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SCHOOL OF BUSINESS, ECONOMICS AND LAW

Degree Project in Logistics and Transport Management

Coping with deviations in delivery times

A case study of a Swedish wholesaler managing the late and early deliveries from suppliers

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Abstract

Companies are dealing with excessive amounts of data nowadays which is due to the recent developments in the field of IT. Many systems and tools exists to manage the data and transform it to valuable information, if the data is not correct these systems will not be of any help. As a result of this Solar Sverige AB has experienced deviations in their delivery times from the suppliers which is costly, time-consuming and may hurt the firm in the long term. In order to understand what the problem is and to cope with deviating delivery times, performance measurement is suggested as a good approach. The purpose of this study is to investigate how coping with deviating delivery times can be handled at a Swedish Electronics and HWS wholesaler. The research approach for this study is qualitative and the empirical data composes primarily of interviews and observations. The challenges with understanding and managing the deviations in the delivery times will be examined by looking at the purchasing process. The findings provide several solutions for how deviating delivery times can be managed, namely by involvement and evaluation in the form of measuring the performance. Additionally, it is important to involve several functions in this process and not isolate it to one department.

Keywords: *purchasing, performance measurement, wholesaling, inventory management, delivery service*

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1 Introduction

This section introduces the topic and relevant background information to the reader concerning wholesaling, inventory management and delivery times. The background of the problem is discussed and then followed by the purpose and presentation of the research questions. This sections ends with a presentation of limitations, delimitation and the research outline

High competitive industries force firms to look for new ways to stay competitive and purchasing is one activity within a firm that could be improved to stay competitive in a high competitive industry. Firms can do so by improving the purchasing process for better costs, quality, lead-time and the overall performance. (Trent & Monczka, 1998)

Bhattacaryya & Guiffrida (2014) suggest that manufacturing firms spend roughly 50% of their revenues on purchases, with that said one can assume that the number for wholesalers is expected to be higher. Wholesalers are very dependent on their supplier's promises as they often compete on time where the delivery times should be accurate in order for the goods to arrive on the expected date in order for the wholesaler to deliver its promises to the customers. (Bhattacharyya & Guffrida, 2014)

For a wholesaler, acting as an intermediate between suppliers and customers, the impact of inaccurate delivery times is critical for the business, as they have to deliver what they promise and in order to do so the suppliers need to do the same. Holding inventories is a good way to ensure that firms have what the customer demand but at the same time it comes at a cost and should be avoided if possible, one thing that have come to many firms attention lately (Waller & Esper, 2014). According to Waller & Esper (2014), inventory management is about reducing the inventory and operational costs while at the same time meeting the customer demand. Therefore, firms now focus on the trade-off between good service levels and low inventory costs. If goods arrive too late it could lead to an unsatisfied customer who may decide to purchase from a competitor, which is a loss for the firm (Cerna & Bukova, 2016). Besides that, late goods trigger extra logistic costs in terms of warehousing, stock-outs and handling which unnecessary ties up capital. However, even though firms aim to shorten the lead times, too early arrivals are not good either. A firm need to plan its resources and is planning accordingly and if something arrives too early, it could create problem when it is going to be handled as it could be a shortage of employees when processing the goods on that day. Another

consequence is also the cost of inventory, as the firm will end up with extra inventory cost due to that. (Bhattacharyya & Guiffrida, 2014)

Good financial performance and at the same time maintain good service levels towards customer is what determines if a firm is successful or not (Mattsson, 2002). Therefore, a firm really needs to make sure that the suppliers perform since their performance affect a firms' performance. In order to manage the suppliers and their performance a firm need a well-functioning and reliable measurement method with action when a supplier for instance fails to live up to the agreement (Aronsson, Andersson & Storhagen, 1989). Bhattacharya & Guiffrida (2014) suggest that the improved delivery precision from the supplier in order to meet customer demand which could be considered as a measurement.

