Common law and language refers to having real-time data, a common source of information and a global IT system that provide information and intelligence to enable decision points to be identified. Procurement area guidelines and common laws are provided by policies and procedures. (Axelsson, et al., 2005)
3 Theoretical framework

Separation of power
Separation of power suggest that the involvement of the central unit is decided by the requirements that the business units has set. The role of the central unit is to monitor best practices and when required coordinate and provide resources. (Axelsson, et al., 2005)

Twin citizenship
Twin citizenship refers to the need for the employees in the different units to be a part of both their business unit but also see themselves as part of the entire company. To be successful the FOP needs its employees to consider themselves as one body therefore seeing to the company's best and not prioritizing the business unit or self-interests. (Axelsson, et al., 2005)

Cross-functional sourcing teams
When structuring a cross-functional sourcing team there are divisional groups that report to the procurement executive for respective division which in turn reports to the chief purchasing officer. There are also cross-divisional commodity teams which prepare commodity plans to the chief purchasing officer these teams are mostly virtual since they often are globally distributed. (van Weele, 2010)

Criteria's to consider for decentralized versus centralized purchasing
Both van Weele (2010) and Handfield, et al. (2011) presents situations when either decentralized or centralized purchasing is preferred. They agree that if the purchases are similar throughout the organization and if the purchased products are similar a more centralized or coordinated approach is beneficial. van Weele (2010) states that if the customers has specific needs it often leads to decentralized purchasing, which Handfield, et al. (2011) concurs with when discussing that if overall business strategy is responsiveness to individual customers a more decentralized approach should be adopted. Handfield, et al. (2011) claims that should the business strategy be efficiency a more centralized approach is recommended.

Van Weele (2010) states that if expertise is required to conduct purchasing a centralized approach is the most common. Van Weele (2010) continues with if the supply market structure consist of a limited amount of suppliers a coordinated purchasing approach is recommended. If there is potential for savings through higher volumes and if the price is fluctuating due to political or economic climate a centralized structure should be implemented.

Handfield, et al. (2011) states that if managements overall philosophy is committed to a decentralized way of working a decentralized purchasing organization is likely to be adopted. When purchasing expenditures gets larger and larger the pressure to centralize becomes higher (Handfield, et al., 2011).

Lastly van Weele (2010) and Handfield, et al. (2011) disagrees when it comes to how geographical location affects the decision whether to centralize or decentralize. Van Weele (2010) mean that if the units are geographically dispersed a decentralized approach is usually adapted. Handfield, et al. (2011) however states that historically this has been the case but with the current information system capabilities visibility has increased when geographically dispersed which in turn promotes more centralization. However for large corporations that are geographically dispersed there usually are local purchasing functions reporting to a large corporate wide purchasing department (Handfield, et al., 2011).
3 Theoretical framework

Benefits and disadvantages of centralized and center-led purchasing structure

Leverage through purchase volumes, such as lowering of prices or increased service through centralized transport contracts are benefits of centralization according to Handfield, et al. (2011). Since the study is concentrated to intra-firm purchasing and transportation issues not being studied this benefit will not be further explained. Reduction of purchasing efforts that are duplicated can be achieved through centralization. Considering an organization consisting of ten different locations with a decentralized approach, this organizations could end up having ten different material release forms, evaluation systems for suppliers, training manuals, different systems with different protocols for communication, quality standards. Such misalignment adds cost, lack of consistency and inefficiency. Coordination of purchasing plans and strategies requires a centralized group to be able to coordinate the plans and strategies for the entire organization. Management and coordination of company-wide purchasing systems. If each division in a company would have its own purchasing, article or data gathering system would lead to a mix of systems that are incompatible. An example of this is HP which have historically adapted a decentralized approach who now have a centrally led procurement group that controls its company wide databases. This has led to HP having visibility to common items within the company's different divisions while also being able to evaluate the performance of its suppliers at a corporate level. It also support company-wide forecasts. Through centralization the personnel can develop expert knowledge within purchasing. Furthermore change processes are often more easily conducted when a centralized structure is adopted due to a centralized company having less resistance to centrally decided changes. Coordination of purchasing plans and strategies requires a centralized group to be able to coordinate the plans and strategies for the entire organization. (Handfield, et al., 2011)

Below is van Weele’s (2010) benefits of centralized purchasing structure presented.

- Concentrated purchasing power
- Uniform attitude towards suppliers
- Organized market research
- More easily expertise build up
- Standardized commercial purchase conditions for different business units.

Van Weele (2010) also presents some disadvantages of centralization which are presented below.

- Centralized responsibility for profit centers
- Weaker customer orientation towards users that are internal
- Purchasing procedures that are more bureaucratic
- A high level of internal coordination is needed
- Communication with suppliers is less direct.
3 Theoretical framework

Benefits and disadvantages of decentralized purchasing structures

Speed and responsiveness is usually increased through adopting a decentralized approach. A greater understanding and knowledge of local requirements and operating procedures as well as developing relationships with local suppliers are further benefits of decentralized purchasing. Another benefit that organization might see is that decentralized personnel feel a commitment to a business unit on a personal level and that employees support and understand the business unit objectives. (Handfield, et al., 2011)

Below is van Weele’s (2010) benefits of decentralized purchasing structure presented.

- Profit centers having direct responsibility for profit
- Procedures are less bureaucratic
- Internal coordination is less needed than in central structures
- There is a direct communication with suppliers and there is a stronger customer orientation when it comes to internal users. (van Weele, 2010)

Van Weele (2010) states some disadvantages with the decentralized purchasing structure which are presented below.

- The purchasing power is dispersed
- Inconsistent attitudes towards suppliers
- Market research that is scattered
- Hard to build up purchasing and materials expertise
- Differing purchase conditions for different business units

Purchasing synergies

According to van Weele (2010) two factors, purchasing maturity and corporate coherence, affect the way a corporate should strategize purchasing and suppliers. The differences in purchasing coordination can be explained by these factors.

Corporate coherence aims to explain how much of the different parts of a corporation is managed as one entity. In other words how much the business units differ in management style, strategy, vision, structure and culture affects its level of coherence. Purchasing maturity aims at explaining to what level the purchasing functions are professional. What status does the purchasing function have, what organizational status and role does the purchasing departments play, how is the availability of purchasing information systems, the personnel quality and the level of supplier collaboration. (Rozemeijer, et al., 2003)

When both purchasing maturity and corporate coherence is high, a center-led purchasing approach is usually adopted. Should both purchasing maturity and corporate coherence be low a decentralized purchasing approach is most likely to be found. If purchasing maturity is high but corporate coherence is low a more federal or local-led purchasing approach is usually adopted. Contrary when coherence is high and maturity is low a central approach is adopted. Coordinated purchasing is preferably used when both coherence and maturity is on a medium level. (Rozemeijer, et al., 2003)

A summarizing illustration over the different purchasing structures are presented below in Figure 17.
Figure 17: Five organizational purchasing structures depending on the factors purchasing maturity and corporate coherence. (Inspired by Rozemeijer, et al., 2003, p. 11)
4 Study specification

4.1 Studied system

Starting by considering the directives that has been given by Company XY this study will only regard the organization and surroundings of the Kraftliner paper. The directives also aims to exclude the planning of the production runs from the study, hence the first demarcation is set. Further Company XY states that they are interested in investigating the strategies and methods for inventory planning. This has consequences such as the study only focusing on the part that includes the processes regarding Make-To-Stock orders.

In Figure 18 below an explanatory illustration of the studied system is presented. Where the part of the whole system that will be investigated in this study is marked with a green rectangle.

The included parties are the mills and all of the sales offices but none of the customers. The reason to exclude the customer is that Company XY’s MTS processes does not include the customer more than the forecast that they provide and the call offs that they do from the VMI stock, which does not affect the complexity of the MTS work processes. However, the forecast is an important part of inventory planning but in this case the forecasts provided by the customers are considered as fixed and therefore not included in the studied system.

Both the sales offices and the mills are involved in the work processes regarding MTS orders. Further on the three sales offices Market 1, Market2 and Market 3 are included in the studied system because they are each stationed at one of the mills and have a close relationship with that mill. Hence they are biased to the respective mill and it is therefore considered interesting to look at those sales offices. The Market 4 and Market 5 sales offices are instead unbiased since they work with all the mills but are not located at any of the mills. This is the reason for including the Market 4 and Market 5 sales office in the studied system. However, all sales office will be studied quantitatively, which is indicated in Figure 18. Due to the time limitations of the study the three remaining sales offices will not be interviewed, furthermore the sales offices are geographically dispersed and it would be very costly to closely investigate all sales offices. Moreover, it can be considered that the interviewed sales offices are representative for all the sales offices in the study.

Lastly the reason to why all three mills are part of the studied system is that they all have different conditions hence the work processes differ for all three mills. Therefore, none of the mills are representative of the other hence it is not possible to not include any of the mills in the studied system while still achieving a correct view of the system.

Furthermore, it is, as described above, only the connections between the sales offices and the mills regarding the MTS orders that will be investigated i.e. the head connections. However, by changing the organisational structure and work processes regarding MTS the spare connections will be affected as well, this is illustrated with yellow dashed lines in Figure 18.

In Figure 18 it is shown that both the sales offices service stocks and the customers VMI stocks are not included in the studied system. This exclusion includes the work that are conducted in the warehouses, i.e. goods receipt and loading. The reason for excluding the work in the warehouses is that the stock levels are considered not to depend on how the work is conducted. However, the stock levels are expected to be affected. What will be effected is the article combination and their respective stock levels but the total stock levels are not considered to be affected.
4 Study specification

Further on the product flow between the production and the warehouses for the service stock respective the warehouses for the service stock and the warehouses for the VMI stock are also precluded from the studied system. This is because the mills' and the customers' capacity will not change, hence the effect of the changes that this study may result in will not influence the transportation capacity needed. However, the product flow is expected to be affected by the changes namely by changes in the tonnage allocation between the different articles, which will not affect the total tonnage.

*Figure 18: Illustration of the studied system.*
To further describe the connections between the sales offices and mills Figure 19 is presented below. As previously stated the studied system only includes the surroundings of the MTS orders, in Figure 19 this is illustrated with a green encirclement. It can be seen, as previously clarified, that this process differs for the different mills. In Mill 2 the sales offices provide the mill with a forecast and then it is up to the mill itself to decide the replenishing quantities for the service stocks, which is then sent to production planning. For Mill 3 the sales offices provide the production planner with a requested need that they want replenished, which then the production planner enters an order for given that the need is possible to be met. Unlike Mill 1 where it is the sales offices themselves that determines the service stock order and places the order directly to the production planning. Like in the case of the head- and the spare connection the direct orders, i.e. orders that is placed by the customers hence being MTO, will be affected of the changes in the organizational structure and work processes. This is illustrated in Figure 19 with the yellow arrows.

To summarize the process surrounding the MTS orders it includes all activities and sub processes from that the customer's forecast is delivered to the point that the production planning takes over. This process will hereinafter be referred to as the replenishment process.
4 Study specification

4.2 Purpose specification

The purpose of the study is presented below

"The purpose of this study is to suggest how Company XY should change their organizational structure and replenishment processes to reduce the sub optimising of the service stocks to enable better customer service while not increasing the costs."

The two main subjects of this study is to investigate on one hand the organizational structure and on the other hand the replenishment processes. From the section above that declares the studied system it is the organizational structure and replenishment processes of the MTS orders that are going to be investigated.

The relevance of this subject is substantiated of the situation in Company XY today. For instance, in cases of capacity issues it is the capacity manager personally who has to evaluate and decide if and where orders have to be moved. Furthermore, the process up to and including placing an MTS order differs depending on which mill that is involved. Both examples are show how insufficient processes are at Company XY. Hence it is interesting and needed to investigate both the organizational structure and the replenishment processes.

Further on the purpose of the study implies that the changes to the organizational structure and of the replenishment processes are supposed to reduce the sub optimization of the mills' service stock levels so that on one hand the customer service can increase since Company XY measures their customer service mostly on the number of stock outs. This together with the knowledge that the process of deciding what to order and placing a MTS order differs depending on which mill that is involved leads to the work process to investigate being only the replenishment process connected to the service stocks.

In addition to that the changes are supposed to reduce the sub optimization of the service stock levels, to increase the customer service, they are also supposed to at least not increase the costs. This study, i.e. the changes, will therefore be evaluated in regard to the customer service and costs.

Figure 20 below illustrates the link between the investigated areas, organizational structure and replenishment process, and the assessment measurements, customer service and cost.

![Figure 20: Illustration of links between the degraded parts of the purpose of the system.]

In the following chapters the degradation of the purpose continues and the three parts organizational structure, replenishment process and evaluation will be further broken down to questions to enable answering the purpose.
4 Study specification

4.2.1 Organizational structure

Both Handfield, et al. (2011) and van Weele (2010) suggest that a company should adopt different types of organizational structures to match the situation it is in. Axelsson, et al. (2005) discusses how companies need to build organizational structures to enable maximized effectiveness when working in complex environments. Hence Company XY’s organization will be evaluated to determine how the structure matches today’s environment. This organizational aspect will be addressed in question 1.

1. Which purchasing organization structure is theoretically considered beneficial given Company XY’s characteristics?

Both Handfield, et al. (2011) and van Weele (2010) define commonality in the purchased products that the purchasing units have as an aspect to consider when deciding on which organizational structure to pick for the purchasing organization. Van Weele (2010) further claims that technical difficulty which demands expertise promotes a centralized organization. To be able to define the degree to which the products, the eight sales offices purchase, are common and what technical expertise that is needed question 1.1. will be investigated.

1.1. Which organizational structure is considered beneficial given the articles the sales offices sell from the different mills?

Handfield, et al. (2011) and van Weele (2010) also agrees on companies needing to choose an organizational structure that meets the business strategy of the company, responsiveness or efficiency, decentralized or centralized. Therefore, question 1.2. will be asked.

1.2. Which organizational structure is considered beneficial given Company XY’s business strategy?

When discussing organizational structures Van Weele (2010) suggest that a centralized approach is preferable when operating in a market that is fluctuating due to political and global economy as well as a few number of suppliers available. Both Handfield, et al. (2011) and Van Weele (2010) discuss how purchasing units with customers with very specific needs affect the organizational structure adopted. Hence to find out what the market Company XY is operating in question 1.3. is asked.

1.3. Which organizational structure is considered beneficial given Company XY’s customers and markets?

Van Weele (2010) also discusses purchasing maturity and corporate coherence as factors that influence what purchasing organization structure that should be used. There are five purchasing structures that stem from the combinations of high or low levels of these two factors. These structures are federal, center-led, coordinated, decentral and central purchasing. According to Rozemeijer, et al. (2003) the characteristics of coherence or maturity a company possess suggest which purchasing structure a company uses. Corporate coherence aims to measure to what level the company act as one entity (Rozemeijer, et al., 2003). When Handfield, et al. (2011) further discusses the process of designing organizations, aspects to consider are the structure and system for communication, coordination, control, division and responsibility of tasks to reach its goals. Hence to find out how coherent Company XY is today question 1.4 will be investigated considering Handfield, et al's (2011) structure aspects.
4 Study specification

1.4. What corporate coherence does Company XY possess considering communication, control, coordination and tasks?
Rozemeijer, et al. (2003) maturity factor is dependent on the purchasing unit’s quality, the collaboration between supplier and purchasing unit, the unit’s organizational status and availability of information systems. Since it is necessary to know what level of collaboration that exist between suppliers and a purchasing unit to evaluate its maturity the following question will be answered.

1.5. What maturity does Company XY possess regarding collaboration and information sharing between the sales offices and mills?
According to Handfield, et al. (2011) the organizational structure of a company affects its purchasing units performance and therefore the entire company's performance. Rozemeijer, et al. (2003), van Weele (2010) and Handfield, et al. (2011) all agree that there are certain company characteristics to consider when choosing an organizational structure for a company's purchasing structure to be successful. Hence Company XY’s purchasing structure will be evaluated to see how their structure affects the company’s performance and how, given its characteristics, it should be structured to better reach its goals.

First the problems with today’s structure will be investigated. Today Company XY has a decentralized purchasing structure where there is no horizontal collaboration. Company XY are today experiencing lack of lateral collaboration, there is sub optimizing both from sales offices and mills. According to Handfield, et al. (2011) misalignment and duplication of work is common within decentralized structures. The purchasing power is usually dispersed, a lack of visibility between units and market research is often scattered. There are issues that can arise due to a decentralized structure where there also is no horizontal collaboration. To be able to further analyze which structure Company XY should adopt, the issues related to today’s structure will be analyzed.

2. Which issues that Company XY are experiencing today are attributed to their organizational structure?
Company XY seek to better their performance in service levels and at least not increase costs for the mills. The main goals are to increase visibility, standardize as well as increase responsiveness and agility between sales offices and mills. The organizational structure that should be adopted to better reach the company's goals will be addressed in the questions following below.

3. What organizational structure should Company XY adopt to reach its goals?
The benefits of a decentralized approach are speed and responsiveness usually being increased. A greater understanding and knowledge of local requirements and operating procedures as well as developing relationships with local suppliers are further benefits of decentralized purchasing. Another benefit that organization might see is that decentralized personnel feel a commitment to a business unit on a personal level and that employees support and understand the business unit objectives. (Handfield, et al., 2011)

Presented above are some benefits of decentralized purchasing structures, in order to evaluate which organizational structure Company XY should adopt the following question is asked.

3.1. What aspects of a decentralized purchasing structure are applicable on Company XY to reach its goals and enhance its performance?
According to Handfield, et al. (2011) forces such as efficiency and globalization has led to an increasing pressure to centralize. There are several examples, Wang and Chan (2008), Franke and Jockel (2000), Handfield, et al. (2011), of companies with a decentralized structure achieving benefits once a centralized structure was adopted. Handfield et al (2011) and Axelsson, et al. (2005) and van Weele (2010) all give benefits to centralized structures, such as better coordination of plans and strategies, decrease of duplicated work and it eases the networking between units. Hence a further investigation, question 3.2, will be made into how a centralized approach can reap benefits to Company XY given its characteristics and goals.

3.2. What aspects of a centralized purchasing structure are applicable on to reach its goals and enhance its performance?

Axelsson, et al. (2005) discusses how there are two conflicting environmental pressures globalization, which is pushing for standardization and efficiency which in turn is pushing towards centralization, and customization, differentiation and responsiveness which is pushing for decentralization. Hybrid structures supply a solution that combine the two approaches (Axelsson et al, 2005). A hybrid structure is according to both Handfield, et al. (2011) and Axelsson, et al. (2005) a way of reaping the benefits of a centralized as well as a decentralized structure while mitigating the disadvantages of both structures. Axelsson, et al. (2005) present benefits such as a macro view being obtained that can coordinate the decentralized units. They further describe how hybrid structures draw the benefits from having a centralized mass but still maintain flexibility and diversity through the decentralized units. Given Company XY’s performance aims and goals it will be further investigated how a hybrid structure can help them reach those goals.

3.3. What aspects of a hybrid purchasing structure is applicable on Company XY to reach its goals and enhance its performance?

When adopting a certain purchasing structure, there are according to Handfield, et al. (2011), Axelsson, et al. (2005) and van Weele (2010) demands that are put on the processes involved within purchasing. For example Handfield, et al. (2011) suggest that centralized purchasing today should have an emphasis on integration, support and coordinating tasks that are common across a business. Therefore, one of the main challenges when adopting an organizational structure is which tasks, processes and activities to centrally control and which not. Hence to investigate how the processes will be affected by the new organizational structure the following question is asked.

3.4. What demands does this new structure put on the processes within the purchasing units and mills?
## 4 Study specification

### Summary of the organizational structure questions

<table>
<thead>
<tr>
<th>Organizational structure</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1.</strong> Which purchasing organization structure is theoretically considered beneficial given Company XY’s characteristics?</td>
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<td><strong>1.2</strong> Which organizational structure is considered beneficial given Company XY’s business strategy?</td>
</tr>
<tr>
<td><strong>1.3</strong> Which organizational structure is considered beneficial given Company XY’s customers and markets?</td>
</tr>
<tr>
<td><strong>1.4</strong> What corporate coherence does Company XY possess considering communication, control, coordination and tasks?</td>
</tr>
<tr>
<td><strong>1.5</strong> What maturity does Company XY possess regarding collaboration and information sharing between the sales offices and mills?</td>
</tr>
<tr>
<td><strong>2.</strong> Which issues that Company XY are experiencing today are attributed to their organizational structure?</td>
</tr>
<tr>
<td><strong>3.</strong> What organizational structure should Company XY adopt to reach its goals?</td>
</tr>
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<td><strong>3.1</strong> What aspects of a decentralized purchasing structure are applicable on Company XY to reach its goals and enhance its performance?</td>
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</tr>
</tbody>
</table>
### 4.2.2 Replenishment process

Both Finne and Sivonen (2009) and Seifert (2003) explain efficient consumer response, ECR, as a management framework that builds on close vertical collaboration between parties in a supply chain. Finne and Sivonen (2009) further states that the aim of ECR is to enable better maximization of customer value and minimize costs. According to Seifert (2003) one of the missions with ECR is to convert the different parties’ individual sub optimal solutions to solutions that are more extensive and works better for the whole supply chain. Seifert (2003) further presents inefficiencies such as unnecessary safety stock and information or inventory that is unused for long periods as issues that can be solved with the ECR management framework.