1.1 Background

Delivery service is a term that includes aspects of delivery including delivery times, delivery precision and information flow among other (Bjørnland, Persson & Virum, 2003). Delivery precision, which is referred to as the ability of deliver with precision within a given period, for instance is suggested to be one of the most important parameters for firms (Bjørnland et al., 2003; Maskell, 1991). The lead-time or delivery times has been gained a lot of attention within its field of research and many definitions of it is a result of the attention. The delivery time or lead-time can be seen as the time from when a demand is created until it is met which Ohlager (2000) argues for. Bjørnland et al., (2003) on the other hand suggest a more specific definition where the delivery time is seen as the time between an order is released until it is delivered.

The lead times and delivery times has gained huge interest and focus over the recent years, both by researchers and in literature with great improvements as a result especially when it comes to the benefits of reducing it. However, contrary to that, the importance of having accurate delivery times has not received the same attention even though it is argued to be as important as short lead times (Mattsson, 2003). For a wholesaler who simply put, is selling products to customers that often are anyone other than the end-customers this issue can be vital as the inventory management and buying

process plays vital role for them to preserve financial sustainability (Britannica, 2017; Wild, 2007; Weele, 2014).

Mattson (2003) argues that the nature of a firm determines what kind of focus there should be on delivery times where firms that rely on promised delivery times, often determined by an ERP-system, should focus on accurate delivery times rather than short delivery times. To be able to meet customer demand and at the same time provide desirable financial results is the ultimate goal for most firms and one way of meeting a customer's demand is the ability to deliver the products within an acceptable timeframe (Wild, 2007). This could be a great challenge for specifically a wholesaler as they often tend to have large and varied assortments to meet customer demand that makes the inventory a big investment for them (Lopata, 1969; Wild, 2007). Since the purchasing department often is the function that manages and controls the inventory, it has been suggested that the purchasing department can be used as a mean for becoming more competitive as a firm especially when it comes to improve the delivery precision (Trent & Monczka, 1998; Bjørnland et al., 2003).

For wholesales which act as intermediaries between manufacturers and for instance retailers and distributors, they have a two dimensions of delivery times to take care of both as the buying party that is dependent on on-time deliveries as well as the selling party where customers are dependent (Dawson, 2007). If goods arrives too early or too late from a supplier it can result in for instance loss of customers, tied-up capital and increased handling costs which also is related to the three business targets brought forward by Wild (2007) which are customer service, inventory costs and operating cost (Cerna & Bukova, 2016).

With that said, the importance of accurate delivery times deservers more attention just as Mattsson (2003) ask for since that is more beneficial for some types of companies. Even though short delivery times have been greatly elaborated on, with beneficial results for many firms, there are also issues with it indicating that it less relevant for some firms as it can inure various costs and risks for a firm (Mattsson, 2003; Cerna & Bukova, 2016).

1.2 Purpose and research questions

The purpose of this study is to investigate deviations in delivery times from suppliers and how these can be measured in order to evaluate the suppliers and their performance. This study will primarily focus on this issue by looking at Swedish wholesaler within Electronics and HWS (heating, water and sanitation) which manages many products and have a large number of suppliers, which delivers products to one of their three central warehouses. The wholesalers have certain specific characteristics that makes it interesting to investigate. This study aims to investigate the causes of deviations in delivery times, how a wholesaler is dealing with it today and how the deviations can be managed better by evaluating the performance of suppliers. Therefore, the following research questions has been designed in order to fulfil the purpose of this study;

1. Why do the delivery times deviate from the expected delivery time?
2. How does a wholesaler manage and following-up on the deviations of delivery times today?
3. How can performance measurements be used by a wholesaler in order to control and evaluate suppliers in order to increase their performance?

The research questions will be answered with the help of a case study mainly that will be conducted at the purchasing department at Solar Sverige AB.

1.3 Limitations

Several limitations had to be taking into consideration for this thesis. Besides the time and resource limits the author is limited by his capabilities and knowledge in certain fields. For instance, suggestions of tools can be made but developing tools of evaluation etc. is not possible. The decision of using a qualitative study eliminated the opportunities to quantify the costs that arise because of deviations in delivery times. The study will only focus on one specific case which are experiencing these problems which is enough and additionally it will only focus on the departments and functions within the company that are somehow involved in the work with delivery times. Finally, this study will provide recommendations for coping with deviations in delivery times but will not be able to implement these improvements.