Collaboration planning, forecasting and replenishment, CPFR, is a further development of the ECR (Seifert, 2003) and can be described as a collaborative process in a supply chain that engages the whole supply chain (Montreuil, et al., 2000). Skjoett-Larsen, et al. (2003) and Fliedner (2003) further describes the CPFR as a cooperation for activities such as planning and replenish inventory and develop demand forecasts. Through the integration that CPFR brings a number of effects can be achieved namely: an overall efficiency in the supply chain (Seifert, 2003), reduced inventory and increased customer satisfaction (Montreuil, et al., 2000; Seifert, 2003). Since Company XY is interested to better plan and replenish their inventories and increase their customer service the first question regarding the replenishment process is:

#### 4. How does Company XY’s replenishment process correspond to the collaborative process CPFR?

CPFR can be seen as an interactive and cyclic process (Fliedner, 2003) and can be divided in to three main themes namely: planning, forecasting and replenishment according to the VICS model. VICS then divide this three themes into groups of steps with a total of nine steps that form the interactive and cyclic process, however Fliedner (2003) divides the process into five steps but both processes include the same stages.

In the planning category the stages are to first state the guidelines for the collaboration and second to form a joint business plan (Fliedner, 2003; VICS as cited in Seifert, 2003). Axelsson, et al. (2005) further mentions that standardization of norms, hence sharing the same beliefs, and coordination of those norms leads to coordination in the organization. Hence the following question 4.1 will be asked.

#### 4.1. How coordinated are the sales offices and mills in their planning processes and does it correspond to the CPFR model?

The next category, forecasting, is represented by six steps in the VICS model and two steps in Fliedner’s (2003) model. This stage regards generating both common sales and demand forecasts, identifying exceptions to the forecasts and resolving them. In Company XY this process looks different depending on which mill the sales offices order from. In the process regarding Mill 1 the sales offices are responsible for all this steps. While in the process regarding Mill 2 and Mill 3 the sales offices are responsible for the sales forecast and identification and resolving of exceptions associated with the sales forecast and the mills are responsible for the process regarding the demand forecasts.
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According to Oskarsson, et al. (2013) the main purpose of a forecast is to predict the customers’ future demand so that it is possible to have the right product available in the right place at the right time. There are a lot of stated reasons to why it is important to produce an accurate forecast. Blackburn et al (2015) for instance states that it is important in the process industry because the capacity utilization is so high. Both Oskarsson, et al. (2013) and Bernard Trustrum, et al. (1987) states that the forecast is an important basis in for example logistics decision making. Skjoett-Larsen, et al. (2003) also states that the forecast is important so that the logistics can be proactive instead of reactive.

Danese and Kalchschmidt (2011) discusses difficulties with composing an accurate forecast. They discuss the choice of information and how to combine different information from different sources and what forecasting technique to choose as important aspects to consider. Hence the following question will be asked.

4.2. What information and technique does Company XY use when forecasting and does it correspond to the CPFR model?

The last category of CPFR is replenishment of the inventory. This part is represented by one step in both Fliedner (2003) and the VICS models, namely replenish the inventories versus transforming the forecast to an order. Oskarsson, et al. (2013) presents two possible techniques to decide what quantity to order each time which depends on the situation. This leads to the question 4.3.

4.3. How does Company XY decide what quantity to order to replenish the service stock and does it correspond to the CPFR model?

Moon and Mentzer (1998) presents a phenomenon called "island of analysis" which means that different groups or individuals in a company produce their own forecast on their own information which they then does not share with the rest of the company. According to Danese and Kalchschmidt (2011) this will affect the accuracy of the forecast. It is reasonably to include the decision making in the above situations regarding the accuracy of forecasts, lack of right information and sharing should also affect the precision of decision.

Singh and Garg (2015) concludes that in an environment where the demand is uncertain sharing information widely in the supply chain both lowers the inventory levels and the bullwhip effect. Costantino, et al. (2014) and Li and Zhang (2015) also conclude the same in their studies where the average service levels to the end customer increases while remaining or decreasing the average inventory levels and number of stock outs. Hence the question 4.4 will be asked.

4.4. To what extent does Company XY share information and forecasts between different departments and does it correspond to the CPFR model?
4 Study specification

Further on the CPFR framework is a process model that depend on the supply chain's coordination capacity to enable an overall efficiency (Seifert, 2003). Company XY has currently a problem regarding the replenishment process' coordination since it is a different process depending on what mill that is involved which affects the overall efficiency of the replenishment process. Axelsson, et al. (2005) states that standardization is a way to reach coordination. They continues and states that standardization of work processes, output of the work and knowledge and skills will contribute to a coordinated organization. Hence the last question in this section will be:

4.5. To what extent are Company XY's forecast and replenishment processes standardized?

CPFR is, among other things, a process model to enable better customer satisfaction and more efficient inventory management through integration and collaboration over the whole supply chain (Harrison & van Hoek, 2002). It is further also a tool for the supply chain to become more responsive through faster reaction to demand changes and create cost reductions without decreasing the service levels to the customer (Danese, 2007). Fließner (2003) further states that CPFR is a tool for visibility to enable meeting volatile demand without increasing costs. Since it is Company XY's goal, among other things, to improve visibility, increase the responsiveness of the replenishment process and increase the customer service levels the following question will be addressed.

5. How can Company XY change their replenishment process according to the CPFR model to better reach their goals?

The organizational structure of purchasing and supply management has an effect on where the formal power of the purchasing decision is located, the distribution of activities and tasks, the scope of the tasks within the purchasing function, the communication and workflow patterns, job satisfaction and how effective the purchasing and supply management function is meeting its goals. As established in questions 4 and 5 the different parts of the replenishment processes that will be evaluated are the information sharing, forecast, allocation and replenishment processes. Since the organizational structure and how the process of information sharing, forecasting and replenishment of service stock should be conducted will be decided in the previous questions the last step will be to decide upon where the decision power shall be for these processes and where the processes and tasks should be conducted. Handfield et al (2011) further agrees that one of the main challenges when adopting an organizational structure is which tasks, processes and activities to centrally control and which not. Therefore, to be able to suggest an organizational layout for Company XY the following question is asked.

6. Where in the organization should the different parts of the replenishment process be conducted?
4 Study specification

Summary of the replenishment process questions

<table>
<thead>
<tr>
<th>Replenishment process</th>
<th>4. How does Company XY’s replenishment process correspond to the collaborative process CPFR?</th>
</tr>
</thead>
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<tr>
<td>4.1</td>
<td>How coordinated are the sales offices and rls in their planning processes and does it correspond to the CPFR model?</td>
</tr>
<tr>
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<td>How does Company XY decide what quantity to order to replenish the service stock and does it correspond to the CPFR model?</td>
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</tr>
</tbody>
</table>

5. How can Company XY change their replenishment process according to the CPFR model to better reach their goals?

6. Where in the organization should the different parts of the replenishment process be conducted?

4.2.3 Evaluation

In Datta and Christopher (2011) different levels of information sharing combined with different organizational structures is analyzed and it is emphasized that the networks overall performance in terms of service levels and stock outs are highly affected by the different combinations. Further on Fliedner (2003) states that CPFR is a tool to reach higher service levels while lowering inventory levels, or in similarity to lower the cost while maintaining the customer satisfaction, which Shu, et al. (2006), Harrison and van Hoek (2002) and Danese (2007) all agrees on. Harrison and van Hoek (2002) also present improvement in profitability as an effect of implementing CPFR. It is with this as a base that the changes in the organizational structures and the replenishment process will be evaluated in terms of customer service and costs. The first evaluation question is therefore the following:

7. How can the changes in the organizational structure and of the replenishment process affect Company XY’s customer service?

A supply chain can compete in various ways, Harrison and van Hoek (2002) presents five elements and Oskarsson, et al. (2013) describes six elements that together compose the competitive advantages of a supply chain, i.e. customer service. Company XY measure their customer service in number of stock outs however it is not only Oskarsson, et al. (2013) element of stock availability that is interesting to evaluate. Besides Oskarsson, et al. (2013) stock availability, the delivery accuracy is interesting to evaluate as well as parts of Harrison and van Hoek (2002) quality and dependability aspects.
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Within Harrison and van Hoek's (2002) dependability aspect the ability to provide the right product in the right quality and right amount is the most relevant, this aspect corresponds to Oskarsson, et al. (2013) delivery accuracy. This aspect will hereinafter be referred to as delivery accuracy. Further on it is this in combination with the stock availability that will be evaluated i.e. whether the right product is available at the right time in the right amount and quality, hereinafter referred to as inventory accuracy. To be able to evaluate what potential improvement the changes can mean for Company XY it is necessary to know how Company XY performs today, hence the following question will be asked.

7.1. How does Company XY perform today in regard to inventory accuracy?
The evaluation will be on the level of potential improvements, hence the following question will be asked.

7.2. What is the possible improvements of the changes regarding Company XY’s customer service?

Except from the customer service the changes will also be evaluated with respect to the costs, hence the second evaluation questing is the following:

8. How can the changes in the organizational structure and of the replenishment process affect Company XY’s logistic costs?

Oskarsson, et al. (2013) presents a total cost model that emphasize the importance of considering both increased costs and decreased costs that can be associated with a change that affects the logistics and further analyze the total cost changes. They mention five different categories of costs namely inventory carrying, inventory handling and holding, transports, administration and others. Since the transports and the operating of the inventories are not expected to change both the transport costs and the handling and holding costs will hereinafter be considered as fixed. However both inventory carrying, administration and other costs will be investigated hence the following three questions will be addressed.

Summary of the evaluation questions
4.2.4 Summary

Down below, in Figure 21, a summary of all main question of each category is presented.

**Organizational structure**
1. Which purchasing organization structure is theoretically beneficial given Company XY's characteristics?
2. Which issues that Company XY are experiencing today are attributed to their organizational structure?
3. What organizational structure should Company XY adopt to reach its goals?

**Replenishment process**
4. How does Company XY's replenishment process correspond to the collaborative process CPFR?
5. How can Company XY change their replenishment process according to the CPFR model to better reach their goals?
6. Where in the organization should the different parts of the replenishment process be conducted?

**Customer Service**
7. How can the changes in the organizational structure and of the replenishment process affect Company XY's customer service?

**Costs**
8. How can the changes in the organizational structure and of the replenishment process affect Company XY's logistic costs?

*Figure 21: A summary of all main questions and an illustration of to which category the questions belong to.*
5 Method

The study conducted at Company XY is what Björklund and Paulsson (2003) refers to as a case study. The case is conducted at a specific company, Company XY, within a specific area, Kraftliner purchasing, and suggestions are written with the aim to produce improvements within the company. A challenge with case studies is that single cases cannot describe the whole truth. This means that the conclusions are limited and can only be verified once other studies are made that concludes the same thing. (Ejvegård, 2009) This has further implications for the generalizability of this study.

This study is both a quantitative and qualitative study. The evaluation part of the analysis and conclusions is quantitatively measured. According to Björklund and Paulsson (2003) a qualitative study aims to gain a deeper understanding for a specific issue. This study is also qualitatively measured, for example the organizational structure where the processes linked to the sales offices are observed but they are not measured on how often the processes are being made.

Throughout the entire study, all stages, One Drive is used when planning and writing, this to ensure transparency between the writers and simplify communications and work distribution.

5.1 Work process

When conducting a study it is according to Lekvall and Wahlbin (2001) important to have an understanding of the steps that are included in the study, why these steps are included and how they are connected. They further suggest the "Wahlbinska U:et" as a workflow of how to conduct and understand these steps and their correlation. This method was developed for market research, (Lekvall & Wahlbin, 2001) but the writers of this study deems it applicable for logistics studies as well and is therefore used in this study.

Since the method is not developed for this study, changes are made to the model to adapt it to this specific study. The adapted model is seen in Figure 22, it is divided into three stages which are the planning stage, investigative stage and concluding stage. In the planning stage the aim of the study is decided upon, the writing of a theoretical framework and the problem formulation is conducted. In the investigative stage, empirical data is gathered, this data is combined with the theoretical framework to conduct an analysis in accordance with the problem formulation. The concluding stage consist of conclusions drawn from the analysis which is then used to formulate suggestions responding to the aim of the study. The three different stages are further explained next.
The planning stage is initiated with a background, gathering of information of the given issue and its surroundings. Through an informal interview with the capacity manager, that was recorded to ensure validity, the gathering of this information was conducted. In line with what Patel and Davidson (2011) suggest as part of the first stage, an understanding of the issue and its surrounding is gathered and an aim is formed which for this study is referred to as background and determining of the study’s purpose. Lekvall and Wahlbin (2001) agrees that what the study should culminate in should be specified at this stage. Further information, gathered through two skype interviews with the capacity manager, culminated in a company description. The theoretical framework was developed through a thorough literature study. Breaking down the aim of the study, based on the theoretical framework, rendered in a, study specific, problem formulation, which according to Lekvall and Wahlbin (2001) is important to successfully plan and conduct a study. The problem formulation is divided into three parts which are organization structure, replenishment processes and evaluation of service levels and costs. The parts of the problem formulation can be seen in Figure 23.
The investigative stage is divided into two parts, gathering of empirical data and analyzing empirical data. Gathering of empirical data is conducted in what Lekvall and Wahlbin (2001) call a field study stage, where interviews, observation and data is gathered through going out into the "field". Results such as data files, taped interviews and notes stems from this field study. The gathering of data is in accordance with the specified questions in the problem formulation. This is in line with what Patel and Davidson (2011) suggest, that how the data is gathered should stem from the problem formulation. Lekvall and Wahlbin (2001) also suggest that an analysis should then be made from the gathered data. This is made through analyzing the experiences, data, observations and information gathered during the field study in combination with relevant parts of the theoretical framework. This to answer the questions in the problem formulation which demands answers of an analytical character.

Within the concluding stage the conclusions and suggestions are presented to answer the aim of the study which is in line with what Lekvall and Wahlbin (2001) suggest in their method. Furthermore, there are discussions regarding whether the study has answered the purpose of the study, its generalizability and its practical and theoretical contributions.

### 5.1.1 Planning stage

#### Background and determination of the study's purpose

Firstly, one of the writers has worked at the Market 1 sales office and has therefore previous knowledge of the studied system and its processes. As before mentioned the planning stage is initiated with a background of the issue to be solved and the related situation. For this study this was done through three interviews with the capacity manager.

The first interview was an unstructured interview, where a shorter presentation was held about the project Company XY are conducting parallel to this study and an open discussion was held after the presentation. The interview was conducted in person between one of the writers and the capacity manager. It was further taped to ensure that both writers had the same information. This interview touched on subjects like the problems experienced today and what company structure they have. The information gained from the first interview was proficient to get an understanding of the problems within Company XY's purchasing organizations and their service stocks to formulate a problem background. Like Patel and Davidson (2011) suggest the purpose was developed from the problem background. A power-point showing what has been done at the parallel project and its goals was also given to the writers. Which is used in the problem formulation.

The second and the third interviews were conducted in a standardized and semi-structured manner between both the writers and the capacity manager. Skype was used to conduct these interviews and they were also taped, to mitigate the risks of losing information given during the interview therefore increasing reliability. The interviews were further conducted to deepen the knowledge and clarify any uncertainties that had arisen after reviewing the previous interview materials. According to Patel and Davidson (2001) a semi-structured interview gives the respondent a large space within to answer the questions. Which is the reason for conducting the interviews in this matter, to provide the interviewee large space to speak freely and therefore not affect their answers.

The interviewee for the three interviews is Claes Claesson, capacity manager, Company XY Paper division.
5 Method

The information obtained from the interviews are summarized in the company description. This company description is approved by the capacity manager who has read it and verifies that it is a correct description of the company and the background.

Theoretical framework

The purpose of a literature study is to obtain information within the literature areas relevant for the study. (Björklund, 2014) Conducting the literature study the literature database used has mostly been Linköpings University's UniSearch, where books, journals, magazines, articles and so on can be found. Google scholar has also been used as a search engine. A few of the search words have been "horizontal", "lateral", "collaboration", "cooperation", "process industry", "inventory control", "supply chain", "purchasing", "organization", "replenishment", "agile", "visibility", "information sharing" and "decision making". The words have been combined in different constellations which has rendered different results. Had other words been used or combinations that were not tried the result might have been different which could have affected the contents of the theoretical framework and thus the study. The more knowledge the writers gained within the study the more refined the searches became. Words such as "CPFR" and "virtual enterprises" were used. References were also found by looking at references of articles, journals and books read. When an interesting read, that was very relevant to the study, was found that referenced to another author the later author and article or book was investigated. Furthermore, some databases such as Elsevier suggest further reading that is similar to the previously read article. Hence when a very relevant article was found the related articles were investigated to see if they were relevant to the study. Databases such as Emerald, Elsevier, Scopus, Libris and Business source premier have been used. Journals within logistics and supply chain management have been used and looked for when searching for articles. It has also been a focus on articles and books with newer release dates since organizational structures within supply chain collaboration are relatively young since being dependent on information systems and IT. Course literature from previous courses taken by the writers at Linköping's University have been used as a starting point for the literature study.

Literature studies can be angled or incomplete since they are based on secondary data (Björklund & Paulsson, 2003). Secondary data means that the data has been developed to be used for a specific study (Björklund & Paulsson, 2003), which is not this study. Taking this into consideration several authors have been used and compared to validate the information. Furthermore, articles that have been cited by many other authors that have been published in journals have been seen as more reliable and therefore more relevant for this study. Articles published in journals related to logistics have also been seen as more relevant to this study and are therefore seen as more reliable to use in the theoretical framework.
5 Method

A literature study is a way of gaining a high level of knowledge, within a specific subject, in a short time with restricted resources (Björklund & Paulsson, 2003). Since the theoretical framework is based on literature within chosen areas the literature study is an important base for the study. The theories presented in the theoretical framework are only a part of the total studied literature. For example there are many theories for collaboration methods in supply chains such as VMI and JIT II, where the purchaser from a company is located at the supplier. Like mentioned in the company description the sales offices are in charge of replenishing the customers stocks which is VMI. Furthermore some of the sales offices are located at the mill, the supplier, and all of them are organizationally located with the mills which is JIT II. Therefore Company XY is considered to already have adopted JIT II and VMI. Given that Company XY already have adopted these collaboration methods the authors of this study did not include these theories in the theoretical framework because they were considered irrelevant. Hence the theories presented in the framework are seen as the most relevant theories for this study. To achieve what Björklund and Paulsson (2003) call objectivity, the writers have tried to have a clear reasoning when choices regarding theories have been made.

Problem formulation

According to Patel and Davidson (2011) as well as Lekvall and Wahlbin (2001) a problem formulation can be done, based on the knowledge gathered through the literature study and the problem background, where it is specified exactly what is to be investigated. This part of the study aims to create a deeper understanding and describe as well as explain the relationships between different theoretical areas. Firstly the studied system was described and further explained. Thereafter a degradation of the purpose of the study was done which rendered the three parts of the problem formulation: Organizational structure, replenishment process and evaluation of solution within the aspects of service level and cost. Since the writers could not find any theories describing the case at Company XY, different theory areas were combined to generate questions. When answering these questions an analysis would be generated, an analysis that is used to form conclusions answering the purpose of the study. Within the organizational structure theories about the relationships between company characteristics, business strategies and organizational structures where combined to see where they correlate. The same was done for processes within replenishing of inventory. Replenishment theories were combined with forecasting, collaboration and inventory theory to generate questions that specify what is to be investigated during the study. This is in line with what both Patel and Davidson (2011) as well as Lekvall and Wahlbin (2001) suggest that the questions formed are used to degrade the purpose of the study and through specifying the questions the problem formulation of the study is specified. For the final part of the problem formulation, the evaluation of the solution theories about inventory costs and service levels have been combined to specify questions to be investigated.

The specified questions developed in the problem formulation was then sent to the clients of this study at Company XY for them to confirm that the study is in line with what they expect. This was done to prevent discrepancies further on in the study.
5.1.2 Investigative stage

In this section the approach, of how the frame of questions are going to be answered, is presented. The investigative stage is divided into four steps, collecting data, analysis of the organizational structure, analysis of the replenishment process and analysis of the effects. These four steps can be divided into two main steps, data collection and analysis. To answer and analyze the questions from the problem formulation the data collection is conducted first. Since the data collection of the three parts organizational structure, replenishment process and evaluation does not depend on the analysis of one of the other parts all data is collected approximately at the same time. An approach of collecting data for one part, analyze it and then collect data for another part is not possible due to time and economical aspects. How the two main steps, data collection and analysis, are conducted will be further explained below.

Collection of data

The collection of data related to the investigative stage is conducted through interviews, observations and statistical data. Most of the data is collected during visits to the three mills and the three sales offices, Market 1, Market 2 and Market 3, which are located at the mills. During these visits data is collected through interviews and observations. Apart from these three sales offices interviews are conducted with the Market 4 and Market 5 sales offices as well, these interviews are conducted through Skype. Further on a Skype interview is also conducted with the supply chain director assistant, statistical data regarding all sales offices and mills are retrieved from her.

Interviews

All interviews in the investigative stage are conducted with the same method which will be described and motivated further. The information that is collected through interviews have to be compiled and cross analyzed to answer the questions hence the interviews are done with a high degree of standardization which, according to Patel and Davidson (2011), is often used when the purpose is to compare and generalize the answers. An interview with a high degree of standardization has a predetermined order to all questions and a low degree of standardization means that the interview is more like a conversation without any predetermined questions (Patel & Davidson, 2011).

Patel and Davidson (2011) also mentions the degree of structure to an interview, which correspond to how predetermined the response sphere is. With a high degree of structure, the interviewee is not able to answer freely instead there are predetermined answers (Patel & Davidson, 2011). In preparation of the investigative stage and the interviews theory regarding organizational structures, information sharing and replenishment processes are studied. This theoretical study affects which questions are asked and how they are asked. Furthermore, the interviews are conducted without predetermined answers. This enables the interviewee to answer freely which results in getting an expanded view and understanding of the organization and processes which is the goal for the investigative stage. The interviews are considered to be conducted in a semi-structured way since the questions are affected by the theory but there are no predetermined answers.
Patel and Davidson (2011) emphasizes the importance of formulating the question as simply as possible. It is for example important to try to avoid long, conductive and presumption questions as well as double and "why" questions. During the work of formulating the interview questions the above aspects have been taken into account. The work of formulating the interview questions has also been done with great planning and consideration which according to Björklund and Paulsson (2003) increases the validity. Furthermore, check questions is used to ensure that the answer to important questions are correct which increase the reliability (Björklund & Paulsson, 2003). If more than one person has the knowledge to answer a question, each person with this knowledge will be asked the question. This corresponds to what Björklund and Paulsson (2003) describes as triangulation which increases the reliability and validity. All interview questions are presented in appendix 2.

The interviews are conducted with one interviewee at a time and both authors are present at each interview which according to Patel and Davidson (2011) can increase the reliability. Further on each interview is recorded which also increase the reliability according to Patel and Davidson (2011) since further notes can be done and it can be ensured that the answers have been grasped correctly. The records are later partly transcribed to extract the important information and answers to the questions. To ensure that each interview with different individuals that have the same role at the different sales offices and mills is conducted as much as possible in the same way, potential supplementary questions are noted and added to the next interview.

**Interviewees**

The interviews are conducted with employees at Company XY that are considered to have knowledge regarding the subjects that are investigated. Below, in Table 2, it is illustrated which employee that is considered to have the insights and knowledge regarding the specific subjects.

*Table 2: Summarizing table of which employees have been interviewed regarding specific subjects.*

<table>
<thead>
<tr>
<th></th>
<th>Capacity manager</th>
<th>Supply chain director assistant</th>
<th>Production planner at mill 1</th>
<th>Production planner at mill 2</th>
<th>Production planner at mill 3</th>
<th>Sales office manager at: Market 1</th>
<th>Market 2</th>
<th>Market 3</th>
<th>Market 4</th>
<th>Market 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategies and goals</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<tr>
<td>Collaborations</td>
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<tr>
<td>Measurements</td>
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<tr>
<td>Market and customers</td>
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<td>Allocation</td>
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<td>X</td>
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<tr>
<td>Replenishment process</td>
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<td>X</td>
<td>X</td>
<td>X</td>
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<td>X</td>
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<tr>
<td>Production forecast</td>
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<tr>
<td>Sales forecast</td>
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</tr>
</tbody>
</table>
Questions concerning the subject strategies and goals are asked to all interviewees since a wide insight of this subject is desirable. Moreover they are all asked so that it is possible to analyze whether all parts of the organization have the same idea of the company's strategies and goals.

Further on, questions regarding both the collaborations in the organization and the measurements that are carried out are also asked to all interviewees. The capacity manager and the supply chain director assistant are interviewed regarding the collaborations and measurements to get an insight of the collaborations and measurements that are present in the entire organization. The production planners at the mills and the sales office managers at Market 1 to Market 5 all are interviewed to get an insight over how each party consider themselves to collaborate with other parties in the organization and how they measure their work and processes. This is done to enable an analysis of how the organization collaborate and how they measure their work and whether the whole organization does it the same way.

Regarding the subject of which markets the organization is located in and the organization's customer the capacity manager and the sales office managers of Market 1 to Market 5 are interviewed. The capacity manager is considered to have an insight of the total market and whether some markets are special in some way. The sales office managers are considered to have the knowledge of how their market's customer may differ and if some customers are more alike than others.

Questions regarding the allocation of the production capacity are asked to the production planners at mill 1 and mill 2 since they are the ones that are calculating the allocations. The sales office managers are also asked question regarding the allocation to get an insight of what their views of the allocation are.

Questions regarding the replenishment process are asked to the production planner at mill 2 and the sales offices managers at market 1 to market 5. The production planner at mill 2 is asked these questions since it is he who have the responsibility of replenishing the service stocks linked to that mill. The sales office managers are asked questions regarding their process of replenishing their service stocks. Furthermore, they are asked questions regarding what their view is of the production planner at mill 2 having the responsibility of replenishing the service stocks linked to mill 2.

Lastly questions regarding the production forecast are asked to the production planners and question regarding the sales forecast are asked to the sales office managers. These are the persons that are considered to have the best insight of how and why the process regarding the forecasts are conducted the way they are.
5 Method

Analysis

After the collection of data is conducted the data and the theories, presented in chapter 3, are analyzed to answer the questions presented in the problem formulation, chapter 4.2. Below the approach of answering the eight main questions are presented.

Organizational structure

1. Which purchasing organization structure is theoretically considered beneficial given Company XY's characteristics?

This question is answered by analyzing a combination of statistical data, information from interviews and observations as well as theories regarding the characteristics of a purchasing organization.

The analysis of the statistical data is performed with a quantitative approach while the analysis of the interviews and observations is conducted with a qualitative approach.

2. Which issues that Company XY are experiencing today are attributed to their organizational structure?

This question regards problems that Company XY is experiencing currently and how those problems relate to their current organizational structure. To answer this the responses to the interviews, the conducted observations and the collected statistical data is analyzed in order to answer the first question. Together with the above mentioned analysis the current state is analyzed with regard to relevant theoretical aspects that has been presented in the theoretical framework related to organizational structures.

The analysis is performed with a qualitative approach where a comparison between the collected empirical data and the theoretical aspects regarding organizational structures are performed to conclude which issues that Company XY are experiencing are attributes to their organizational structure.

3. What organizational structure should Company XY adopt to reach its goals?

This question is answered through analyzes of the theoretical framework regarding the organizational structure in combination with and in regard to Company XY’s already known goals and issues that question 2 has shed light on. This analysis is also done with a qualitative approach through comparing the known issues and goals with what the theoretical framework regarding organizational structures presents as typical pros and cons of different organizational structures.
5 Method

Replenishment process

4. How does Company XY’s replenishment process correspond to the collaborative process CPFR?

This question regards Company XY’s current replenishment process and to what extent the current process correspond to the CPFR framework. The question is answered by analyzing the information collected in the interviews and observations regarding the replenishment process, allocations, collaborations and forecasts with the theoretical framework regarding the collaborative process model CPFR, information sharing and the conducting of an accurate forecast. The analysis is performed with a qualitative approach.

5. How can Company XY change their replenishment process according to the CPFR model to better reach their goals?

When the current replenishment process has been defined in regard to the CPFR framework in question 4 the next step is to consider how the process can change in regard to the CPFR model to better reach Company XY’s goal, which is the intend of question 5.

The question is addressed with an analytical approach. The analysis is of a qualitative character and is performed as a comparison of theoretical aspects, presented in the theoretical framework, the collection of the answers to question 4 and Company XY’s goals.

6. Where in the organization should the different parts of the replenishment process be conducted?

This question regards where the processes that is the subject of question 4 and 5 should be conducted in the organizational structure that is the result of the third question. This is addressed with an analytical approach. The analysis is of a qualitative character and it is conducted as a comparison of what the processes requires and how it can be met by the possibilities of the organizational structure

Effects

7. How can the changes in the organizational structure and of the replenishment process affect Company XY’s customer service?

This question aims to estimate how the recommended changes to the organizational structure and the replenishment process could affect the customer service that Company XY provides to their customers. To answer this question a quantitative analysis of the effects of the changes is conducted.

8. How can the changes in the organizational structure and of the replenishment process affect Company XY’s logistic costs?

This last question regarding the cost aspect of the changes is answered through reasoning of and a qualitative analysis of the theoretical aspects presented in the theoretical framework. Analysis’ are performed, as comparisons between the current state and the possible state, of the aspect that, according to the theory and reasoning, affects the costs.
5 Method

5.1.3 Concluding stage

The concluding stages is to summarize the analysis of the study and provide a distinct answer to the purpose of the study. The stage is divided into two sub sections namely conclusion and discussion.

Conclusion

In the conclusions the recommendations of which organizational structure Company XY should use is presented together with the parts of the replenishment process that the authors recommend Company XY to change and where each process should be conducted.

Discussion

In the discussion it is evaluated whether the purpose is fulfilled, how generalizable the study is, how the changes affects the surrounding processes and what the theoretical and practical contribution of the study is. Recommendations of future studies is also presented.
6 Collected data

6.1 Yearly planning

In the end of each year the Kraftliner organization makes a rough production budget and sales budget for the coming year. The production budget is conducted to get an overview over the organization’s total production capacity. To be able to calculate the total capacity the budget is conducted for each mill and for each quality, brown Kraftliner and white Kraftliner separately. These budgets are calculated by the mills and are based on the number of production days for the coming year separately for each month. When the days of production is established then the production planner at each mill calculates a rough average of the tonnages they will be able to produce each day depending on the average production per hour. This production average per hour is based on historical data of production per gsm since one ton of a light gsm requires more production time than one ton of a heavy gsm. The sales budget is a compilation of the historical sales for each sales office and known changes for the coming year. (Davidsson, 2015)

Based on these budgets a market plan is conducted. The purpose of the market plan is to decide which articles to which customers to produce at which mill to generate as good sales as possible for all mills. The decision of which article to produce where is based on costs and logistic aspects. The factors that are considered regarding the costs are transport costs and production costs. The production costs are partly depending on the fact that production of one ton of paper is not the same for different machines and partly on the fact that some reel widths are better to produce on specific machines due to the trimming possibilities. The cost of trimming is the waste left after trimming in the reel widths. The logistic aspects are considered in situations of loading capacity. However, it is not taken into account that some machines are better at producing either heavy or light gsms. This is something that the capacity manager would like to take into account, however the cost of taking this into account is considered higher than the possible win. (Claesson, 2015 and Davidsson, 2015)

The conduction of the market plan is one of the capacity manager’s most important task. It is the capacity manager’s main task to optimize the three mills and their five machines. When optimizing the capacity manager have to take each mills individual wants into account but an objective view is critical to make decisions that benefit the cluster. An example of this is that it costs more to produce white Kraftliner in Mill 2 than in Mill 1 due to their white pulp being more expensive to produce. Therefore, it is preferable to produce more Royal2000 in Mill 2 and more white Kraftliner in Mill 1 since Royal2000 needs less white pulp. Furthermore, the capacity manager is responsible to make sure that the machines capacity is utilized in an optimized way.
6.2 Production planning

6.2.1 Mill 1

The production in Mill 1 is divided onto two machines, on the first one, PM1, only brown Kraftliner is produced and on the second one, PM2, both white Kraftliner and Royal2000 is produced. The monthly production is ideally planned in four runs from one Saturday afternoon to the next Saturday afternoon. However, depending on the demand these runs can be extended until Tuesday but then the next coming run is shortened to be between Tuesday and Saturday. The reason for that the run can only be extended to Tuesday is the departure of the vessel on Wednesdays. Each production run has an order deadline on Wednesdays e.g. the sales offices have to enter all orders before the deadline.

The production runs of brown Kraftliner are planned in the way that one run starts with light gsm and gradually increase to heavy gsm and the next run then starts with heavy gsm and decrease to light gsms. This can be illustrated as a sinewave, see Figure 24. The production runs for white Kraftliner and Royal2000 are divided in a similar way. The runs always start with producing light gsms of Royal2000 which then gradually increase to the heavy gsms. When the heavy gsm is produced of Royal2000 the production is switched to white Kraftliner which starts with heavy gsms and gradually decrease down to light where the run ends. The next run begins with light gsm of Royal2000 again, see illustration in Figure 25.

![Figure 24: Illustration of a production run on PM1.](image1)

![Figure 25: Illustration of a production run on PM2.](image2)
In the beginning of the year the production planner provides the sales offices with the information of which gsms that are being produced which runs during the coming year. This information includes the closing date for each run, the date of production, date of shipping and date of delivery to each external warehouse that Mill 1 delivers to. The Market 5 sales office thinks that this production schedule is very clear which is good. The Market 5 sales office also states that the delivery dates at the warehouses are reliable due to the stable schedule of the vessel.

6.2.2 Mill 2

The production in Mill 2 is divided onto two machines, the first, PM6, produces brown Kraftliner and the second, PM5, produces white Kraftliner and Royal2000.

Each month the production on these machines are planned based on a production forecast, sales forecast and historical sales data. The monthly production is further on divided into four cycles. Each cycle is ideally 7.5 days, however depending on demand the cycles can be both shortened or extended as long as all four cycles is conducted during the planned month. The production in each cycle follows a sequence where the production always starts with the lightest gsm and then gradually increases to the heaviest at the end of the cycle. Then the next cycle starts with the lightest gsm again. This is the same for both PM5 and PM6, see an illustration in Figure 26 below.

![Illustration of the production cycles on PM5 and PM6](image)

The detailed day production plan is locked three days ahead, meaning that the sales offices have to place their orders at least 3 days before production. However, the production planner makes changes to the production plan each day, depending on previous days’ production, problems and the stock levels in the service stocks. The reason for taking the stock levels of the service stock into consideration when making these changes is because in Mill 2 it is the production planner that is responsible for the replenishment of the service stocks.
6.2.3 Mill 3

The production in Mill 3 is in ideal situations divided into two production cycles per month. They start producing light gsm one cycle and gradually increase the gsm through the cycle. The next cycle is then beginning on the gsm that the last cycle finished with, hence it starts with heavy gsm and gradually decrease to light gsm, see Figure 27 for an illustration of a preferred production run. However, Mill 3 has a problem with their production of virgin pulp. This sometimes results in that the paper production have to switch from Kraftliner production to produce Deckenpapier since Deckenpapier does not need as much virgin pulp as Kraftliner. When the production then goes back to produce Kraftliner they have to start with relatively light gsm and usually gradually increase to heavy gsms. This complicates and further delays the production especially for light gsms if the production is switched when producing heavy gsms. Figure 28 below illustrates a possible situation when the production has to switch to Deckenpapier.

![Figure 27: Illustration of a preferred production run.](image1)

![Figure 28: Illustration of an interrupted run.](image2)
6.3 Forecast

The Kraftliner organization works both with production forecasts and sales forecasts. In this section the processes of how these forecasts is generated will be explained.

6.3.1 Production

The production forecast is done the same way for the three mills but are used in different extent. The production forecast is based on the expected number of production hours each month and the average amount of tons produced per hour. This is done for brown Kraftliner separately from white Kraftliner and Royal 2000 since the different qualities are produced on separate machines. This forecast is then broken down to specific tons of different gsm. This specific amount of tons for each gsm is based on historical sales data from the previous months, hence not the sales forecast that is provided by the sales offices every other week. (Davidsson, 2015)

This production forecast is used by the organization in the planning and the monthly evaluation. Mill 1 and Mill 2 also use the production forecast when calculating the allocation, which is explained in chapter 6.4.

6.3.2 Sales

The sales forecast is based on the three month rolling forecast that the customers provide to the sales offices once a month. This forecast is provided on an article level entered into the SAP by the customers themselves. The customers’ forecasts are allowed to deviate five percent on a total level and 25 percent on an article level. The sales offices then process the forecasts and then they provide a sales forecast to Mill 1 and Mill 2 every other week. This is not done for Mill 3 since they do not work with allocation, which will be further described in chapter 6.4. The forecast that is provided to Mill 2 is entered into SAP and the production planner can extract it from the system. For Mill 1 the production planner sends an excel-file every other week in which the sales offices fill in the forecast. This forecast is provided on a gsm level. How the forecasts are processed differs depending on the sales office.

The Market 1 sales office validates the customers’ forecasts meaning the sales office change the forecast taking capacity, personal knowledge and consumption data into account. They also state that the forecast provided by SAP can be used as a guideline when validating the forecast. The algorithm that calculates the forecast that is suggested in SAP is based on the last year’s consumption with extra weighting on the last three months’ consumption. However, in situations such as holidays when the number of working days decrease the algorithm’s accuracy decrease hence the forecast suggested in SAP cannot be used without further insight. The employee that places the replenishment order is acting as a last check of whether the forecast is accurate or not. (Bengtsson, 2015) The Market 3 sales office uses an average of the customers forecast and the forecast suggested in SAP when changing the forecast. Both the Market 1 and Market 3 sales office makes these changes on a monthly basis.

Further on they also make changes to the forecast on a weekly basis taking into account information that the sales offices have regarding the customers’ previous consumption, additional orders, seasonality, working days and additional shifts. The Market 2 sales office however trusts the customers hence does not change the monthly forecast and they only change the forecast on a weekly basis if the customers tell them to. (Jansson, 2015)
6.4 Allocation

Allocation is used by two of the three Kraftliner mills, namely Mill 1 and Mill 2. The allocations that are given to the sales offices are based on a three month rolling sales forecast provided from the sales offices and a production forecast. The sales offices provide the mill every other week with a three month rolling forecast divided by brown Kraftliner, white Kraftliner and Royal2000. Since the sales forecast generally is higher than the production forecast the allocation is calculated as a percentage of the sales forecast. This percentage is the same for all sales offices and are based on the difference between the total sales forecast and the production forecast. The allocation is calculated for each run in Mill 1 and cycle in Mill 2 once a month. Possible changes in demand between the sales offices during the month does not affect the allocation. (Andersson, 2015) (Davidsson, 2015)

However, each run some sales offices are in need of more tons than their allocation but then there is probably other sales offices that does not need all of their allocation and next run it can be the other way around. This normally evens out over the month and the calculation of the allocation for each run is not redone during the month. (Andersson, 2015)

For both Mill 2 and Mill 1 the allocation that is given to the sales offices are supposed to cover both direct orders and the replenishment of the service stocks. For paper produced in Mill 1 the decision of how much of the allocation that will be used for direct orders versus replenishment of the service stocks is the sales offices’ (Andersson, 2015; Bengtsson, 2015; Eriksson, 2015; Göransson, 2015; Hansson, 2015 and Ingvarsson, 2015). For the paper produced in Mill 2 however it is the mills responsibility to replenish the service stock but it is still the total allocation for all sales that is communicated to the sales offices (Davidsson, 2015). This means that the replenishment of the service stocks can have to be reduced depending on the amount of direct orders from the sales office since the sales offices do not know what of the allocation that is calculated to be reserved for replenishing the service stocks (Davidsson, 2015; Bengtsson, 2015; Eriksson, 2015; Göransson, 2015; Hansson, 2015 and Ingvarsson, 2015)

In the cases when the allocation for the paper produced by Mill 1 does not cover the need the production planner has to prioritize which sales offices that should get more and how much more and which to downsize. The factors that are considered when prioritizing is the stock levels of the stocks that each sales office is responsible for, the budgeted stock levels and the current sales rate. However, they do not take into account the target stock levels or the material that is in transit. These decisions are made in communication between the sales offices, production planner and capacity manager. (Andersson, 2015)

In the case when the direct orders for paper produced in Mill 2 from a sales office occupies more of the allocation than forecasted the production planner can choose to either ask the sales offices what to prioritize or make the decision by himself. In the case when the production planner asks the sales office what to prioritize he tells the sales office the percentage of how much he has to cut their replenishment with and asks what they want him to replenish. When the production planner himself prioritize the replenishment he takes into account the current stock levels at the warehouses and compare it against the asked stock level. In day to day decisions such as prioritizing what to replenish for each sales office the production planner can make the decision himself. However, when it comes to bigger decisions such as which sales office to prioritize over another then the capacity manager is involved. (Davidsson, 2015)
The sales offices that has been interviewed all agree on that the system with allocation is good. They also agree on that it is best when working with Mill 1 since the sales offices are in charge of how to use the allocation. According to the sales offices it enables a good visibility of what is in production and certainty that it will be produced. The allocation system in Mill 2 however does not enable the visibility and certainty since the sales offices does not know exactly what is in production for them. (Bengtsson, 2015; Göransson, 2015 and Ingvarsson, 2015)

In the case of Mill 3 the Market 3 and Market 4 sales offices states that it is good that Mill 3 does not work with allocation since it enables flexibility while the Market 5 sales office disagrees since it often results in delays in production. The Market 3 and Market 4 sales offices however admits that the system of no allocation leads to delays hence uncertainties regarding when the paper will be available arise which is not good. The Market 5 sales office further states that it would be preferable to have allocation at Mill 3 as well since it would clear up the problem of over booking the production.

Even though the sales offices agree on that the allocations system of Mill 1 is the best they present some flaws.

- The allocation is only calculated once a month
- The calculations only take the forecast into account
- The division of the allocation on the sales offices is done on incomplete information

The Market 1 sales office thinks that the division of the allocation could be better performed if information regarding stock levels, what is in transit and what is in production would be taken into account. This would generate a decision that is calculated on both forecast but also what the sales offices have available in stock.

For the allocation to work the best possible way it is necessary that the sales forecast that is the basis of the division on the sales offices are as accurate as possible. If the consumption deviates too much from the market plan and the monthly sales forecast the allocation system will not work. (Bengtsson, 2015 and Hansson, 2015)
6.5 Replenishment process

As earlier stated which party that is responsible for the replenishment process differs depending on which mill produces the paper in question. It further also differs on the sales office. In this section the difference of how the replenishment process is performed will be explained.

6.5.1 Mill 1

For the paper produced in Mill 1 it is the sales offices’ responsibility to replenish the service stocks. All sales offices provide the mills with forecasts and receives an allocation for each run based upon that forecast. The sales offices then decide how much of the allocation to fill with direct orders and how much to use for replenishment of the service stocks. (Andersson, 2015)

The sales offices base their replenishment on a target stock level for each individual article. This stock level is given in days of consumption which are based on forecast and is recalculated every time replenishing is done. Further on the sales offices uses the replenishing suggestion that is calculated in the mills system, Business system 1. This suggestion is based on information of the service stock levels, quantities in production, called off quantities and forecasts, however it does not take the stock levels at the customer into account. Therefore, if there is a shortage at the customer the sales office extract an excel-file and recalculates the replenishment quantities. Further on the algorithm calculating the suggestion does not either take the allocation into account, hence the sales office uses it as a basis but always have to adjust it to fit into the allocation. (Bengtsson, 2015) This process is easy and quick for high volume articles but take a bit more time for the articles with lower volumes (Ingvarsson, 2015). The process of deciding what to replenish the service stock with is performed once every week before the closing date on Wednesdays.