1.4 Delimitations

In order to get a comprehensive in-depth understanding of this issue and how it is related to firms the authors chose to exclusively focus on one single firm instead of multiple firms. Additionally, it was also decided that a wholesaler would be of interest given the nature of it where the purchasing, inventory and deliveries are important aspects of their business. The given size of the firm is also an important aspect as it has clear organisational structure and roles that can be evaluated and used to easily apply theories in order to draw conclusions in relation to the topic.

1.5 Research outline

This study is divided into six different sections including introduction, theoretical background, method and implementation, empirical findings, analysis and discussion, and finally conclusion.

Introduction

The first section of this study introduces the problem to the reader. First a brief introduction is brought forward introducing concept of wholesaling and inventory management and followed up the problem and the purpose of the study together with research questions. This section ends with limitations and delimitations.

Theoretical background

This section includes the theoretical framework and other important theories for this study. It beings with introducing wholesaling, inventory management and the purchasing process to give some brief background information. Later on, data quality, performance measurement, delivery service and cross-functional communication is being introduced.

Method and implementation

In this section, the research practices that have been applied throughout the study will be presented. First, the research approach will be introduced followed by the research design which mainly is based on a case study. Data collection, validity, and reliability, will conclude this part. In the research design, the case company will be introduced with basic info and the rationale for selecting it.

Empirical findings

Since the company is already introduced in the method and implementation part, this chapter will present the empirical findings that have been collected at the case company. Primarily from the eight interviews, that was conducted involving several departments and roles at Solar with a focus on the purchasing department. When these departments are presented, they will be followed by a presentation of the main information systems and tools that are being used. After that, the focus will be on the purchasing process.

Analysis

This section will analyse the empirical findings by discussion them in relation to the theoretical background. This section will be structured based on four themes, the role of tactical purchasing, impact of bad data quality, measuring the performance and cross-functional communication.

Conclusion

This is the final section that will conclude the thesis by answering the research questions. These answers are related to the analysis and empirical findings and will provide possible suggestions. This section will be end with a suggestion for future research.

2 Theoretical background

This section introduces the theoretical background that establishes the basis for this study and which will not only provide knowledge to the reader but also be used in the analysis of the empirical findings. This section introduces the concept of wholesaling and then continues with the relation to inventory management and the purchasing process. Later it continues to present data quality, performance measurement, delivery service and cross-functional communication.

2.1 Introduction to the theoretical background

The aim of the theoretical background is to provide with decent background information regarding the topic and issues related to inventory management, wholesaling, purchasing, delivery times and performance measurement. The author begins by widely introduce the concept of wholesale and moves into inventory management which is followed by the purchasing process. This is to provide a wide and general introduction to the main parts of the topic. Further, on the information systems, data quality, performance measurement, delivery service provides and cross-functional communication is introduced which are specifically related to the topic for this thesis. Bad data quality, importance of cross-functional communication and performance measurement are all argued to be vital to the process of coping with deviating delivery times.

2.2 Wholesale

Wholesaling emerged during the 19th century as a result of the introduction of mass production and mass marketing where the role of wholesalers was to market large manufacturers' product to many retailers at higher unit costs. Britannica (2017) uses a simple definition of wholesaling as the selling of any type of products to anyone but the end-consumer that often implies retailers and other distributors.