All sales offices that have been interviewed agree that the replenishment process for paper linked to Mill 1 is smooth due to the visibility that Business system 1 enables and the allocations. Further on the Market 5 sales office point out that it also helps that Mill 1 have a very clear production schedule. The Market 1 sales offices also point out that the visibility together with the fact that the sales office is in charge of the replenishment makes the process more responsive to deviations from the forecast and it is easier to “put out fires”.

6.5.2 Mill 2

For the paper produced in Mill 2 it is the production planner’s responsibility to replenish the service stocks. The replenishment process is based on a target service stock level for each article that has been agreed on between production planner and sales office. This target stock level is given in days of consumption. (Davidsson, 2015) One problem with this system is that according to the Market 4 and Market 5 sales office the production planner does not have the same idea of the concept of safety days as the sales offices. Safety days for the sales offices means that there are for example ten days of consumption in stock at the warehouse. The production planner instead counts the safety days with what is in production, transit and the stock at the warehouse. This means that in reality the service stock never actually reaches what the sales offices means with safety days. (Hansson, 2015 and Ingvarsson, 2015)

The replenishing of the service stocks is based upon information regarding the target service stock, consumption, stock levels and already called off articles. A roughly calculation of the replenishment is done once a week and can be updated at the latest one day before production. (Davidsson, 2015)
Both the Market 4 and Market 5 sales office states that it is difficult to see what the production planner have decided to replenish the service stock with i.e. what is in production each run. Hence they do not know what they will have in stock the coming days. (Hansson, 2015 and Ingvarsson, 2015) There is a daily report send as an excel-file from the warehouse to the sales offices including information regarding stock levels, what is in transit between mill and warehouse and what has been called off. This makes the planning a little bit easier for the sales office. (Ingvarsson, 2015) Another problem is that the system is set up in a way which only allows call offs on products that are physically in stock at the warehouse, this increases the lead time to the customers. However, if the product is not jet planed in production it is possible for the sales offices to call off the articles directly from the mill. (Ingvarsson, 2015) The Market 5 sales office also states that because the loading of trucks are optimized reels with the same article number can be loaded on different trucks which makes it difficult for the sales to know when all reels will be in stock.

6.5.3 Mill 3

The replenishment process for paper produced in Mill 3 is maintained by the sales offices. It is however not done once a week as for Mill 1 instead it is done every time the production planner announce that a specific gsm is planned for production (Eriksson, 2015). This is done the following way, the production planner informs the sales offices of that a specific gsm is planned for production at date X the coming week and then again at date Y. With this information the sales offices calculate their need for the production run based on stock levels, quantities in production and the forecast until next production opportunity. This however is based on the premises that the production schedule will hold which it seldom does because of the frequency of overbooking the production. The overbooking of the production is due to that if the total need exceeds the production capacity the production planner sends out a request to the sales office to cut their need since the total need is exceeding the capacity with Z tonnages. However, none of the sales offices are specifically told to cut their need so it is not sure that the total need actually will decrease or that the right sales office will cut their need. Lastly it is the production planner that places the orders for production into the system. (Eriksson, 2015; Hansson, 2015 and Ingvarsson, 2015)

The process of deciding what and how much to replenish the service stock with is somewhat difficult when it comes to the paper produced in Mill 3 compared Mill 1. All sales offices interviewed agree on one part of this difficulty being due to the unforeseen delays incurred by the over booking of the production. Due to the knowledge of that the production are often delayed the Market 3 sales office states that there is a probability that sales offices put in more need to cover potential delays which can further delay the production which is not good. The Market 4 and Market 5 sales offices also states that it is a problem that the stock levels communicated to the sales offices includes the physical stock, i.e. it is not possible to distinguish what is already called off and therefore not available. This results in that the sales office sometime calls off papers that is not actually available.
6.6 Collaboration

The collaborations between sales offices, mills and sales office and mill varies depending mostly on mill but also on sales office. In this section the existing collaborations in the Kraftliner organization will be further outlined.

6.6.1 Meetings

The sales offices collaborate together when it comes to problems they experience that regards the supply chain. This collaboration is in form of meeting between the supply chain managers for each region where they discuss the problems and how they can solve them. These meetings are held a couple of times every year. (All) According to the Market 1 sales office it is often that things casing problems for one sales office might not cause problem for another which leads to compromises being made to satisfy everyone.

Further on there are a weekly telephone meeting every Monday between mills, sales offices and the capacity manager. On these meetings the main topic is possible production issues at each mill and if there are any overall trends of market deviation. During these meetings the capacity manager is provided with information from all sales offices and mills regarding problems in stocks and production and if sales or production deviates from what has been forecasted. Solutions to the problems is not decided upon during the meetings, instead the decisions are made later when the involved parties have had the chance to investigate what they are able to do. One example of what is addressed during one of these meetings is the need and possibility to move production from one mill to another. (Claesson, 2015)

6.6.2 Moves

Moves of production form one mill to another is further on a decision made by the capacity manger in collaboration with the involved mills. This includes both if a mill is over booked as well an under booked. It is always the mill that is experiencing the problem, i.e. under- or over booked, that takes the initiative to contact the capacity manager. (Andersson, 2015; Davidsson, 2015 and Fredriksson, 2015)

The need of moving production can be caused both by deviations in demand from sales forecast, deviation in production forecast and unplanned stops or problems in the production. Unplanned problems and stops in production is hard to foresee and prevent. The problems of deviation from forecast however can be somewhat prevented with better forecasts. The capacity manger is typically interested in making the production planner conduct the production forecast as much as possible on gsm level. Today all intra-group customers provide their three month rolling forecast on a gsm level. This correspond to approximately 55-60 % of the total production. Today it is conducted on quality level and calculated out of an average of produced ton per hour. The capacity manager states that the accuracy would be better if the production planners would take the information provided to them on gsm level into a greater account. (Claesson, 2015)
The moves also result in problems for the sales offices of which tonnages are moved. Firstly, it becomes difficult for the sales office to calculate the need for replenishing the service stocks. This because there are no smooth and easy way to summarize information from the different mills and the level of information is not the same depending on mill. (Ingvarsson, 2015) Secondly, to change in the system where the product is produced is complicated. The orders that have to be moved, if already booked, have to be reentered in the other mill’s system, it is not as easy as just changing the mill code. Furthermore, there is an overlap time due to the inconsistency of the mills which creates delays. (Bengtsson, 2015; Göransson, 2015; Hansson, 2015 and Ingvarsson, 2015)

Moving tonnages can also be difficult in respect to quality. It is namely known that, especially for white Kraftliner, the quality of the paper produced in Mill 1 is better. Another problem with moving tonnages can be of historical aspects and cultural differences. For example, it is difficult to move production from Mill 1 to any other mill when it regards Market 8. This since the Market 8 always has bought paper from Mill 1 and it is especially difficult to move the production the Mill 2 since the cultural differences is, according to the Market 8, a problem. (Claesson, 2015)

6.6.3 Borrowing paper

Another way of collaborating in the Kraftliner organization is for the sales offices to borrow paper from each other this is however not done by the Market 2 sales office. If one sales office is in need of borrowing paper the sales office either goes to the production planner of the mill that produces the paper in question or looks up information by themselves in the different systems. According the Market 1, Market 4 and Market 5 sales office it is easy, due to Business system 1, to by themselves look up the information of other sales offices stock levels when the paper is produced in Mill 1. The system enables a good visibility of among other things the other sales offices stock levels (Ingvarsson, 2015). The visibility makes paper from Mill 1 easier to shift from one sales office to another. If paper, produced in Mill 1, is borrowed form one sales office it is the sales office themselves that books and register the move however they have to inform the back office at the mill of the move (Hansson, 2015).

In Mill 3 however there is no good system for the sales offices to overview other sales offices stock levels, hence all sales offices have to go through the production planner. (Göransson, 2015) After that the sales office in need have taken contact with the mill it is the mill who is in charge of the communication. At Mill 3 it is the back offices’ task to rebook and register a move of reels form one sales office to another. (Hansson, 2015)

When it comes to paper produced in Mill 2 it is like in Mill 3 the back office or production planner at the mill that is communicating the stock levels between the sales offices. But the process of rebooking and register the move is as in Mill 1 the sales office responsibility and they only have to inform the back office of the move. (Hansson, 2015)
6.6.4 Information sharing

Information sharing is done by all parties in different extent but what can be said to be accurate for all information sharing is that the content and design differs depending on which party has provided the information.

The capacity manager for instance receives a report every Monday from each mill. These reports however have a different design and content for each mill. Furthermore, the capacity manager states that it would be difficult for another employee to understand all reports since it is not easy to understand what the numbers actually presents. The information presented in these reports includes consumption and stock levels for each sales office and quality. However, the stock levels is presented in different levels for each mill and another problem is that it is no possible to extinguish whether the paper is usable for all customers or only a couple.

The capacity manager would like to have a central report that summarizes the three mills stock levels and forecast on a quality level. The capacity manager furthermore states that a common system with information divided on each sales office regarding stock levels, sales forecast, consumption and what is in transit would be preferable to enable a better overview.

Production information from the mills

Information regarding the daily production situation and problems in production is shared in different extent depending on mill.

Mill 2 provide the sales office with a daily report every morning. This report informs the sales offices of which gsm will be produced for the different qualities the coming two days. The production planner also includes information regarding any delays or changes in the production plan. However, the sales office themselves have to compare yesterday’s report with today’s to figure out what has been delayed. (Ingvarsson, 2015) Furthermore even if the sales offices are able to figure out what is delayed they do not know what tonnages in production that is booked for their replenishment.

Mill 1 only provide the sales offices with information regarding delays if the production is delayed to the extent that reels will not be loaded on to the vessel. It is however possible for the sales offices themselves to retrieve the information from Business system 1 which clearly present the initial planned production date and the new planned production date. According to the Market 5 sales office this is however not an effective way since it is not something they include in their daily tasks.

Further on the production planner of Mill 3 send out, as Mill 2, a daily production report for the coming days. In the report it is stated which gsm will be produced and which date it will be produced. The production planner also includes information regarding if any specific gsm is delayed however it is like in Mill 2 the sales offices task to compare the daily production reports to figure out how much the production is delayed. (Ingvarsson, 2015)

The sales offices all agree that this information should be provided with a daily report that states which gsm that are delayed, which sales office orders are affected and when it initially was planned for production i.e. the degree of delay.
6 Collected data

Old reels
Further on the information shared by the mills regarding old reels differs a lot depending on mill. For paper produced in Mill 2 the information sharing is very inconsistent. The production planner sends out an email from time to time with information regarding old reels. For the reels produced in Mill 1 the production planner shares information to the sales office the 15th of each month regarding which reels will be older than 60 days in the end of the month. For the reels produced by Mill 3 this information is instead shared weekly through an intranet platform. Information shared through the intranet regards which reels will be older than 60 days in the end of the current month. (Ingvarsson, 2015) The intranet platform are appreciated by the sales offices however they believe that it is unnecessary to check it every week since it can result in unnecessary work if the reels are consumed during the week. It should be enough once a month.

Other
The possibility to retrieve information from the three mills is today various. In Mill 1 for example Business system 1 enables a good visibility and the Market 1, Market 4 and Market 5 sales offices all agree that all information they need is possible to retrieve from Business system 1. For Mill 3 however the biggest problem the sales offices experience is the lack of information of what is in transit and that it is not possible to distinguish what is already called off of the stock levels (Göransson, 2015; Hansson, 2015 and Ingvarsson, 2015). When it comes to Mill 2 the sales offices lack information regarding what of the tonnages in production are booked for them, what is in transit and when the reels will be available for call off in the warehouse (Ingvarsson, 2015).

As states above the system in Mill 1, Business system 1, is a popular system among the sales offices. Business system 2 and 3 however are not that popular since they are not considered as easy to work in as Business system 1 (Göransson, 2015; Hansson, 2015 and Ingvarsson, 2015). Since the sales offices do not know how to use the systems they think that it is the mills responsibility to provide the sales offices with the information they need (Davidsson, 2015). The mills however think that the sales offices should be able to do this by themselves since they are offered education in the system (Davidsson, 2015).

6.6.5 Other
Furthermore, they collaborate by trying to get an understanding of other markets' future forecasts and demand. This is done to know what can be expected from their own market. Things discussed would be safety stocks and mega trends in the market. (Göransson, 2015)
6.7 Markets and customers

The markets and customers that the Kraftliner organization supply paper to differs in some ways and have similarities in others. This will be further described below.

6.7.1 Generally

The market for the Kraftliner organization is quite seasonal, however since the organization sells from the northern Europe to the south these seasons do not necessarily match each other. The seasonality products are for example paper used when producing cartons for different fruits and vegetables which differs a lot depending on the region. (Claesson, 2015) A seasonal trend that however does not differs depending on region is Christmas and inventory taking in the beginning of January. The need of lowering the stocks for inventory taking in the beginning of January generates a surge in the middle of January. (Bengtsson, 2015) Except form seasonality the demand on the market also fluctuate a lot depending, for example, on campaigns that the plants’ customers have and the weather for the customers in the agricultural market (Eriksson, 2015). According to the Market 1 sales office the sales offices are less and less experiencing fluctuations due to economical situations since the organization got more integrated with their customers.

The decision of which articles to allow VMI for is a decision that is made from sales office to sales office and from customer to customer.

In Table 3 below the number of customers that each sales office has are presented together with the total of tonnages each sales office sell to the intra-group customers during one year.

Table 3: Presentation of the number of customer for each sales office and the tonnage sold to intra-group customers during one year.

<table>
<thead>
<tr>
<th>Number of customers</th>
<th>Total tonnages per year to intra-group customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market 1</td>
<td>16 106 457</td>
</tr>
<tr>
<td>Market 2</td>
<td>23 157 037</td>
</tr>
<tr>
<td>Market 3</td>
<td>12 59 304</td>
</tr>
<tr>
<td>Market 4</td>
<td>19 124 096</td>
</tr>
<tr>
<td>Market 5</td>
<td>30 248 534</td>
</tr>
<tr>
<td>Market 6</td>
<td>14 125 137</td>
</tr>
<tr>
<td>Market 7</td>
<td>17 78 632</td>
</tr>
<tr>
<td>Market 8</td>
<td>17 167 502</td>
</tr>
</tbody>
</table>
6.7.2 Market 1

The Market 1 sales office supply six corrugating mills as well as six special units, two bag in box, two solid board and two preprinters. None, apart from one of the preprinters, of the special units have been granted VMI. They also sell paper to trading houses that is exported and is mostly for the small reels with small width. One of the differences between the Market 1 sales office and the other sales offices is that they have all these special units which demand special attention.

After working with a customer for a while knowledge or feeling for the articles is achieved, things like fluctuation and regularity and influence of number of articles is anticipated and known better. The Market 1 sales office also have one customer that from the outside would look like a standardized customer but in reality requires unreasonable demands and is keeping one employee completely busy.

6.7.3 Market 2

All production for the Market 2 sales office is linked to Mill 2 since it is so close geographically to the market. The Market 2 sales office customer plan their production one and a half day in advance. Each representative from the sales office serve about three plants. The decision of the amount of safety days are depending on the consumption. For articles with high consumption the safety is easy to maintain in days. For articles with very small volumes however the safety is displayed in tonnages instead. Some of the customers do not have the warehouse space to keep the number of safety days that the sales office has calculated. One of these customers complicates it further since they have an irregular consumption which would need a higher safety. (Eriksson, 2015)

6.7.4 Market 3

The paper that is supplied to the Market 3 sales office’s customers are produced in Mill 1, white Kraftliner, and Mill 3, brown Kraftliner. The reason for that they are not supplied by Mill 2 is the difficulty and cost of transport, since there is no rail between Mill 2 and the customers of Market 3.

The set up for the customer are different since it works better for some plants to have fixed tonnages while others work better by having flexible days of supply. Further on the Market 3 sales office’s customers’ have different needs. For example one plant never works during the last day of the month therefore less is replenished, this to support a decrease of the working capital. They also have a laminate customer which is different from the others. Since there are regional differences the supply chain manager prefers to work decentrally. (Göransson, 2015)

6.7.5 Market 4

The Market 4 sales office have customers that orders everything from 13 articles to 100 articles from Company XY’s Kraftliner product portfolio. The fluctuation is high for all these customers and the daily fluctuation is more or less the same however over a whole month the customer with less articles have a more stable consumption. Further on the customers often have a warehouse space that is so small that they cannot contain the safety stock that the sales office would like to keep for service level reasons.
6.7.6 Market 5

The Market 5 sales office experience the problem of moving tonnages due to the quality differences with some of their customers. They also experience great differences in the amount of consumption between the different customers. One customer can for example use three reels during a week while another customer uses as much as up to 300 tons per week. They also have one customer who uses side reels which is outside of the allocation. (Ingvarsson, 2015)

6.8 Strategies and goals

Historically the customer has been “King” which meant that the sales offices and the Kraftliner organization adopted their work for each customer. Today it is more standardized which means that the customers' wishes cannot be met at all times. For example the files sent out to the customers are standardized and do not always contain the information they want. Another example is that there has been a standardization for gsm. (Bengtsson, 2015)

Further on there has been found that the more VMI that is established the lower the stock levels have become. This is because the plants do not have an incentive to keep the stocks low since they do not own the reels until they consume them. The customers prefer the VMI set up and the mills prefer it since stocks are lowered. This contribute to the overall goal to keep as low stock levels as possible at customers while still being efficient. The long term goal is to keep their customers, short term there are debit goals on a mill level. Further on it is desired that Mill 2 and Mill 3 are more flexible since they are located close to the customers while Mill 1 maintain the stable scheduled production. (Claesson, 2015)

All three mills are evaluated on how well they are able to produce accordingly to the production budget and since the budget is on a ton basis they are also evaluated on their profitability. The reason for the evaluation of the profitability is because they have to be evaluated on how well they produce corresponding to the demand since they otherwise could produce only heavy gsm to reach the tonnage goal. (Claesson, 2015)

The aim is also for all sales offices and mills to have as few stock outs as possible. Every month a KPI report is sent out that measure the sales office performance in terms of forecast accuracy, stock outs and stock levels. (Claesson, 2015)

Stock out claims registered by the customers are evaluated to see what the reason for the stock out is. Possible reason is delay in production and over consumption by the customer. It is also analyzed whether the stock out could have been prevented by moving reels form another customer or if the sales office could have borrowed reels from another sales office. (Bengtsson, 2015 and Eriksson, 2015) The Market 2 sales office actually analyzes all stock outs even those that are not registered by the customers.

Both Mill 2 and Mill 3 have limited access to warehouse space. Since external warehouses are expensive the goal is to, as much as possible, load the reels directly from production onto a truck for transportation to the customers. (Eriksson, 2015 and Göransson, 2015)
7 Analysis

7.1 Organizational structure

1. Which purchasing organization is theoretically considered beneficial given Company XY’s characteristics?

1.1. What structure is considered beneficial given the articles the sales offices sell from the different mills?

According to both van Weele (2010) and Handfield, et al. (2011) a more centralized approach is beneficial when the purchased products are similar.

By looking at the market plan and comparing the articles bought by the sales offices it can be seen from the Table 4 below the sales offices sell up to 87% of the same articles to their customers. Meaning that 87% of the articles that the sales offices sell can be sold to another sales office's customer. Given the large amount of commonality between the sold products between the sales offices a centralized structure should be beneficial for Company XY to adopt.

*Table 4: Common articles, divided on quality, between the sales offices*

<table>
<thead>
<tr>
<th>Total number of articles</th>
<th>Number of common articles</th>
<th>Percentage of common articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Kraftliner</td>
<td>510</td>
<td>440</td>
</tr>
<tr>
<td>White Kraftliner</td>
<td>168</td>
<td>155</td>
</tr>
<tr>
<td>Royal 2000</td>
<td>155</td>
<td>127</td>
</tr>
<tr>
<td>Total</td>
<td>833</td>
<td>722</td>
</tr>
</tbody>
</table>

Furthermore, it can be seen in Table 5 that the three mills have 35% of the products in common, which further suggest that there is large commonality of the products and therefore a central unit is suggested to be beneficial.

*Table 5: Common articles, divided in quality, between the mills.*

<table>
<thead>
<tr>
<th>Total number of articles</th>
<th>Number of common articles</th>
<th>Percentage of common articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Kraftliner</td>
<td>510</td>
<td>182</td>
</tr>
<tr>
<td>White Kraftliner</td>
<td>168</td>
<td>58</td>
</tr>
<tr>
<td>Royal 2000</td>
<td>155</td>
<td>55</td>
</tr>
<tr>
<td>Total</td>
<td>833</td>
<td>295</td>
</tr>
</tbody>
</table>
1.2. Which organizational structure is considered beneficial given Company XY’s business strategy?

Handfield, et al. (2011) discussed that when efficiency is the main strategy a more centralized approach is suggested while it is suggested that a more decentralized approach is beneficial when responsiveness is the main strategy.

Like the capacity manager suggested in chapter 6.8 there is an effort to have Mill 1 keeping a stable standardized scheduled production with maximum output. Therefore, it can be seen as Company XY for Mill 1 has a strategic approach of efficiency for Mill 1 where a more centralized approach is beneficial. Since Mill 2 and Mill 3 are geographically closer to the markets there has been an effort to keep them more flexible. This indicates that a more responsive approach is adopted for Mill 2 and Mill 3. This further suggest that a more decentralized approach should be adopted.

As described in chapter 6.8 there has, for the sales offices, become a more standardized approach towards the customers compared to before. Projects such as standardization of the gsms and widths that is offered to the customers are an example of these standardization efforts. This suggest Company XY is looking for efficiency when it comes to the article range they are offering. Therefore, this characteristic suggests a centralized approach as being beneficial.

Company XY’s goals to become more standardized and agile as given from chapter 1.1 suggest both an efficiency strategy as well as a more responsive strategy. Which also means that both a centralized and decentralized approach is beneficial.

From the chapter 6.8 the aim of keeping as low stock levels as possible at customers while still being efficient can be found, which indicates an efficiency strategy. As before mentioned, when adopting an efficiency strategy, a centralized approach is considered beneficial.

Taking theory and Company XY’s strategies into consideration it suggests that Company XY has the characteristics that would benefit from both a centralized and decentralized structure.

1.3. Which organizational structure is considered beneficial given Company XY’s customers and markets?

According to Handfield, et al. (2011) and van Weele (2010) a decentralized approach should be adopted whenever the customers have specific needs or lack commonality. Handfield, et al. (2011) and van Weele (2010) furthermore suggest that when acting on markets that are dependent on economical fluctuations the company should adopt a centralized approach. Through analyzing the sales offices and their customers it can be seen from Table 6 that the commonalities between the customers differs for the sales offices is between 25 and 47%. Furthermore, it shows that the number of articles the customer orders differs from 84 to 242. Which therefore indicates that Company XY has the characteristics that benefit from a decentralized structure.
Furthermore, it can be seen from Table 7 that the number of customers, the number of articles supplied and the quantities supplied varies quite a lot between the sales offices which show on low commonalities between the sales offices. Therefore, a centralized approach cannot be recommended.

**Table 7: The number of customers, articles and sold tonnages per year for each sales office.**

<table>
<thead>
<tr>
<th>Total number of articles</th>
<th>Number of customers</th>
<th>Total tonnages per year to intra-group customers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market 1</td>
<td>230</td>
<td>16</td>
</tr>
<tr>
<td>Market 2</td>
<td>250</td>
<td>23</td>
</tr>
<tr>
<td>Market 3</td>
<td>94</td>
<td>12</td>
</tr>
<tr>
<td>Market 4</td>
<td>121</td>
<td>19</td>
</tr>
<tr>
<td>Market 5</td>
<td>254</td>
<td>30</td>
</tr>
<tr>
<td>Market 6</td>
<td>228</td>
<td>14</td>
</tr>
<tr>
<td>Market 7</td>
<td>130</td>
<td>17</td>
</tr>
<tr>
<td>Market 8</td>
<td>288</td>
<td>17</td>
</tr>
</tbody>
</table>

In chapter 6.6.1 it is suggested that during the supply chain workshops it is often found that things causing problems for one sales office might not be causing a problem for another. This shows that the sales offices markets differ in what needs to be done which decreases the commonalities of the sales offices. Therefore, a more decentralized approach is consistent with the characteristics.

In chapter 6.7.1-6.7.6 all the interviewed sales offices and capacity manager describes how many of their customers have special solutions or demand special treatment. It could concern anything from having a special set up when it comes to replenishing to having special widths or product specifications forcing the paper to be produced at a certain mill. More examples of this is forecasts having to be altered because some plants always embellish or their maximum stock level is lowers than the weekly consumption or stock levels are maintained in different ways adopted so that it works best for the customer. Hence they have special needs that constantly needs to be maintained. This further suggest that a decentralized approach is consistent with the characteristics that Company XY possess.
Moreover, as described in chapter 6.7.1, the customers' consumption is very seasonal and varies depending on which market it belongs to. For example Market 1 has a surge when it is potato season while Market 7 can have surge in consumption during citrus season. This makes the different markets differentiated, knowledge about the different markets is needed to be able to make the right decisions when it comes to forecasts and replenishments as described in chapter 6.7.2-6.7.6. Therefore, since there is certain knowledge needed to be able to satisfy the customers' needs a more decentralized approach is consistent with the characteristics of Company XY's customers.

Taking theory and Company XY's commonalities into consideration it suggests that Company XY has the characteristics that would benefit from a decentralized structure.

By summarizing question 1.1, 1.2 and 1.3 it can be seen that the commonalities of the products sold suggest a centralized structure while the business strategies and goals suggest both a decentralized and a centralized structure. The commonalities of the customers suggest a decentralized structure to be beneficial. This is displayed in Table 8.

1.4. What corporate coherence does Company XY possess considering communication, control, coordination and tasks?

According to (Rozemeijer, et al., 2003) corporate coherence aims to explain how much of the different parts of a corporation is managed as one entity. In other words, how much the business units differ in management style, strategy, vision, structure and culture affects its level of coherence. When Handfield, et al. (2011) further discusses the process of designing organizations, aspects to consider are the structure and system for communication, coordination, control, division and responsibility of tasks to reach its goals. Therefore, the coherence of the aspects that Handfield, et al. (2011) puts forward as important when it comes to structuring organizations will be analyzed for Company XY below.
Mills
As can be read in chapter 6.5.1-6.5.3 the process of replenishing differs between the three different mills. Therefore, the sales office work in different ways having tasks that differ between the sales offices. The sales office has the task of replenishing the service stock in Mill 1 and Mill 3 while in Mill 2 it is the responsibility of the mill. This shows that there is a low commonality hence coherence for both the task of replenishing the stock as well as where the control of the service stock is located between the mills.

When it comes to borrowing paper from each other the coordination differs as described in chapter 6.6.3 between the mills. For Mill 1 the sales office coordinate while for Mill 2 and Mill 3 the mill coordinates this. Which is a sign of low coherence between the mills when it comes to coordination as well as control.

Sales offices
In chapter 6.6.4 it is discussed that the delays are communicated in three different ways which therefore is a sign of low coherence of the mills.

The sales office work different when it comes to the forecasts as can be read in chapter 6.3.2 some of the sales offices change the forecasts and some do not. This means that the tasks, the responsibility and the control of forecasts differ between the sales offices hence decreasing the commonality between the sales offices which indicates that there is low coherence for the sales offices.

The KPI report that is sent to the sales offices once a month as described in chapter 6.8 is the same for every sales office which show on commonality in information sharing when it comes to evaluating the sales offices. For this KPI report there is a set level of deviation that is regarded as an approved deviation for forecast which is common for all the sales office. Which shows on a high commonality when it comes to the evaluation of the sales offices. Therefore, increasing the coherence of the sales offices.

As can be seen in chapter 6.8 the Market 2 sales office keeps track of the stock outs in a way that the other sales offices do not. This shows a lack of coherence between the sales offices when it comes to tasks that are performed.

Mills and sales office
As can be read in chapter 6.6.4 the three mills use three different business systems not only are the systems different but the information that is available in the system differs as well. For example in the system in Mill 1 the sales office can see what has been called off which they cannot in the system for Mill 3. Therefore, it is concluded that there is low commonality when it comes to the system for communication. Moreover, as both the capacity manager and the sales offices witness in chapter 6.6.4 there are different reports regarding stock levels, old reels and delays. These reports not only differ when it comes to layout but the information in them as well as when they are sent out differ. Which shows there is low commonality when it comes to information sharing as well as information shared. Which therefore implies that the coherence of the mills and sales offices is low.
The yearly planning where the coordination, control, division and responsibility of where to produce and sell the paper for the mills and sales offices are conducted in one market plan as described in chapter 6.1. This indicates there is coherence between the sales offices and between the mills when it comes to planning the year.

The Monday meetings that involves all mills and sales offices as described in chapter 6.6.1 indicates that some of the information sharing between the sales offices, capacity manager and mills is coherent.

Altogether it can be suggested that the coherence at Company XY is low for mills but also somewhat for the sales offices.

1.5. What maturity does Company XY possess regarding collaboration and information sharing between the sales offices and mills?

Like Rozemeijer, et al., (2003) suggest the maturity of the purchasing function is an important aspect to consider when choosing an organizational structure. Purchasing maturity depends on the status the purchasing function have, what organizational status and role does the purchasing departments play, how is the availability of purchasing information systems and the level of supplier collaboration (Rozemeijer, et al., 2003).

As described in chapter 6.6.3 collaboration between the sales offices is common, they do this to borrow paper from each other. They either use the system in Mill 1 or go through the two production planners in Mill 2 and Mill 3. Even though there are different ways of conducting the collaboration there is a constant collaboration between the sales offices. The only sales office that does not borrow paper on a regular basis from other sales offices is the Market 2 sales office. Which leads to considering the sales offices having maturity.

The Monday meetings that are held once a week as described in chapter 6.6.1 work as a way of coordinating as well as collaborating between sales offices, between mills as well as between mills and sales offices. Therefore, when it comes to supplier collaboration there is purchasing maturity.

A couple of times a year there are workshops where the sales offices meet up and discuss issues they are having and try to figure out solutions to these problems as suggested in chapter 6.6.1. This show that there is further collaboration between the sales offices therefore it can be suggested that the sales offices have purchasing maturity.

Since the business systems differ between the mills, chapter 6.6.4, the sales offices are forced to work in different systems. This therefore decreases the availability of purchasing information hence leading to lower maturity for the mills and sales offices.

Taking all into consideration the sales offices can be considered having purchasing maturity compared to the mills but the maturity is not high. Therefore it can be suggested from answering question 1.4 and 1.5 that both the coherence and the maturity is low for Company XY which has been summarized in Table 9.
Company XY’s processes have the characteristics of having low maturity and low coherence. Rozemeijer, et al. (2003) suggest that when corporate coherence and purchasing maturity is low a decentralized structure is usually found. Therefore given the characteristics that Company XY’s processes have today a decentralized structure match the structure they have adopted.

Taking the resulting analysis from question 1.1-1.5 it can be found that Company XY’s products, markets and strategies indicates that a hybrid structure would be beneficial. The way the processes are conducted today indicate that Company XY’s processes match with a decentralized structure. This has led to the conclusion that Company XY’s structure today does not match the suggested structure to adopt taking into consideration the products, markets, customers and strategies. This is indicated in Figure 29 where the suggested area to be beneficial for customers, markets, products and strategies is encircled in green while the actual structure given the processes is encircled with yellow.

2. Which issues that Company XY are experiencing today are attributed to their organizational structure?

By looking at the organizational structure Company XY has a decentralized structure where each mill has their own priorities and way of working. The sales offices also have a decentralized structure where each sales office is in charge of their own customers and replenishment of their stock. So both the sales offices and mills have a decentralized structure which are only centrally coordinated through the capacity manager.
According to Handfield, et al. (2011) misalignment and duplication of work is common within decentralized structures. The purchasing power is usually dispersed, a lack of visibility between units and market research is often scattered.

One of the issues that the sales offices brought up as a problem in chapter 6.6.4 is them only seeing their own situation and therefore not being able to collaborate in a proper manner with other sales offices. Furthermore, the sales offices discuss how during the Monday meetings the mills have information that they talk and base decisions about, like sales versus forecasted sales, which the sales offices do not have. Lack of transparency is something Handfield, et al. (2011) brought up as an effect of a decentralized structure. Therefore, the lack of visibility between sales offices and between mills can be attributed to the organizational structure.

Handfield, et al. (2011) further brings up duplication of work as a consequence of a decentralized structure. Another problem that the sales offices has brought up in chapter 6.6.2 is when orders are being moved between mills the orders have to be reentered. Furthermore, whenever paper is bought from all mills the sales office has to enter three different systems, extract information and manually summarize this information which leads to duplication of work. The duplication of having to reenter an order or enter three different systems to gather information can be attributed to the decentralized structure of the mills.

The sales offices and the capacity manager complains, presented in chapter 6.6.4, that it is hard to retrieve the same information as gotten from one mill from the other two mills which creates issues since there is no standard way. For example in Mill 3 they cannot see what has been called off while in Mill 1 they can. This leads to a lack of visibility both between the sales offices and mills as well as between the mills. Like the capacity manager discuss that there are three different documents that he receives containing different information. This lack of visibility has further led to decisions being made without the entire information which in turn has led to sub optimizing. Handfield, et al. (2011) suggests that lack of visibility can be a consequence of decentralizations. Since this lack of visibility is due to the mills working in different ways it can be analyzed that these problems are attributed to the decentralized way the mills are working when it comes to information sharing.

The sales offices are working differently some measure stock outs on a daily basis while others do not, some change the forecast while others do not (chapter 6.8 and 6.3.2). Inconsistency and misalignment is often a consequence of decentralization according to Handfield, et al. (2011). Therefore, it is concluded that the lack of alignment when it comes to both measurements and forecasts can be seen as a consequence of the decentralized structure.

Mills should be able to see all stock for the sales offices but since there are different systems this is not possible which has led to some sales offices being prioritized when they should not have been and vice versa, chapter 6.3.4. This problem arises since there is a lack of visibility between the mills. The lack of visibility is due to their different ways of working and business systems. Lack of visibility and inconsistent attitudes towards suppliers and conditions are consequences of decentralization (Handfield, et al. 2011). Therefore, it is suggested that the lack of visibility and the inconsistency is caused by the decentralized structure.
7 Analysis

The issues that Company XY are experiencing today that can be attributed to their organizational structure are:

- Lack of alignment
- Lack of visibility
- Duplication of work

3. What organizational structure should Company XY adopt to reach its goals?

The main goals of the project that Company XY has initiated is to standardize, become more transparent, agile and responsive. Furthermore, they want to keep their customers while short term having profitability goals (Chapter 8).

From the previous analysis it is concluded that Company XY today has a decentralized purchasing structure furthermore it has been concluded that the coherence is low and that the purchasing maturity is also low but further on its way towards mature.

3.1. What aspects of a decentralized purchasing structure are applicable on Company XY to reach its goals and enhance its performance?

One of the problems that have been brought up during interviews is that the overlap time when changing where orders are to be produced is too long causing delays, chapter 6.6.2. Speed is something that is increased when adopting a decentralized approach according to Handfield, et al., (2011) which has not been the case at Company XY when it comes to changing order location since the different processes caused by the decentralization hinders the speed of the process. Therefore, this issue with the decentralized approach has to be mitigated to enhance the performance of Company XY.

As before mentioned under question 2 duplication of work, lack of transparency and misalignment is common at Company XY due to their decentralized structure. This counter the goals of trying to standardize which is one of the goals that Company XY has and should therefore be mitigated or eliminated to enhance its performance and reach its goals.

Today as can be seen from Table 10 and Table 11 and from interviews in chapter 6.3.2 and 6.7.2-6.7.6 that a lot of the changes that are done today regarding forecasting is based on the knowledge the sales offices have regarding their customers and their market. Forecasts has as before described an important aspect for the company to be successful and profitable. From Table 11 it is further suggested that the local knowledge that the sales offices always contribute to better forecasts. Profit centers having direct responsibility for profit is one of the benefits of decentralization according to van Weele (2010). The benefits of direct responsibility for profit is an aspect of the decentralized structure that helps Company XY reach its goals of profitability.
7 Analysis

Table 10: A presentation of how much the different forecasts and changes deviate from the actual consumption on an aggregated level.

<table>
<thead>
<tr>
<th>Market</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market 1</td>
<td>7.5%</td>
<td>5.3%</td>
<td>3.2%</td>
</tr>
<tr>
<td>Market 2</td>
<td>7.3%</td>
<td>4.1%</td>
<td>2.5%</td>
</tr>
<tr>
<td>Market 3</td>
<td>8.3%</td>
<td>3.5%</td>
<td>2.6%</td>
</tr>
<tr>
<td>Market 4</td>
<td>7.1%</td>
<td>5.7%</td>
<td>8.4%</td>
</tr>
<tr>
<td>Market 5</td>
<td>4.1%</td>
<td>3.6%</td>
<td>1.5%</td>
</tr>
<tr>
<td>Market 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Market 7</td>
<td>11.9%</td>
<td>8.8%</td>
<td>11.4%</td>
</tr>
<tr>
<td>Market 8</td>
<td>4.8%</td>
<td>4.9%</td>
<td>5.2%</td>
</tr>
<tr>
<td>Average</td>
<td>7.29%</td>
<td>5.13%</td>
<td>4.97%</td>
</tr>
</tbody>
</table>

Table 11: A presentation of how much the different forecasts and changes deviate from the actual consumption on an article level.

<table>
<thead>
<tr>
<th>Month</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Januari</td>
<td>27%</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td>Februari</td>
<td>30%</td>
<td>25%</td>
<td>21%</td>
</tr>
<tr>
<td>Mars</td>
<td>29%</td>
<td>24%</td>
<td>21%</td>
</tr>
<tr>
<td>April</td>
<td>29%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Maj</td>
<td>30%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Juni</td>
<td>33%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Juli</td>
<td>31%</td>
<td>28%</td>
<td>23%</td>
</tr>
<tr>
<td>Augusti</td>
<td>32%</td>
<td>28%</td>
<td>25%</td>
</tr>
<tr>
<td>September</td>
<td>30%</td>
<td>26%</td>
<td>23%</td>
</tr>
<tr>
<td>Oktober</td>
<td>33%</td>
<td>27%</td>
<td>22%</td>
</tr>
<tr>
<td>Average</td>
<td>30.40%</td>
<td>25.70%</td>
<td>22.10%</td>
</tr>
</tbody>
</table>

According to Axelsson, et al., (2005) one of the two conflicting pressures, customization, aims to differentiate and be responsive which in turn pushes for decentralization. Company XY’s goal to become more responsive corresponds to the market pressure which is pushing for decentralization. Therefore a decentralized approach is a way to meet the goal of becoming more responsive.

Furthermore, it is discussed in under question 1 that the sales offices customers have special needs where local knowledge of the market and the customers are needed to be able to satisfy the customers. According to Handfield, et al., (2011) to have greater knowledge and understanding of local requirements and operating procedures is a benefit of a decentralized structure. Company XY’s goals to be agile and responsive is therefore satisfied by a decentralized structure. The benefits of responsiveness and customer satisfaction is an aspect of the decentralized structure that helps Company XY reach its goals of responsiveness and keeping customers.

Since the decentralized structure does not help Company XY reach all its goals and does not enhance its performance on all aspects a pure decentralized structure is not to be recommended.
3.2. What aspects of a centralized purchasing structure are applicable on Company XY to reach its goals and enhance its performance?

Like mentioned in question 1 and 2 there is several ways of working, different systems, different information, measurements and communication channels which has led to incompatibility. Which in turn has affected the company's responsiveness, transparency and standardization. Through adopting a centralized structure the duplication efforts can be reduced as well as coordination and standardization can be achieved (Handfield, et al., 2011).

Like Handfield, et al., (2011) suggest to be able to coordinate plans and strategies as well as coordinate different units in an organization a centralized structure is needed where there is a central group that works with suggested coordination. Furthermore, HP who adopted a more centralized approach achieved visibility for all units and increase evaluation of performance of the suppliers. Company XY has expressed goals to become more transparent and standardized (chapter 6.8). Therefore, it can be suggested that Company XY’s goals of becoming more transparent and standardized can be met through adopting a centralized structure.

According to Axelsson, et al., (2005) one of the two conflicting pressures, globalization, pushes for standardization and efficiency which in turn push towards centralization. Mergers, downsizing and consolidations in combination with global competition has furthermore led to companies adopting a centralized structure. Company XY has become a global company through mergers and consolidations and are now working on a global market as described in chapter 2 they are also looking for standardization and efficiency according to chapter 6.8. Which therefore should push them towards centralization to meets its goals of standardization and efficiency.

Furthermore, Company XY wants to become more responsive and agile and keep their customers as suggested in chapter 6.8. One of the disadvantages of centralized structures is that the procedures become more bureaucratic as well as there being a weaker customer orientation according to van Weele (2010). The more bureaucratic the processes become the more rigid they are therefore the responsiveness is decreased and having weaker customer orientation might affect the customer service and therefore the ability to keep customers.

From these analysis' it can be further concluded that a centralized purchasing structure does not meet all of Company XY's goals hence a pure centralized organizational structure is not recommended.

3.3. What aspects of a hybrid purchasing structure is applicable on Company XY to reach its goals and enhance its performance?

The goal when adopting a hybrid structure is to reap the benefits of both a centralized and decentralized structure while mitigating the negative effects of such structures (Axelsson, et al. 2005). From the previous analysis' it has been concluded that there are some benefits of a decentralized structure that meet Company XY’s goals and some of the goals are met when adopting a centralized structure. Furthermore, it has been concluded that some of the negative effects of the two structures are counteractive to the other structure's benefits. Therefore, to be able to meet all the goals of Company XY a hybrid structure is recommended since it can reap the benefits of both a centralized and decentralized structure while mitigating the negative effects.
There are three different hybrid structures as defined by Axelsson, et al. (2005), which are coordinated purchasing, center-led purchasing and local-led purchasing. Where center-led and local-led purchasing units are ways of avoiding centralized rigidity and decentralized fragmentation (Axelsson, et al. 2005). Which correlates to the goals that Company XY has to become more agile, chapter 6.8, therefore avoiding rigidity and become more standardized hence avoiding fragmentation. Another reasons for a hybrid structure is to combine common requirements among units to improve the service provided by the suppliers (van Weele, 2010). Which correlates to the goal of keeping customers, chapter 6.8, by improving customer service. Since center-led and local-led structures enable companies to avoid rigidity and fragmentation, which coordinated purchasing does not, these structures are relevant for Company XY.

The goals of wanting to standardize, chapter 6.8, indicates that Company XY want to increase their coherence but not be completely centralized since the sales offices local knowledge leads to better customer service as well as producing the right materials. Furthermore, Company XY seek to increase their transparency and decrease sub optimizing through collaborating more between the mills and sales offices. Furthermore they want to increase transparency and sub-optimization through sharing information in the same way therefore also increasing their maturity.

Handfield, et al. (2011) describes center-led purchasing organization structures as combinations of a centralized approach for several business units with common purchased items and a decentralized approach to unique requirements. A difference between center- and local-led structures is that the central unit conduct the purchasing for the products that are common. A center-led structure is therefore not applicable to Company XY since the sales offices will still conduct the purchasing.

The sales offices possess specific knowledge about the market and customers they are supplying as well as the markets and customers differing, chapter 6.7. This leads to each market and customer having unique requirements which is a large part of what that the sales offices have to take into consideration when supplying. According to Axelsson, et al., (2005) a local-led purchasing organization has a central core which is small that supports and coordinate the decentralized units, taking this into consideration a local-led approach is suggested to be more beneficial. This because Company XY's sales offices will possess the purchasing power but there is a need for better coordination of these units.