Dawson (2007) defines the wholesaler as an intermediary between manufacturers and for instance retailers, suggesting them to deal solely with business customers and not end-consumers. The functions that a wholesaler can have has changed over time as they went from having functions like breaking bulk and provide retailers with lower volumes, supply and demand smoothing and clarifying details to become coordinators of the total supply chain (Dawson, 2007). Syntetos, Babai, Davies & Stephenson (2010) argues that wholesalers also add value to the products as they bring them closer to the end-consumers and making them more available. Rosenbloom & Andras (2008) point out that wholesalers connect distant buyers and sellers and refers to them as global

marketers which have been a big enabler for the global trade. A wholesaler can be niched by having a focus on one segment of products or be a traditional full-function merchant creating channel flows between buyers and sellers. These flows include product, ownership, promotion, negotiation, financing, risking, ordering and payment (Rosenbloom & Andras, 2008). The view of the wholesaler as a marketer is widely recognized in the literature, Rosenbloom & Warshaw (1989) mentions that their task is to conduct the marketing functions in order to provide flow an of products throughout the supply.

In order to do so, wholesalers have to effectively manage their inventory levels to provide high service levels meaning having the product available. However, this is a trade-off between costs of inventory, which is the biggest investment for wholesalers, therefore they need to have effective inventory control to be financial stable and meet customer demand. (Syntetos et al, 2010; Lopata, 1969)

Weele (2014) argues that there are two major important function for wholesaler, the buying process and inbound logistics. Since nothing is produced at the wholesaler, the time between purchase and actual sale is very short which in some cases has led to emerge of buying and sell department (Weele, 2014).

2.2 Inventory Management in a Wholesaling Context

The importance of inventory management applies to not only wholesaler, but nearly every company. A firm's success relies on its ability to meet the customers demand and at the same time provide stable financial figures. The main task for a firm, which supplies products to customers is to have the right product available, good price, and within a decent timeframe. (Wild, 2007)

Waller & Esper (2014) describes inventory management as reducing the inventory and its operational cost while still being able to meet the customer demand. Inventory management and control of the inventory is a big issue for wholesalers, not only because inventory is a big investment for them but also because they tend to have a big and varied assortment (Lopata, 1969). Inventory management contributes to the wellbeing of the whole firm but that does not mean that they purchase what the firm

afford. Within inventory management, stock control is important and the duty is to meet the demand at the lowest cost possible. The aim of controlling the inventory is to support and optimize business activities with three targets: *customer service, inventory costs* and *operating costs*, which requires the controller to make valuable judgements. However, the goal is to optimize them all the same time without trade-offs between the targets. (Wild, 2007)

2.3 The Purchasing Process

Trent & Monczka (1998) suggest that the purchasing process can be improved in order to achieve better costs, quality, lead-time, and overall performance. Since purchasing is said to be one out of two major functions for wholesalers this makes purchasing even more important in this case (Weele, 2014).

The purchasing process composes of six steps as the illustrated in the figure below. The first three steps are the tactical purchasing and the last three steps are referred to as the operational purchasing. Tactical purchasing refers to the process of identifying supplier and setting up a contract while the operational purchasing composes of the ordering, expediting, follow-up, and evaluation. Weele (2014) adds that these steps cannot be combine into one role therefore new purchasing specialist roles have emerged to manage these processes. (Weele, 2014)

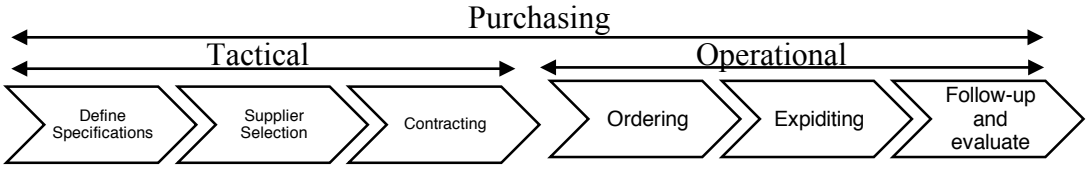

Figure 1 Purchasing Process (Weele, 2014)

The tactical purchasing also referred to as sourcing often about making the product available by selecting specification, finding suppliers and contracting just as Weele (2014) indicates. Traditional sourcing is also known as being a lot about negotiating the same contract and terms on an annually basis which makes it more of a routine job and it is not unusual that one person is involved in the whole process (Weele, 2014; Krajlic, 1983). However, as times has changed purchasing as it was seen before is changing

and not only by specialist role but it is also becoming a strategic issue as instead of only monitor development and wait for disruptions it requires management to take control and make things happen for its own advantage (Krajlic, 1983). This specially holds true when dealing with suppliers with uncertainty and risks where international suppliers are a great example of that (Krajlic, 1983). Cachon & Zhang (2006) mentions that when it comes to contracting except from price a buyer should also put emphasis on the delivery time. Often short deliveries are required and it is costly therefore in order to make ensure that the delivery times follows a buyer can introduce late fees that can be charged when deliveries are late (Cachon & Zhang, 2006).