The decentralized units at Company XY have facilities and services that they share and are therefore interrelated, furthermore the sourcing power in a local-led purchasing organization resides with the decentralized units. As Rozemeijer, et al., (2003) suggest a local led purchasing structure is to be adopted when there is higher coherence and maturity but there is an emphasis on local decision making. As indicated in Figure 30 below according to the goals Company XY have and Rozemeijer's, et al., (2003) and Axelsson's, et al., (2005) structure theories a local-led purchasing structure should be adopted.

To enable Company XY to become more agile and standardized a hybrid structure is suggested. A local-led structure is further suggested since it will enable Company XY to reap the benefits of both a centralized as well as a decentralized structure while mitigating the negative effects of the two structures.
Before 2020

A virtual organization is according to DeSanctis and Monge (1999) an assemblage of functionally and/or culturally diverse entities that are geographically distributed and linked together thru electronic forms of communication and the entities are relaying on lateral, dynamic relationships for coordination. Harrison and van Hoek (2002) states that a virtual organization is characterized as a group of separate organizations operating as a single entity. Virtual organizations enable fast responsiveness, high efficiency and flexibility (Hughes, et al., 2001, Lin & Lu, 2005). This theory corresponds to Company XY’s situation, since both sales offices and mills are as described, geographically distributed (chapter 2), culturally diverse (chapter 6.7.1), linked through electronic forms of communication, (chapter 6.6.4) and are relying on lateral coordination (chapter 6.6.1) although not to the extent Company XY would like. Today it cannot be concluded that Company XY is a virtual enterprise since they are not operating as a single entity nor is the lateral collaboration present between mills and some sales offices. Given the theory and Company XY’s characteristics and goals to increase transparency and increase flexibility a virtual organization is suggested to be beneficial.

Bearing partners wanted to have communication simplification between partners, obtain visibility of items that are common in order to be more responsive to customer needs and reduction of inventory levels at warehouse locations they did this by adopting a virtual organization (Franke & Jockel, 2000). These objectives correspond to the issues that have been found at Company XY as well as their goals with the project to become more transparent and flexible, while keeping customers and reaching short term profitability goals. Both theory describing the traits of when to adopt a virtual organization fits Company XY as well as the objectives Bearing partners had for adopting a virtual organization corresponds to Company XY's. Therefore, a hybrid and virtual organization is suggested to be adopted.
Wang and Chan (2008) refers to virtual enterprises and defines it as independent enterprises in a production system that, depending on market demand, can be dynamically insourced or outsourced. In the case of Bearing Partners the virtual enterprise has a task of creating a common inventory of all eight partners from which each retailer can use to meet their customers' orders and manage inventory in real time from different units (Franke & Jockel, 2000). Company XY has varying market demand that to be met the capacity manager is insourcing and outsourcing the three mills' capacity by moving orders between the mills. This is done manually with the help of the sales offices. The difference here being that the capacity manager does not have access to a virtual enterprise where there is a common inventory, allocation, sales or production forecast for the different units. Which has led to wrongly made decisions when it comes to prioritizing sales offices and resources. For Company XY to efficiently and flexibly allocate and move the resources, of the three mills and eight sales offices, to reach their goals, visibility through a common source for the resources has to be established. A suggestion for how this should be done is displayed in Figure 31 where the virtual common inventory is displayed in the center of the figure a common production forecast for the mills is displayed to the right and a common sales forecast for the sales offices is displayed to the left.

Harrison and van Hoek (2002) states that for a virtual organization to succeed the participating enterprises should have consistent standards and procedures and common sources for customer data and orders. This is something Company XY does not have today as described under question 1 and 2 and therefore to be able to become a virtual organization the processes have to be standardized and there has to be a common source for data i.e. information.

Therefore, to enable Company XY to reach their third goal of becoming more transparent a virtual organization is suggested. Which will help to decrease the sub optimization during decision making for allocations and priorities when moving orders and capacity through increasing the visibility and therefore enabling more collaboration between units.

When SAP is implemented this virtual organization where the Company XY act as one entity where there is access to all inventory, allocation, sales and production forecasts will be enabled through SAP.
3.4. What demands does this new structure put on the processes within the purchasing units and mills?

According to van Weele (2010) centralization demands high internal coordination. For Company XY this means that since a hybrid structure is both centrally and decentrally controlled to be able to collaborate with the central unit the processes have to be standardized. This is because they are not today, the available information needs to be coordinated in a standardized manner.

To enable a local-led structure there has to be a common law and language which refers to having real-time data, a common source of information and a global IT system that provide information and intelligence to enable decision points to be identified (Axelsson, et al., 2005). At Company XY today there is no real-time data, no common source of information and no global IT-system, chapter 6.6.4, which leads to them having to do this manually until 2020 when SAP will be implemented at all mills.

When adopting a hybrid structure with a central unit, its role will be to monitor best practices and when required coordinate and provide resources (Axelsson, et al., 2005). Today there is no expressed best practice to adopt for processes such as replenishing of service stocks, forecast corrections, information sharing. Therefore, to be able to adopt a hybrid structure best practices should be established. This will be further discussed under questions 4, 5 and 6.

The demands that are put on the processes and mills are:

- Standardized coordination for information
- Common source of information
- Real time data
- Best practices have to be established
7.2 Replenishment process

4. How does Company XY's replenishment process correspond to the collaborative process CPFR?

4.1. How coordinated are the sales offices and mills in their planning processes and does it correspond to the CPFR model?

The planning stage of the CPFR process are concentrated on guidelines for the collaboration and forming a joint business plan (Fliedner, 2003; VICS as cited in Seifert, 2003). Coordinating parties in a supply chain is also an important aim of the CPFR process. Sharing the same norms and coordinating them is according to Axelsson, et al. (2005) one way of achieving a coordinated organization. The Kraftliner organizations' commonalities in their planning processes will therefore be analyzed below.

The yearly planning of the Kraftliner production and sales that are described in chapter 6.1 are one example of the Kraftliner organization's joint planning processes. The market plan that the yearly planning generates can also be seen as a joint plan on how the organization will be able to reach their sales and production goals for the year.

One of the commonalities for the mills and sales offices is that they all are evaluating their customer service based on number of stock outs. Since all parties in the organization is evaluated on the number of stock outs at the customer it can be seen as a common planning factor since all parties tries to avoid stock outs as much as possible. Furthermore, as can be read in chapter 6.8, all sales offices are, apart from the stock outs, also evaluated on a couple of other KPIs that are evaluated once a month. These KPIs are forecast accuracy and stock levels. This should also lead to the factors that are considered when planning to be common since they are all evaluated on the same basis.

Further on the organization also have, as described in chapter 6.6.1, weekly Monday meetings where problems that concern and affects big parts of the organization is discussed. These meetings are also an example of the common planning that is achieved in the organization.

There are also meetings where the supply chain managers for each market meet and discuss problems, solutions and ideas to improve the individual market but also the whole organization.

The above common processes of planning and improve the Kraftliner organization can be seen as the organization has partly common planning processes, which is one of the parts of CPFR. In Table 12 a summary of the planning processes and how they are considered to correspond with the CPFR model is presented.
Table 12: A summary of whether Company XY’s planning processes correspond to the CPFR model.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Yes</th>
<th>Partly</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yearly planning</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Measuring Stock Outs</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Common KPIs for sales offices</td>
<td></td>
<td>X</td>
<td></td>
</tr>
<tr>
<td>Monday meetings</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Supply chain developing meetings</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>

4.2. What information and technique does Company XY use when forecasting and does it correspond to the CPFR model?

According to Oskarsson, et al. (2013) the main purpose of a forecast is to predict the demand of the customers. Blackburn, et al. (2015) enhance that forecasts is important especially in the process industry since the need of utilizing the capacity to max is high and it is important to produce the right product.

Blackburn, et al. (2015) further states that the forecast is an important part in supply chain management since it is the basis for, among other things, production planning.

As described in chapter 6.1 the first step of the yearly planning is for each mill to calculate a production budget for the coming year which together generates a total production budget. This can be compared with the third step of CPFR however instead of a common sales forecast it is a common production budget that is generated. The capacity estimation is more or less done the same way for all mills, they predict the number of working days the coming year and then calculates the average amount of tonnage the mill will be able to produce each month. Each mill is also working with production forecasts through the year which are basically the same as the budget but it is redone each month which makes it possible to include problems that may have occurred and are affecting the production. This can be compared to the fourth and fifth step of VICS CPFR model which regards identifying and resolving exceptions.

As described in section 6.1 all sales office provides a yearly sales forecast to the head quarter that are combined to a total sales forecast for the complete organization. This too can be compared to the third step in VICS CPFR model. This forecast is based on last year’s consumption and knowledge that the sales offices have regarding changes of their customers’ activities the coming year, this correspond to what Oskarsson, et al. (2013) and Axsäter (2006) presents as typical information that should be used when forecasting.
Further on all sales offices are, as described in chapter 6.3.2, provided with a forecast from their intra-group customer through SAP however the sales offices have different approaches to how they proceed with the forecast process. The Market 2 sales office trusts that the three month forecast that the customer provide them with are correct and does not change it. Other sales offices choose to monthly validate and change the three month forecast. The Market 3 sales office calculates an average between the forecast provided by the customers and by the forecast that is calculated in SAP. The algorithm in SAP calculates a forecast based on the last years’ consumption with extra weighting on the last three months. The other sales offices validate the three month forecast by making changes with regard to knowledge the sales offices have regarding their customers’ previous consumption, additional orders, seasonality and working days. Hence instead of only using historical data the sales offices strengthen the accuracy of their forecasts by using more than one type of information which correspond to Oskarsson, et al. (2013). This information is also used by the sales offices when they on their own initiative corrects the forecast weekly. This is however not done by the Market 2 sales office who only changes the weekly forecast if the customer tells them to. The conclusion to be drawn from this is that some of the sales offices works corresponding to the CPFR models fourth and fifth step while others do not.

It can be further established that since the organization of Company XY does not work with order forecasts the step six to eight in CPFR are not present. The process goes from step five to step nine right away.

Shu, et al. (2006) describes CPFR as a collaboration that aims to share standardized information and Blackburn, et al (2015) states the importance of choosing the right information to conduct the forecast. The sales offices way of working, which is very unstandardized, results in that the information provided to the mills cannot be said to be standardized which is according to Shu, et al. (2006) one of the main aims of the CPFR collaboration.

A summary of how Company XY’s forecast processes are considered to correspond to the CPFR model is presented below in Table 13.

*Table 13: A summary of whether the forecast processes are considered to correspond to the CPFR model.*

<table>
<thead>
<tr>
<th></th>
<th>Yes</th>
<th>Partly</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production budget</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Production forecast</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales budget</td>
<td>X</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sales forecast</td>
<td></td>
<td>X</td>
<td></td>
</tr>
</tbody>
</table>
4.3. How does Company XY decide what quantity to order to replenish the service stock and does it correspond to the CPFR model?

The last part of CPFR is replenishment of the inventory and since one of the aims of the CPFR model is to better coordinate the supply chains the replenishment processes in the Kraftliner organization and the commonalities between the sales offices and mills will be analyzed below.

As described in chapter 6.5 the choice of what and how much to replenish the service stock with is done by different parties depending on mill. It is the sales office responsibility when replenishing service stocks linked to Mill 1 and Mill 3 and when the paper is produced in Mill 2 it is the mills responsibility.

As described in chapter 6.5.2 the replenishment of the service stocks that are maintained by the production planner in Mill 2 is based on the target stock level and information regarding consumption, stock levels and already called off articles. A rough calculation is done once a week and it is possible to update it at latest one day before production. The target stock level can be seen as the replenishment level that Oskarsson, et al. (2013) describes. The target stock level is typically presented in the unit of number of weeks of consumption. This is recalculated with the forecast for the coming period each time the replenishment is calculated since the order quantity have to cover the future demand. This means that Mill 2 uses a combination of two methods that are presented by Oskarsson, et al. (2013) namely the replenishment level method combined with the forecast method since the replenishment level is based on forecasts instead of previous consumption.

Further on in chapter 6.4 it is described that Mill 1 and Mill 2 works with allocations. These allocations state a capacity that each sales offices have reserved in the production each run/cycle including both replenishment orders and direct orders. This means that in Mill 2 where the mill is responsible for the replenishment the sales offices does not really know how much of the allocation they actually can use for their direct orders. Nor do they know if all their allocation actually is used to refill service stocks. This problem is however not present with Mill 1 since the sales offices have the control of all orders, hence all the allocation.

When working with Mill 1 and Mill 3 it is, as described in chapters 6.5.1 and 6.5.3, the sales offices responsibility to replenish the service stock. The basic concept is the same as for the replenishment in Mill 2 namely that the sales offices replenish with the goal to keep a number of weeks of consumption in the service stock. However how this is calculated differs between sales offices and mill.

With Mill 1 the replenishment is calculated for all gsms once a week as the production runs are stable. For Mill 3 however the calculations are done for specific gsms each time the production planner informs the sales offices that the specific gsm is planned for production in the near future.

The replenishment of paper produced in Mill 1 are calculated based on a calculation conducted in Business system 1. The algorithm in Business system 1 takes the service stock levels, quantity in production, called off quantities, forecast and the target service stock level into account when calculating a suggestion of what and how much to replenish. The algorithm however does not take the allocation or the stock levels at the customer into account. The sales offices therefore always have to extract the information into an excel-file and recalculate the suggested quantities with regard to the allocation and stock levels at the customers.
For Mill 3 the calculations of what to order is done different by the sales offices but the following information is used to different extent by the sales offices.

- stock level at customer
- service stock level
- target service stock level
- time between production opportunities
- forecasted demand
- quantities in production
- quantities in transit

Since Mill 3 does not apply allocations the sales offices requests to get all their calculated need produced. However the production capacity does not cover the total need for all sales offices which results in that the production planner asks the sales office to prioritize and cut their requests. This often results in delays in the production since the sales offices may not cut as much as needed, hence the production planner produces over the mills capacity. The delays then results in that the sales office may get stock outs since they have not calculated for the production to be delayed, hence they have replenished with too little.

The lack of visibility and collaboration between the sales offices and mill in the replenishment process for Mill 2 is one clear indication of that replenishment process does not have the conditions for CPFR. The process of replenishing the service stock linked to Mill 3 is further more a sign that the replenishment process is not conducted in collaboration with the different parts of the supply chain as well as they could have. This indicated further that the replenishment process is not conducted according to the CPFR model, see Table 14.

Table 14: A summary of whether the replenishment processes are considered to correspond to the CPFR model.

<table>
<thead>
<tr>
<th>Mill</th>
<th>Correlates to CPFR model</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mill 1</td>
<td>X</td>
</tr>
<tr>
<td>Mill 2</td>
<td>X</td>
</tr>
<tr>
<td>Mill 3</td>
<td>X</td>
</tr>
</tbody>
</table>

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4.4. To what extent does Company XY share information and forecasts between different departments and does it correspond to the CPFR model?

As Li and Zhang (2015), Costantino, et al. (2014) and Singh and Garg (2015) all conclude that information sharing between all partners in a supply chain leads to lower inventory levels and decreased bullwhip effects. Hence with widely information sharing the supply chain can better plan their processes and become more responsive to changes in demand. The extent of information sharing in Company XY’s organization will therefore be analyzed below.

As described in chapter 6 there are a lot of ways and in different intervals that information and forecasts are shared in the Kraftliner organization. Starting with the sharing of forecasts all sales offices provide the head office in Paris with an overall forecast on article level once a year as a basis for the market plan that are conducted for the whole organization. During the year every other week a three month rolling forecast is shared from all the sales offices to the mills that supply the different sales offices. This is then a part of the base for the planning of the production for the mills. Both the yearly and the three month rolling forecast are provided more or less the same way for all sales offices. However, the forecasts are revised from the forecasts that are provided from the customers on different levels and sometime not at all. The sharing of forecasts to the involved parties in the supply chain are an example of coordination that are in line with the CPFR aims.

Because of the fact that the three mills have three separate systems that are not compatible with each other or SAP the information sharing is partly not the same depending on mill and partly difficult which results in difficulties when making decisions. There are a lot of situations when this problem with inadequate IT-systems results in problems for the day to day work. In the chapter 6.6.2 the process of deciding what to order when production is moved from one mill to another is described and this process is an example of day to day work that is affected by the inadequate IT-system. Because of the lack of compatible IT-systems a lot of manually work has to be done for the sales offices and depending on mill this processes are different. Except from the extra work the big problem with the information is that all mills cannot provide the information on the same level or even the same information e.g. stock levels belonging to Mill 1 are describing the stock that is available for call off while Mill 3 communicates the total physical stock including what is already called off. This is also a problem of the weekly reports that are provided to the capacity manager from each mill. Danese and Kalchschmidt (2011) presents among other aspects that proper information is something that affects the accuracy of a forecast. Even though this is not about forecasts it can be translated to the accuracy of decisions such as the right order quantity.

The lack of compatible IT-systems may, even though it is not the mills’ intention, result in that information that the mills have are not communicated to the rest of the organization which is a typical situation of what Moon and Mentzer (1998) presents a "Island of analysis". This also results in that decisions regarding all mills and sales offices that the capacity manager makes with the weekly reports as basis are made on improper information which may result in incorrect decision making.

According to Fliedner (2003) CPFR is a tool for visibility and visibility is needed to be able to coordinate the supply chain. The lack of compatible IT-systems is one of the big obstacles for the Company XY Kraftliner organization to enable CPFR. A summary of how Company XY’s sharing of information and forecasts are considered to correspond to the CPFR model is presented in Table 15 below.
7 Analysis

Table 15: Summary of whether the sharing of information and forecasts are considered to correspond to the CPFR model.

<table>
<thead>
<tr>
<th>Corresponds to the CPFR model</th>
<th>Yes</th>
<th>Partly</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sharing of information</td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Sharing of forecasts</td>
<td>X</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

4.5. To what extent are Company XY’s forecast and replenishment processes standardized?

According to Seifert (2003) CPFR is a process model that depends on a supply chain’s coordination capacity to enable an overall efficiency and Axelsson, et al (2005) states that standardization of processes, outputs and skills are a way to reach coordination in an organization.

It is clear that there are not a lot of processes and tasks in the Kraftliner organization that are standardized. Axelsson et al (2005) presents the standardization of work processes, which is not present in the forecast or replenishment processes in the Company XY Kraftliner organization. The forecast process are conducted differently depending on sales office and the replenishment process is different depending both on mill and sales office. There are no common rules or steps decided by the organization that all sales offices should use, there are not even rules present for individual sales offices.

Further on Axelsson, et al. (2005) talks about standardize the worker and that way know what to expect from each other which makes it easier to coordinate accordingly. In the Kraftliner organization the knowledge of what to expect from each other is quite clear in the sense of what tasks that each part of the supply chain is responsible for. However, one exception is the question of whose responsibility it is to fetch information from the systems linked to Mill 2 and Mill 3. As described in chapter 6.6.4 today most of the sales offices thinks it is the back office or production planner at the mills responsibility since they know the system while the mills think that the sales offices should be able to do it.

Further on there is also a clear situation where the knowledge and skills is not standardized. The situation is the safety days that Mill 2 agreed with the sales offices to obtain. In chapter 6.5.2 it is described that the sales offices see the concept "safety days" as the number of days in stock at the warehouse, however the mill also includes what is in production and in transit as well. This results in that when the sales offices think they will have 13 days of safety in stock at the warehouse in reality they will maybe have as maximum 8 days in stock.

Lastly Axelsson, et al (2005) presents the standardization of the output of the work as a way to enable coordination in an organization. This regards to define and standardize the result of a work process. In the Kraftliner organization there are no guidelines or rules to make sure that information and decisions that are made throughout the whole organization have a standardized designing or output.
7 Analysis

An example is the three month rolling forecasts that the sales offices provide to the mills every other week. These forecasts are processed differently depending on sales office and thereby the output is not standardized, even though it is in the same unit, since the information included are various.

5. How can Company XY change their replenishment process according to the CPFR model to better reach their goals?

Seifert (2003) describes CPFR as a model with the aim to create processes in a supply chain that enables collaborative conditions between retailers and suppliers. Seifert (2003) further states that through integration of both supply and demand processes efficiency is improved in the whole supply chain.

As the answers to question 4 states there are a lot of parts of the replenishment process that does not live up to what can be seen as CPFR collaboration. Many of the processes that are carried out in the Kraftliner organization are some kind of best practice for each individual department or even employee. Seifert (2003) states that a part of CPFR is to share information between the involved parties and Axelsson, et al. (2005) states that standardization is a way to enable coordination which is one of the main aim of CPFR.

Therefore discussions regarding best practice and standardization of processes in the replenishment process are presented below. The discussions starts with the processes of information sharing and continues with the forecast process and lastly the replenishing of the service stocks is discussed.

Information sharing

As appears in the answering of question 4 the information that are shared in the Kraftliner organization are not standardized to the execution neither in the way it is shared. The execution of the information shared differs depending on the mill that the information originates from. For Mill 1 most of the sales offices are happy with the information that they get access to through Business system 1. For Mill 3 and Mill 2 however the sales offices are not as pleased. Mill 3 does not provide information regarding what is in transit or how much of the stocks that are already called off and therefore not available. In Mill 2 the biggest problem is that the sales offices do not get access to information regarding what is in production, on its way or when paper will be ready for call off.

When it comes to how the information is shared there are also differences depending on the mill. To start with the information needed for every day work are fetched in different ways depending on both mill and sales office. Some sales offices are very comfortable with a specific IT-system while others that does not do as much business with that mill are not. The lack of knowledge of the systems results in that the sales offices have to involve the production planner to fetch all relevant information for the day to day work.

It is easy to realise that the lack of knowledge of how to use the mills’ different systems are a factor that makes the visibility and the information sharing part of CPFR impossible. The Kraftliner organization have to enable better information sharing in the supply chain to enable visibility.

The information that the sales offices need to do their day to day work, such as refilling the service stocks, have to be the same regardless of mill. Before 2020 it is recommended that this information is provided in a report from all mills every morning. After 2020 the sales offices should be able to retrieve all the necessary information from SAP.
There are also differences in how information regarding old reels and delays in production are shared from the mills to the sales offices, which is described in chapter 6.6.4. The 15th of every month Mill 1 share information regarding reels that in the end of the month will be older than 60 days. In Mill 3 the information regarding old reels are share each week through an intranet platform. This intranet platform provides the sales offices with information which reels will be older than 60 days in the end of the current month. The intranet platform are appreciated by the sales offices however they believe that it is unnecessary to check this every week, it should be enough once a month. The information shared about old reels by Mill 2 is not consistent and are provided through an email from time to time. This process should be standardized in the sense of both how often it is provided and how it is provided to enable easier communication and work processes for the sales office that are dealing with more than one mill. The interval for sharing information is regarded the old reels is recommended to be once a month. This interval is founded on the sales offices opinion that it is often enough since it otherwise can result in unnecessary work. The information should before 2020 be provided in form of a report but after 2020 the information should be able to be provided through the IT-system.

Furthermore in chapter 6.6.4 it is also described how information regarding delays is provided to the sales offices. Mill 2 provide the sales office with a daily report regarding what will be produced the two coming days. What production that possibly is delayed the sales office have to check by them self by comparing today’s report with yesterdays. The big problem with this mill however is that the sales offices do not know what replenishing quantities are included in the production, hence they do not get any meaningful information out of the comparison of the reports. Mill 1 does not provide any report or similar regarding delays in production unless the production is delayed to the extent that the reels miss the vessel. However, all sales offices can access the information in Business system 1 where it clearly states when it will be produced and when it initially was planned to be produced. This however is not appreciated by the sales offices since this is not part of their day to day processes. The production planner in Mill 3 sends out a daily report with information regarding what and when it is planned to be produced and if the production of any special gsms are delayed. However, the sales offices themselves have to compare the daily reports to see with how much it is delayed. What is commonly about these ways of sharing information regarding what is delayed in production is that the information is inadequate.

The process of informing the sales office of what is delayed in production has to be standardized to enable better coordination between the mills and sales offices. According to the sales office the process should include a report that clearly state which gsms that are delayed, which sales offices orders are affected and with how much it is delayed i.e. when it originally was planned to be produced. Furthermore, the information should be provided to all involved sales offices daily. However, after 2020 this information should be able for the sales office to access through the IT-system.
The capacity manager is also affected by the lack of standardization. The reports that are provided by the mills once a week are all different designed and the content are not the same. Since the reports does not provide a clear and complete overview of the situation in the organization it becomes difficult for the capacity manager to conduct a reliable analysis. This results in that decision regarding for example where to produce or which sales office to priorities may be made wrongfully. To enable better collaborated planning for the mills and sales offices, which is in line with CPFR, these reports should be standardized regarding information and design to make the analyse and decision making easier for the capacity manager and more accurate. What is recommended is that pre 2020 the information needed for making the decision should be provided to the capacity manger in a standardized weekly report. After 2020 the capacity manger should be able to extract the reports from the IT-system.

A summary of which information that have to be standardized both to content and how it is shared is presented in Figure 32 below. The common conclusion that can be made about which information is shared and how it is shared is that to enable coordination and collaboration across the supply chain accordingly to CPFR is to standardize what information is shared and how it is shared. This would also contribute to making the visibility in the organization better which are one of Company XY's goals.

The forecast process

According to Axsäter (2006) forecasting is an important part of inventory control. Danese and Kalchschmidt (2011) further states that forecast errors are correlated to costs and delivery performance which implies that higher forecast accuracy leads to lower costs and better delivery performance. Lambert et al (1998) further on discusses conducting of forecast as a necessary way to be able to, among other things, lower the number of stock outs and increase customer service.

Danese and Kalchschmidt (2011) emphases the importance of proper usage and combining of correct information to improve the forecast accuracy. Further on Moon and Mentzer (1998) discusses the phenomena "island of analysis" that has a negative impact on the accuracy of the forecast since information is not shared to all parties in the supply chain.
The phenomena "island of analysis" that Moon and Mentzer (1998) discusses are as described when answering question 4.3 present in the Kraftliner organization forecast process. According to Seifert (2003) the CPFR model aims among other things to enable better information sharing and jointly manage planning processes. Fliedner (2003) further describes CPFR as a visibility tool. So by embracing and trying to implement the CPFR model on the forecast process should make it possible for the Kraftliner organization to enable more accurate forecasts and also better visibility which is one of their overall goals.

Since one of the conditions of CPFR collaboration is to have a functioning coordination in the supply chain the organization would also benefit by standardizing the forecast process. Since accordingly to Axelsson, et al. (2005) standardization enables coordination in a supply chain.

In the CPFR model the third step regards generating a common sales forecast from consumption data. In the Kraftliner organization this is done once a year when the overall market plan is conducted. All sales offices are providing a sales forecast for the coming year that are based on last year’s consumption and knowledge regarding any specific changes at the customers. The mills are not conducting a sales forecast but a production budget which are based on last year’s production. These processes are both corresponding to the CPFR model and all sales offices and mills are doing it the same way so it is already standardized so no changes are recommended.

The next step of the forecast process is the monthly work that is done. In chapter 6.3.2 it is described that every other week the sales office provides Mill 1 and Mill 2 with a three month rolling sales forecast on gsm level for all intra group customers. This information is used to calculate the allocation, the information is not provided to Mill 3 since they do not work with allocation. Some of the sales offices thinks it is good that Mill 3 does not use allocations since it enables flexibility however the most of the sales office would prefer to have an allocation at Mill 3 as well. The reason for the sales offices to prefer allocation is that today the sales offices does not know if they will get what they requested since the production planner at Mill 3 can cut their request if she thinks it is necessary.

With allocation dedicated to each sales office the sales office can be sure of how much they will be able to order each time and then they can decide what and who to prioritize themselves. With allocations some of the moves that today are made can perhaps be avoided since the sales offices can plan their replenishment better and Mill 3 may not be as delayed as they often are today due to long production runs. One obstacle however is Mill 3’s problem with their pulp production. It is however considered that it should be possible to forecast the needed production of Deckenpapier based on historical data. With the forecast of Deckenpapier production it is then possible to forecast how much brown Kraftliner Mill 3 will be able to produce each month hence allocation can be applied. Implementing allocation on all mills would standardize the process which would enable better coordination between the sales offices and the mills. The implementing of allocations for all mills is therefore recommended.
The allocation process itself then has to be standardized to enable easier process for the sales offices and make sure that all mills are calculating the allocation equally. Today the allocation is based on the production capacity and the three month rolling sales forecast that the sales offices provide to the mills every other week. To start with the way that the forecasts are communicated to the mills differ. For Mill 2 the sales offices enter the forecast into SAP and Mill 1 send out an excel-file that the sales offices fill in. To make the work easier for the sales offices this should be done the same way for all mills. If the forecast would be communicated through SAP for all mills there would not be any additional work for the sales offices since the forecasts are already in SAP. It is therefore recommended that all sales offices should communicate the forecasts being the base for allocations with SAP.

The fourth and fifth step of the CPFR model is to identify and resolve exceptions in the forecast. This corresponds to the validation and corrections that the sales offices are doing monthly and weekly on the three month rolling forecasts which is described in chapter 6.3.2. The sales offices are provided with forecasts from the customers and validates and corrects them on a monthly base. This process is done differently depending on sales office. The Market 2 sales office have decided to trust the customers and does not correct the monthly forecast at all and are only correcting it weekly if the customer tells them to. The Market1, Market 3, Market 4 and Market 5 sales office however are validating and correcting the forecasts both monthly and weekly. The Market 3 sales office changes the monthly forecast by calculating an average between the forecast provided by the customer and the forecast that are calculated in SAP. The other sales offices are making changes monthly and weekly with regard to knowledge they have regarding the customer's previous consumption, additional orders, seasonality, working days and additional shifts at the customer. Analyzes done on historical data clearly states that the forecasts changed with regard to the knowledge the sales offices have of their customers’ daily activities are more accurate, see Table 16. It can be concluded that not taken this information into account is a shortage of some of the sales offices forecasting techniques. According to Blackburn, et al. (2015) inadequate forecasting techniques leads to inaccuracy in forecast and uncertainty in production.

Table 16: Analyze of historical data regarding the accuracy of forecasts.

<table>
<thead>
<tr>
<th>Sales Office</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
<th>The influence of the weekly corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market 1</td>
<td>7,5%</td>
<td>5,3%</td>
<td>3,2%</td>
<td>57%</td>
</tr>
<tr>
<td>Market 2</td>
<td>7,1%</td>
<td>5,7%</td>
<td>8,4%</td>
<td>18%</td>
</tr>
<tr>
<td>Market 3</td>
<td>8,3%</td>
<td>3,5%</td>
<td>2,6%</td>
<td>69%</td>
</tr>
<tr>
<td>Market 4</td>
<td>7,3%</td>
<td>4,1%</td>
<td>2,5%</td>
<td>66%</td>
</tr>
<tr>
<td>Market 5</td>
<td>4,1%</td>
<td>3,6%</td>
<td>1,5%</td>
<td>63%</td>
</tr>
<tr>
<td>Market 6</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Market 7</td>
<td>11,9%</td>
<td>8,8%</td>
<td>11,4%</td>
<td>4%</td>
</tr>
<tr>
<td>Market 8</td>
<td>4,8%</td>
<td>4,9%</td>
<td>5,2%</td>
<td>11%</td>
</tr>
<tr>
<td>Average for all</td>
<td>7,3%</td>
<td>5,1%</td>
<td>5,0%</td>
<td></td>
</tr>
<tr>
<td>Average for the best sales offices</td>
<td>6,8%</td>
<td>4,1%</td>
<td>2,5%</td>
<td></td>
</tr>
</tbody>
</table>

If all sales offices would use the knowledge to change the forecasts it would be possible to produce more accurate, hence maybe stock outs could be prevented. Identifying and resolving exceptions from the forecast is also one of the steps in CPFR which further implies that all sales offices should validate and correct the forecasts. It is therefore recommended that the sales offices should change the forecasts both weekly and monthly with regards to the knowledge the sales office have regard the customers’ daily activities.
As mentioned earlier the allocation is today partly based on the production capacity which is forecasted by the mills on a monthly basis. This production forecast is calculated with respect to expected production hours for each month and an average of tonnages produced per hour. The average of tonnages produced per hour are calculated out of the sales forecast however this means that the production forecast is generated on the aggregated level of brown and white Kraftliner. According to the capacity manager this is something that has to be changed since the average tonnage produced per hour can be very misleading. This results in that the mill cannot produce all the tonnages that they have forecasted which in turn means that the allocation given to each sales office are inaccurate.

All forecasts that regards the intra-group customers are on gsm level, 55-60 % of all production, and the capacity manager would like the mills to take advantage of that to better plan their production. If the mills conduct the production forecast as much as possible on the information that is given on gsm level the capacity would be better estimated hence the allocation given to the sales offices would be more accurate. This would then mean that the sales offices to a greater extent than before can trust that they will be able to use all the allocation. Which would be beneficial to the replenishing of the service stocks since it becomes more clear how much the sales offices have available for them in production. It is therefore recommended that the mills start generating the production forecast as much as possible with the actual forecast of each gsm instead of an average.

The allocation is today calculated once a month and are evenly divided on the runs/cycles. Whence the allocation is calculated and distributed to the different sales offices it is not changed. This is according to the sales offices one of the weaknesses of the way the allocation is calculated since changes in consumption during the month is not taken into account. Another weakness that the sales offices have expressed is that the calculation of the allocation does not take the available stock into account. This would maybe not be such a big problem if the production would cover all sales forecast however that is not the situation at Company XY. The production forecast is in general always lower than the sales forecast. The allocation is therefor never equal to the sales forecast since the difference between the production forecast and sales forecast is supposed to be covered by what is in stock. This means that a sales office that have low stock levels does not get any more allocation to refill the stocks compared to a sales office that have high stock levels. This results in unbalanced stock levels for the sales office and it becomes very hard to get back to an equilibrium regarding the sales offices service stock levels. If the allocation would be taken the stock levels into account and updated weekly the allocations would probably be more fair and the total stock levels would probably be better hence the customer service could be better. Updating the allocation weekly would also furthermore utilize the weekly changes of the forecasts discussed earlier. It is therefore recommended that the calculation of the allocation should include the stock levels and they should be updated weekly.

A summary of how the allocation, sales forecast and production forecast should be conducted to enable a more accurate production, replenishing of service stocks and less moves of tonnages between mills is presented in Figure 33 below.
7 Analysis

Figure 33: Summary of how the processes regarding the forecasts should be conducted.

The process of replenishing the service stocks

Continuing with the CPFR model it is in question 4.2 stated that the Kraftliner organization does not have the steps six to eight since they do not work with order forecasts. The process at Company XY jumps directly from validating and correcting the sales forecast to generating a replenishment order, which is the last step of the CPFR model. However as step six in CPFR combines information regarding the sales forecast and inventory strategies to generate the order forecast so does Company XY when generating the replenishment order. However, it is established in question 4.3 that how the replenishment orders are generated differs depending on which mill that supplies the paper.

As established in 4.3, it is the sales offices responsibility to replenish the service stocks when the paper is supplied from Mill 1 and Mill 3 but it is the mill's responsibility when the paper are supplied from Mill 2. Analyzing historical data it is established that the replenishment done by Mill 2 generates more stock outs than the replenishment done by the sales offices, see Table 17. Furthermore, the sales offices express a desire of having the control of replenishing the service stock linked to Mill 2 as well. Furthermore, one of the sales offices states that they have a better ability to respond to changes in the customers' demand when they are responsible for the replenishment (chapter 6.5.1). It is also Company XY’s desire to standardize the processes in the Kraftliner organization which further confirms that the sales office should be responsible for replenishing the service stock for all mills.

Table 17: Presentation of the cost of stock outs and the percentage of the stock outs.

<table>
<thead>
<tr>
<th></th>
<th>Mill 1</th>
<th>Mill 2</th>
<th>Mill 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenue including october</td>
<td>392 932 623 €</td>
<td>275 011 585 €</td>
<td>250 594 998 €</td>
</tr>
<tr>
<td>Total costs</td>
<td>28 255 €</td>
<td>38 141 €</td>
<td>14 898 €</td>
</tr>
<tr>
<td>Stock out percentage</td>
<td>0,0072%</td>
<td>0,0139%</td>
<td>0,0059%</td>
</tr>
</tbody>
</table>
As stated in the question 4.3 one of the problems when deciding what to replenish the service stock linked to Mill 3 is that the production often is delayed which makes it difficult to estimate the time to the next ordering opportunity. This makes the decision of how much to replenish difficult since the time that has to be covered in stock is uncertain. One of several possible reasons for the delays in Mill 3 is that the production planner often presses in more production than the mill has capacity for which delays the production. This would be avoided if the allocation as discussed earlier is implemented for all mills. There are also other reasons for the delays, for example the need of producing Deckenpapier, however allocations are considered to be decreasing the delays a little bit. The replenishment process would also benefit of allocations since it would be easier for the sales offices to calculate the replenishment orders since the delays would decrease and the process would probably be performed more organized and less sporadically.

Lastly it is established in 4.3 that the calculation of how much to replenish the service stock with is based on the same idea for all sales offices. However, it is also established that the information that is available from the different mills varies which results in that the calculation is not really done the same way. As established when answering question 4.3 the replenishment calculation used by the sales offices are a combination of Oskarsson, et al. (2013) replenishment level and using the forecast of the next period to calculate the new replenishment level at each ordering opportunity. It is recommended that this is how the sales offices should continue calculating how much and what to replenish. However, as state above the information that is used to calculate this differs since the mills do not share the same information. This will however be solved if the recommendations regarding standardizing the shared information will be implemented.

The information that is needed to calculate the replenishment level is according to Oskarsson, et al. (2013) the following:

- consumption since the last order
- stock levels
- lead time

Since the replenishment level, i.e. target service stock levels, in this case is calculated based on the forecast, the forecast is also needed. Compared to the information that is used today the sales offices also use information regarding what is in production and what is in transit. The reason for checking this information is that the time between placing two orders are shorter than the lead time which means that orders placed last time have not get been delivered. What is recommended for the Kraftliner organization is that the calculation should be done the same way for all sales office and with the same information from all mills. This would mean that the process of replenishing the service stock would be done the same way for all mills which helps the sales offices since they do not have to learn different methods. The method that is recommended is the method they use today and the information that all sales offices should use independent of mill is the following:

- stock level at customer
- service stock level
- target service stock level
- time between production opportunities
- forecasted demand
- quantities in production
- quantities in transit
7 Analysis

This is considered to correspond to what Oskarsson, et al. (2013) presents except from the information of material that is in production and in transit, which in this case is necessary since the time between placing orders are shorter than the lead time.

How the process of replenishing the service stock is recommended to be changed to better reach Company XY’s goals is presented in Figure 34 below.

![Figure 34: A summary of how the processes of replenishing the service stocks is recommended to be changed to better reach Company XY’s goals.]

6. Where in the organization should the different parts of the replenishment process be conducted?

As established at question 3 Company XY should adopt a hybrid structure. In question 5 it has been established how the processes should be conducted which only leaves to decide where the different processes should be conducted, within the hybrid structure, which is discussed below.

Forecasts

According to (Axelsson, et al., 2005) the power should lay with the business units in a local-led organization. Decisions should be made, without bureaucratic procedures, by employees with expertise of the local environment who then are accountable. This in combination with the testimonies, in chapter 6.3.2, of the sales office about them correcting the forecasts based on knowledge they have about the market and the individual customers suggest that the forecast corrections should be done by the sales offices. Furthermore, when looking at Table 18 and Table 19 it can be seen that the sales offices corrections both on article level and aggregate level decreases the forecast inaccuracies. Therefore, the correction and entering of forecasts should be done at a decentralized level i.e. by the sales offices.
7 Analysis

Table 18: A presentation of how much the different forecasts and changes deviate from the actual consumption on an aggregated level.

<table>
<thead>
<tr>
<th>Market</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market 1</td>
<td>7,5%</td>
<td>5,3%</td>
<td>3,2%</td>
</tr>
<tr>
<td>Market 2</td>
<td>7,3%</td>
<td>4,1%</td>
<td>2,5%</td>
</tr>
<tr>
<td>Market 3</td>
<td>8,3%</td>
<td>3,5%</td>
<td>2,6%</td>
</tr>
<tr>
<td>Market 4</td>
<td>7,1%</td>
<td>5,7%</td>
<td>8,4%</td>
</tr>
<tr>
<td>Market 5</td>
<td>4,1%</td>
<td>3,6%</td>
<td>1,5%</td>
</tr>
<tr>
<td>Market 6</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Market 7</td>
<td>11,9%</td>
<td>8,8%</td>
<td>11,4%</td>
</tr>
<tr>
<td>Market 8</td>
<td>4,8%</td>
<td>4,9%</td>
<td>5,2%</td>
</tr>
<tr>
<td>Average</td>
<td>7,29%</td>
<td>5,13%</td>
<td>4,97%</td>
</tr>
</tbody>
</table>

Table 19: A presentation of how much the different forecasts and changes deviate from the actual consumption on an article level.

<table>
<thead>
<tr>
<th>Month</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
</tr>
</thead>
<tbody>
<tr>
<td>Januari</td>
<td>27%</td>
<td>24%</td>
<td>20%</td>
</tr>
<tr>
<td>Februari</td>
<td>30%</td>
<td>25%</td>
<td>21%</td>
</tr>
<tr>
<td>Mars</td>
<td>29%</td>
<td>24%</td>
<td>21%</td>
</tr>
<tr>
<td>April</td>
<td>29%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Maj</td>
<td>30%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Juni</td>
<td>33%</td>
<td>25%</td>
<td>22%</td>
</tr>
<tr>
<td>Juli</td>
<td>31%</td>
<td>28%</td>
<td>23%</td>
</tr>
<tr>
<td>Augusti</td>
<td>32%</td>
<td>28%</td>
<td>25%</td>
</tr>
<tr>
<td>September</td>
<td>30%</td>
<td>26%</td>
<td>23%</td>
</tr>
<tr>
<td>Oktober</td>
<td>33%</td>
<td>27%</td>
<td>22%</td>
</tr>
<tr>
<td>Average</td>
<td>30,40%</td>
<td>25,70%</td>
<td>22,10%</td>
</tr>
</tbody>
</table>

Comparing this to a centralized forecast done by a system which can be seen in Table 18 would lead to a forecast deviation of almost seven percent which further suggest that it should be done in a decentralized manner.
Replenishment

It can be further suggested, taking into consideration the Axelsson, et al's., 2005 theory that the decision power should lay with employees with expertise of the local environment, that the sales offices should be in charge of replenishing the service stocks. This is further supported considering Datta & Christopher's, (2011) case where the decision making for replenishing from a production center should be located with the distribution centers to enhance certain performance measurements. These measurements were stock outs, response time, production run length, change overs, service level and network inventory. These performance measures all correlate to Company XY's goals of being responsive, keeping customers and increase profitability (chapter 6.8). Moreover, when looking at Table 20 it can be seen that when the replenishment decisions are being made by the sales offices the stock out percentage is half of that when replenishment is made by a mill. Which further confirms that the replenishment should be made by the sales offices.

Table 20: Presentation of the cost of stock outs and the percentage of the stock outs.