The purchasing process varies from one firm to another but also within a firm. There are three different situations, which involves different steps of the purchasing process. One situation is when a new product is about to be introduced by a new supplier, the second situation referred to as the modified rebuy is similar to the first one only difference is that the supplier is known. The last situation is the most common that is the straight rebuy and involves a known product from a known supplier which is also where the ordering take place. (Weele, 2014)

However, Jonsson & Mattsson (2011) argues that another factor that may differentiate the purchasing process is the nature of the product, since it can vary if it is a product that is held in stock or made-to-order. Jonsson & Mattson (2011) argues that there is a general view of the purchasing process that is shared among many firms. This 8-step-process composes of the *material requirement, procurement, purchase request, purchase order, delivery control, delivery reception and follow-up and evaluate.* This process will be used to look in to the general view of the operational purchasing which excludes the second as it is not involved in the straight rebuy process (Weele, 2014). Weele (2014) argues that this enables efficiency in terms of speeds for the transaction for both parties.

Step 1 Material requirement: When a future demand is identified, either by planned orders or by an order requisition based on forecasting. This initiates the purchasing process. (Jonsson & Mattson, 2011)

Step 2 Purchase request: Depending on the system, a purchase request comes when the system feels that the levels are getting low. It can be triggered based on re-order points as a result on either forecasting or an order from sales. These signal that the purchasing department receives is the basis for the purchase order. (Jonsson & Mattson, 2011; Weele, 2014)

Step 3 Purchase Order: The purchase order includes price, units, quantity, material number, order number, requested deliver day and the delivery destination. The purchase order when it is sent to the supplier triggers the delivery process and it works as legal document between the two parties. (Weele, 2014) It is very likely that an agreement regarding price and delivery is agreed upon already and thus only a call-off order is placed by the purchasing department making this process quick. Call-off orders are used as a simplified purchase procedure when the agreement is done by the tactical purchasing side, which is known as the procurement, especially with continuous purchasing. The people involved in this step is often the materials planners. (Jonsson & Mattsson, 2011; Weele, 2014) The supplier usually forwards a form of delivery confirmation, which not always aligns with the request in terms of quantity and delivery date and has to be dealt with (Jonsson & Mattson, 2011).

Step 4 Delivery control: In this step, delivery control is carried out in order to make sure supplier deliver as it has been agreed. For instance, correct price and that the goods arrive within the agreed timeframe. (Weele, 2014) If the suppliers fail to deliver on within agreed timeframe, the firm needs to stay in close contact with the supplier in order to minimize the risks that may occur due to the delay (Jonsson & Mattsson, 2011). The buyer is responsible for notifying the supplier that the time for deliver is approaching. However, it also happens that a supplier notifies the buyer that the delivery is on its way, which allows the goods receipt to prepare for the incoming goods in time. In some cases, there are pre-arranged delivery days where buyer place order on a certain day and can expect it to be delivered on a specific day (Jonsson & Mattsson, 2011).

Step 5 Delivery reception: This is the step where the goods arrives at the buyer's facilities and is being handled. The employees at the delivery reception screens the

received goods in order to detect any deviation from what was agreed in terms of quantity, quality and damage. Sometimes suppliers screen the goods but damages for instance can still occur during the transport that makes it important to check. (Jonsson & Mattsson, 2011)

Step 6 Follow-up and Evaluate: This step is a real evidence of the statement made by Weele (2014) stating that these steps cannot be combined into one role. Just like procurement, for many firms these two steps are not included in the daily operational buying process but is still critical. Weele (2014) argues that following-up and evaluating suppliers is of great importance as it allows the firm to know which suppliers are good enough. When enabling this kind of purchasing the sourcing firm supposedly sign an agreement with the supplier that both agreed on and the delivery times are an important aspect that should be included which can help to facilitate the evaluation (Jonsson & Mattson, 2011).