<table>
<thead>
<tr>
<th></th>
<th>Mill 1</th>
<th>Mill 2</th>
<th>Mill 3</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total revenue including october</td>
<td>392 932 623 €</td>
<td>275 011 585 €</td>
<td>250 594 998 €</td>
</tr>
<tr>
<td>Total costs</td>
<td>28 255 €</td>
<td>38 141 €</td>
<td>14 898 €</td>
</tr>
<tr>
<td>Stock out percentage</td>
<td>0,0072%</td>
<td>0,0139%</td>
<td>0,0059%</td>
</tr>
</tbody>
</table>

Information sharing

Separation of power suggest that the involvement of the central unit is decided by the requirements that the business units has set. The role of the central unit is to monitor best practices and when required coordinate and provide resources. (Axelsson, et al., 2005) The unit at headquarters oversees issues and matters that concern the whole firm and look for opportunities that might benefit the entire firm. The central unit has the macro view that the individual decentralized units do not have. (Axelsson, et al., 2005) This theory suggest that the main task of the central unit should be decided upon by the sales offices and correspond to their needs. Furthermore, it should establish best practices, coordinate and provide resources. The expressed needs from the sales offices about one common place where the information, stated under question 5, is available leads to this central unit being the ones supplying this common information. Furthermore, this information should be summarized at the center to be able to distribute resources in a correct way by having the macro view that the decentralized units do not have. Datta and Christopher (2011) concludes that there should be central coordination of local and global information to enable decision makers make correct decisions and help them to tackle demand fluctuation. This gives further reason for the central unit to be responsible for the information sharing.

Moreover, by looking at Table 21 below it can be seen that 35% of the products that the three mills produce are common. Which gives further reason for wanting to have the macro view, which the central unit would have that is not present today. Hence the visibility between the mills would increase by adopting a central unit that summarizes the information from the three different mills.
7 Analysis

Table 21: Common articles, divided in quality, between the mills.

<table>
<thead>
<tr>
<th></th>
<th>Total number of articles</th>
<th>Number of common articles</th>
<th>Percentage of common articles</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brown Kraftliner</td>
<td>510</td>
<td>182</td>
<td>36%</td>
</tr>
<tr>
<td>White Kraftliner</td>
<td>168</td>
<td>58</td>
<td>34%</td>
</tr>
<tr>
<td>Royal 2000</td>
<td>155</td>
<td>55</td>
<td>36%</td>
</tr>
<tr>
<td>Total</td>
<td>833</td>
<td>295</td>
<td>35%</td>
</tr>
</tbody>
</table>

Allocation

Datta and Christopher (2011) concludes that there should be central coordination of local and global information to enable decision makers make correct decisions and help them to tackle demand fluctuation. The unit at headquarters oversees issues and matters that concern the whole firm and look for opportunities that might benefit the entire firm. The central unit has the macro view that the individual decentralized units do not have. (Axelsson, et al., 2005) Since allocation should be adopted by all three mills like suggested in question 5 and will be used to distribute the resources of the mills and sales offices. Like it has been suggested in interviews in chapter 6.4 the allocation today is based on the wrong information and is therefore not fairly distributed. Furthermore, it has been suggested in chapter 6.6.4 that the different mills have different information and the capacity manager has different information from different mills. Therefore, they are lacking he macro view of all the mills and all the sales offices resources. Therefore, to enable Company XY making decisions that are not sub optimized, when it comes to allocation distribution, the central unit should handle the allocation handling. Moreover, it eases the utilization of the central unit’s knowledge of the situation at all mills and sales offices. Moreover, by looking at Table 4, on page 88, and Table 5, on page 88, it can be seen that the mills share a lot of the product produced as well as the sales offices which further indicates that a macro view is suggested to be beneficial.

It is suggested that the forecast and replenishing of service stocks should be done decentrally by the sales offices and the information sharing and allocation distribution should be done centrally by the central unit which is summarized in Table 22.

Table 22: Summary of if the processes are recommended to be conducted centrally or decentrally and who should do them.

<table>
<thead>
<tr>
<th></th>
<th>Centrally/Decentrally</th>
<th>Which part</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sales forecast</td>
<td>Decentrally</td>
<td>Sales offices</td>
</tr>
<tr>
<td>Replenish the service stocks</td>
<td>Decentrally</td>
<td>Sales offices</td>
</tr>
<tr>
<td>Production forecast</td>
<td>Decentrally</td>
<td>Mills</td>
</tr>
<tr>
<td>Allocation</td>
<td>Centrally</td>
<td>Central unit</td>
</tr>
<tr>
<td>Information sharing</td>
<td>Centrally</td>
<td>Central unit</td>
</tr>
</tbody>
</table>
7 Analysis

The distribution of where the processes are suggested to be executed is further displayed in Figure 35.

![Figure 35: Illustration of where the processes are recommended to be conducted.](image)

7.3 Evaluation

7. How can the changes in the organizational structure and of the replenishment process affect Company XY’s customer service?

7.1. How does Company XY perform today in regard to inventory accuracy?

From calculations made from the KPI reports for the months that have passed for the year of 2015 there is a stock out ratio for the produced tonnages value versus the costs of stock outs at each mill. From Table 20 on page 120 it can be further concluded that Mill 2 has twice the percentage of Mill 1 and Mill 3. Meaning that Mill 2 provide half as good customer service when it comes to stock outs which is the only customer service measurement Company XY has today.

Today the average deviation for forecast accuracy is 4.98% of the sold volumes meaning that almost five percent of the total volume sold were wrongly produced volumes or not produced volumes. This affects the sales offices ability to meet the customers’ demands and therefore their customer service. As can be seen in Table 18 on page 119 some of the sales offices have lower average and some of the sales offices have a higher average. As can be seen and has been previously analyzed is that the sales office work in different ways when it comes to correcting forecasts, some change them and some do not.

7.2. What is the possible improvements of the changes regarding Company XY’s customer service?

Given the suggested changes where Mill 2 starts to work like Mill 1 and Mill 3 when it comes to replenishing the service stock it is suggested that Mill 2 could better their customer service to reach the same level as Mill 1 and Mill 3.
Given the suggested process to change the forecasts without the customers telling the sales offices to like the four sales offices interviewed that is known that they change the forecasts. Taking this into consideration it is suggested that the sales offices could lower their average to become as low as the four sales offices correcting the forecasts. The following could lead to the sales offices having an average deviation of 2.5% instead of 5%, see Table 23. This would lead to decrease of shortages or wrong production with 42 000 tons each year which in turn would increase the sales offices ability to supply the customers hence increasing the customer service.

**Table 23: Illustration of the accuracy of the forecast processes.**

<table>
<thead>
<tr>
<th>Market 1</th>
<th>Forecast provided by SAP</th>
<th>Forecast validated monthly by sales office</th>
<th>Forecast corrected weekly by sales office</th>
<th>The influence of the weekly corrections</th>
</tr>
</thead>
<tbody>
<tr>
<td>7,5%</td>
<td>5,3%</td>
<td>3,2%</td>
<td>57%</td>
<td></td>
</tr>
</tbody>
</table>

| Market 2   | 7,1%                     | 5,7%                                      | 8,4%                                      | 18%                                    |

| Market 3   | 8,3%                     | 3,5%                                      | 2,6%                                      | 69%                                    |

| Market 4   | 7,3%                     | 4,1%                                      | 2,5%                                      | 66%                                    |

| Market 5   | 4,1%                     | 3,6%                                      | 1,5%                                      | 63%                                    |

| Market 6   | -                        | -                                         | -                                         | -                                      |

| Market 7   | 11,9%                    | 8,8%                                      | 11,4%                                    | 4%                                     |

| Market 8   | 4,8%                     | 4,9%                                      | 5,2%                                      | 11%                                    |

| Average for all | 7,3%                     | 5,1%                                      | 5,0%                                      | 11%                                    |

| Average for the best sales offices | 6,8%                     | 4,1%                                      | 2,5%                                      | -                                      |

8. How can the changes in the organizational structure and of the replenishment process affect Company XY’s logistic costs?

Since there is no measurement that gives information on the stock for only Kraftliner at the moment, inventory carrying costs cannot be measured. What can be estimated is only the worth of the paper that is wrongly produced or not produced. When it comes to other costs the only measurement that is measured is the stock out costs which has been calculated by summarizing the total costs for stock outs for the year so far divided by mill. The mills production budget was then compared to the stock out costs which rendered a percentage for the estimated sold goods value versus the costs caused by stock outs.

By adopting the suggested improvement measures it is estimated that stock out costs can be cut by around 27 000 Euros per year furthermore wrongly produced or non-produced stock worth 23 000 000 Euro per year can be avoided, see Table 24. These numbers are estimations of the possible effects, it is not guaranteed that the outcomes of the changes will be the suggested effects. Synergy effects can lead to the effects rendering even lower costs for stock-outs and less products being wrongly produced or the effects can be less than suggested due to aspects that have not been considered.

**Table 24: The cost of stock outs and the savings that can be done by correcting the forecast.**

<table>
<thead>
<tr>
<th>Average deviation today</th>
<th>4,97%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost for todays deviation</td>
<td>54 891 902 €</td>
</tr>
<tr>
<td>Proposed deviation</td>
<td>2,45%</td>
</tr>
<tr>
<td>Cost for proposed deviation</td>
<td>27 005 053 €</td>
</tr>
<tr>
<td>Saves by correcting forecasts</td>
<td>27 886 850 €</td>
</tr>
</tbody>
</table>
8 Conclusions

It has been concluded that Company XY have the characteristics of a company that have products with large commonalities and sales offices that sell a lot of the same products. Which is correspondent to a centralized structure. Furthermore, it has been concluded that the markets and the customers do not have a lot in common since they have different needs and seasonality's. Which corresponds to when a decentral structure is beneficial. Company XY’s strategies to be responsive and standardized are consistent with both a decentralized structure as well as a central structure. This led to the conclusion that the characteristics Company XY possess are consistent with those that benefit of both a centralized as well as a decentralized structure.

Moreover, by analyzing the procedures and the fact that they are done differently depending on mill and sales office shows that the coherence of the company is low. Furthermore, the maturity of the sales offices were concluded to have medium maturity while the mills had low maturity since there is lack of collaboration between mills and information being scattered as well as inconsistent. These effects are consistent with a decentralized structure which Company XY has today. Furthermore, problems like duplication of work, inconsistent work processes and misalignment that are causing inefficiencies at Company XY are common effects that can be traced back to the decentralized structure they have today.

Company XY’s goals to become more transparent and standardized as well as more agile cannot be met by either a pure centralized or decentralized structure. Because of this a hybrid structure is suggested which will mitigate the rigidity of a centralized structure but also mitigate the misalignment and inconsistent processes of a decentralized structure. For Company XY to enable the adoption of a hybrid structure where transparency is achieved a virtual organization is suggested. Furthermore, a virtual organization should be adopted to enable one source of information for all units. This will solve the issues Company XY has today regarding information being inconsistent or lacking hence increase the visibility. The virtual organization will not have a common system, since there is none today, but have a manually controlled center that summarizes the different information from the decentral units therefore creating a virtual inventory and information center for all units. This will lead to all units, both sales offices and mills, having one source for information. The central unit’s responsibility will be to summarize the information into one report or information source before 2020. This hybrid virtual organization is displayed in Figure 36. The single source of information and the central unit’s tasks are displayed in Figure 37. After 2020 the unit will work towards coordination and best practice monitoring.
The adopted structure puts demands on the processes like having the same knowledge for everyone as well as working after best practices and therefore in a standardized way. The best practices for the information sharing pre 2020 is concluded to be reports. These reports should be standardized in regards to content, design and sharing intervals. After 2020 the information is considered to be shared through SAP and the interested parties will be able to extract the reports when needed. The best practice for the forecast process does not depend on the IT-system hence it is the same both before and after 2020. Firstly, it is considered that the sales forecast that the sales offices provide the mills with every other week should be shared through SAP. This will save time for the sales offices since the customers already uses SAP to communicate their forecast. Further on it is considered that the sales forecasts should be validated and corrected with regards to information of the customers’ activities both monthly and weekly by all sales offices. This will generate a more accurate sales forecast which in turn means that the production forecast can be more accurate, hence the inaccurate production should decrease. It is also concluded that the best practice for the
production forecast is to conduct it on gsm level as much as possible. This is considered to further contribute to a more accurate production forecast. Further on it is concluded that the best practice regarding the allocation is to implement it for all mills. With allocations on all mills it is considered to enable an overall better planning for all sales offices and mills but especially for Mill 3 since it should decrease the delays due to long production runs. Lastly it is concluded that the best practice for the replenishment process is firstly that independently of the mill the sales offices should be responsible for the replenishment process. It is further more concluded that all sales office should use the same information and method to calculate the replenishing need.

Moreover, it is concluded that the forecast and forecast corrections should be done decentrally. Should the forecast be done centrally, by the system, the deviation could increase to a percentage of around seven percent.

The information sharing should be done and coordinated by a central unit in a standardized manner. The estimated effect of this will be a uniform way of communicating information between mills and sales offices and having the correct information about the resources of both mills and sales offices. Hence increase the visibility between the different units. Furthermore, the ability to make correct priorities when it comes to moving and increasing orders for sales offices will be eased by the visibility, which in turn will increase the responsiveness.

The replenishing of stocks should be done decentrally by the sales offices. This is because the sales offices have knowledge about their customers and can make right priorities between which customers to prioritize in production. The effects of changing this to be done in a decentralized manner, by the sales offices, will lead to all the mills being more customer oriented and utilize the knowledge of the sales offices, as well as cut costs by about 27 000 euro.

The distribution of allocation should be done centrally to utilize the knowledge the central unit has of all the mills and sales offices' resources. Therefore, the sub optimization that is experienced today when it comes to allocation and distribution of tonnages is suggested to be decreased. The distribution of where the processes are suggested to be executed is displayed in Figure 38.

![Figure 38: An illustration of where the processes are recommended to be conducted](image)
To summarize the conclusions the suggested structure, including responsibility distribution and tasks, are displayed in Figure 39 below.

Figure 39: A summarizing illustration of the suggested structure, including responsibility distribution and tasks.
9 Discussion

9.1 Fulfillment of purpose

The purpose of the study is presented below:

*The purpose of this study is to suggest how Company XY should change their organizational structure and replenishment processes to reduce the sub optimizing of the service stocks to enable better customer service while not increasing the costs.*

The organizational structure that has been suggested has had a starting point in relevant literature areas, such as purchasing organizations, supply chain collaboration and inventory control. The structure has further been suggested by qualitatively analyzing and taking Company XY's goals and characteristics into consideration but with the end goal of enabling better customer service and decrease costs. Furthermore a qualitative analysis of the replenishment processes have rendered in suggestions for how the processes, involved when replenishing the service stocks, should be executed. These suggestions have had a starting point in theory while taking the goals and requests of Company XY into consideration with the end goal of enabling better service and decrease in costs. Furthermore potential decreases in costs and increases in service due to the suggested organizational structure and replenishment processes have quantitatively been presented, hence it can be considered that the purpose of this study has been fulfilled.

The suggested organization is deemed applicable since when conducting the study the company's goals and wishes have been taken into consideration. Furthermore the changes for the replenishment processes are changes to processes that already exist at Company XY. Therefore the authors of this study deem the suggested changes to be applicable and possible for the company to execute. The suggested effects are as before described potential benefits, there is no guarantee that the effects will not become less or greater than suggested.

The directives given by Company XY, revolving SAP, has rendered in the study not considering solutions regarding information system technology. This has limited the study since a different information system could possibly contribute to improvements that were not able to investigate in this study. Furthermore directives to only investigate Kraftliner has further led to the suggestions being limited. Since the sales offices also are in charge of the replenishing of the customers stock of recycled paper, studying the organization and processes for replenishing of recycled paper could have contributed to other solutions being found.

9.2 Generalizability

Since this study has been conducted on a specific organization the result in form of recommendations is not considered to be applicable to other organizations. However, the theory that is presented and used in the study are not specific to the field considered in this study. The framework of questions is furthermore considered to be applicable to all types of purchasing and ordering organizations. Hence it is considered that the whole study could be applied to another organization with the result of recommendations regarding how that organization should change their structure and processes to enable better customer service.
9.3 Effects on the surrounding processes

As described in the chapter 4.1 there are several processes in the Kraftliner organization that may be affected by the changes that are recommended in this study. How these processes may be affected is discussed below.

One of the processes that are expected to be affected by the result of the study is the process of placing direct orders. Since the sales offices provide the mills with forecasts for all consumption, i.e. both direct orders and replenishment orders, the recommendations regarding the forecast process will affect the direct order process. The recommendation to standardize that the forecasts should be validated and corrected monthly and weekly by all sales offices and that it should be provided through SAP to all mills will simplify the work for the sales offices. Further on if the monthly and weekly validations and corrections is done to the forecasts regarding the direct orders the allocation will be affected and become more accurate.

In chapter 4.1 it is described that both the service and VMI stocks are expected to be affected by the changes that will be recommended. The recommendations are expected to affect the stock levels on an article level but not totally, after analyzing the organization and replenishment process the foreseen affects are considered to be accurate.

Further on it is also expected that the transports mill to service stock and service stock to VMI stock would not be affected any more than that the composition of what is loaded would change but the total amount of transports were not thought to be affected. After the analysis this is considered to hold. However, with the changes to the forecasting processes together with the recommendation to apply allocations for all mills the transportation need between different service stocks and different customers are predicated to decrease.

9.4 Theoretical and practical contributions

This study contributes in a theoretical aspect by linking together the different areas of supply chain management, collaboration methods and organizational structures. From the writers’ literature study research it was found that this area has not before been extensively researched. Therefore, it can be suggested that the theoretical framework of this study can contribute as a base and inspiration for further research in the area of organizational structures to enable collaboration within supply chain management.

The practical contributions of this study is a basis that can be used for decision making. The study puts forward a potential organizational structure citing its benefits and reasons to why Company XY should adopt this structure. Therefore this study can be used when deciding upon which organizational structure to adopt at Company XY. It can further be used when evaluating the processes connected to the replenishing process since it brings up both issues with the way they are working today and possible solutions for improving the way Company XY is working. Hence Company XY can use this study when deciding upon which changes to be made in the organization as well as their processes.
9.5 Future studies

A study regarding delivery service is recommended considering the only way Company XY is measuring customer service today is through stock outs. Having another measurement is believed to be beneficial since it could ease the evaluation of the performance of sales offices, mills and transporters which could be used to trace the root causes which can subsequently be used for improvement. Furthermore, all the sales offices and also the capacity manager that have been interviewed has expressed a need for measuring the performance of being able to meet confirmed delivery dates. The study could furthermore investigate how this measurement should be used to develop better customer service and profitability.

Another suggested study is to investigate the demands that should be put on the SAP implementation. Several sales offices and the capacity manager has expressed problems with the SAP system that is set up for the recycled part of the Paper division. This study can be used as a base for the future study since a lot of the wished information to be available has been expressed in interviews. Furthermore, the central unit that is recommended in this study will gain knowledge about what information that should be available for the sales offices and mills and could therefore be used in the future study. The future study should render a specification of what should be possible to do in the system as well as what should be available to see.
References


Appendix 1: Performance measurements

NAV1

CSDLN

Case

1 2 3 4 5

110000 115000 120000 125000 130000 135000 140000 145000 150000

Case

1 2 3 4 5

93 94 95 96 97 98 99 100

CSLN in gr
Appendix 2: Interview questions

Basic questions

Introduction questions
1. What are your responsibilities?

Overall Krafliner/Their own department
2. What is your business plan? (4.1)
3. What are your goals? (4.1)
4. Do you have a specially pronounced strategy to reach does goals? (1.2)
   a. What strategy does Smurfit Kappa work after?
      i. Responsive, speed, effectiveness etc.

MTS
5. What processes are outside you jurisdiction? (1.2)
   a. Where are decisions made?
      i. centrally, decentral?
6. In regard to the MTS process what are your responsibilities? (1.4)
   a. How is these processes/task performed?
   b. What info is needed?
   c. Where does the info come from?
   d. Who do you provide information to?

7. Does any customer have special needs/requirements? (1.3)
   Labeling, stock levels etc.
8. Do you collaborate with the Sale offices? (1.5/4.1)
   a. In what aspects?
   b. How is the collaboration formed?
   c. Are there any guidelines given from the organization for these collaborations?

Replenishment
9. How is the replenishment process performed? (4.4)
   a. What technique is used to decide how much to replenish each sales office’s service stock?
   b. Information needed?
10. Different depending on sales office? (4.4)

Exceptions
11. When the production is not producing as planned, what information do you provide to the sales offices?
    a. How far/bad does the situation need to be until you contact the sales offices?
    b. How do you prioritize between sales offices when needed?
    c. Do you communicate with the sales offices regarding their stock levels at other mills in these situations?
12. When the demand is higher than what the mill can provide how is decisions made regarding what to produce and to who?

Customer service
13. How do you measure customer service?
14. Do you have any goals?
    a. e.g. keep service stock down
    i. difference depending on VMI stock or mill stock?
15. Is this evaluated?
    a. How?
    b. Frequency?

Final questions
16. How are your performance measured?
17. Do you experience any problems with the sales offices?
    a. Depending on sales office?
18. Do you experience any overall problems that, according to you, occurs because of the organizational structure?
19. Do you experience any overall problems that, according to you, occurs because of the MTS processes?
Special questions

Asked to the responsible for allocation

Allocation
1. What aspects is taken into account when deciding the allocation for different sales offices?
2. Do you have to prioritize?
   a. how is this done?
   b. Different from time to time?
      i. always the same sales office?

Asked to the responsible for inventory model

Model - Inventory control
1. What aspects are considered when deciding the service stock levels for each Sales office?
2. Why is the model designed the way it is?

Asked to the responsible for forecasting

1. How is the correction of the forecast process performed?
   a. Centrally decided?
   b. What information is used and why?
   c. Which technique is used and why?
2. How do you share information regarding forecasts to
   d. Mills?
   e. other Sales offices?
3. Which information is shared and used and why?
4. To what extend do you use information from other sales offices and mills when correction forecasts?