Weele (2014) discuss different organisational structures within multi-unit firms and two of them are the centralized and decentralized structures as showed below. The characteristic of the centralized purchasing structure is that the purchasing department operates on a corporate level as a central purchasing unit, which is good when the different units (whether regional or product) purchase the same products. The central purchasing structure is good as it can induce better conditions in terms of price, cost, service and quality as well as standardized products and suppliers. While purchasing in the decentralized purchasing structure is under each business unit, which can sometimes be ineffective when different business units are negotiating with the same suppliers. The decentralized structure could however be beneficial for firms with different products in their business units. A disadvantage with the centralized purchasing structure is the alignment between business-unit owners and the corporate management. (Weele, 2014)

2.4 Information Systems and Data Quality

An information system is according to O'Brien & Marakas (2007) the organized combination of people, hardware, software, communication network, data resources and policies and procedures, which intends to store, retrieve, transform, and disseminate information throughout an organization. The main goal with information systems is to

support the integrations between inter-organizational processes (Hammer, 2001). A firm can use many types of systems to coordinate their activities and Enterprise Resource Planning (ERP) is a type of system that is very common which integrates all processes within a firm (Monk & Wagner, 2006). Klaus, Rosemann & Gable (2000) defines ERP-system as comprehensive packed software solution with the aim to integrate the different business processes and function to provide a holistic view of the business from one source. Different departments within a firm have different processes and data even though they are highly dependent of each other. ERP allows the departments to share everything and communicate effectively between each other that makes it easier to operate for the company as a whole. (Monk et al., 2006)

An ERP system is composed of different models that supports several processes including material planning, purchasing, inventory control, customer service, finance and auditing (Monk & Wagner, 2006). Monk & Wagner (2006) mentions that one activity in one process activates an activity at another process for instance a customer order can generate a purchase requisition. ERP systems are targeted to companies that composes of several units and preferably purchase, produce, sell or administer (Klaus et al., 2000).

Systems like ERP-systems have been around for a long time and ERP-systems emerged originally from the MRP (Material Requirement Planning) which calculated what material was needed for production and later it became MRPII involving other processes which later resulted in ERP (Klaus et al., 2000). In order to make ERP-system more beneficial and flexible O'Brien & Marakas (2007) suggest that firms should connect other systems to the ERP-system, for instance decision supporting systems among many others.

These added systems will also help firms to manage the risk of excess information, which together with information quality is two obstacles for many firms operating with information systems (Eppler, 2015; O'Brien & Marakas, 2007). According to Marsh (2005) one issue of data quality is that organisations tends to overestimate the quality of their own data and at the same time underestimate the cost of the errors. The recent development of IT over the recent decades has allowed organisations to gather big

amounts of data, which are being stored. These big volumes have become a complex issue for firms as more and larger information resources are being used today, which increases the risk of poor data quality. (Watts & Shankaranarayanan, 2009; Haug, Zachariassen & van Liempd, 2010)

One cannot discuss and information systems and IT without mention electronic data interchange (EDI) which is a system that allows two parties to communicate and store data between themselves in a standardized form (Lysons & Farrington, 2012). EDI is mostly found within bigger organization that exchange large data volumes on a daily basis. The reason for that is that it is complex, costly and requires good IT infrastructure that everyone do not have. (Jonsson & Mattsson, 2011). This can sometimes be an issue for large companies when dealing with smaller suppliers for instance when it comes to the exchange of order confirmations and delivery notes will become less effective (Lysons & Farrington, 2012). As a solution for this is the web-EDI which is a system more basic than EDI system that is fully compatible with a normal EDI and communicates through the web browser. It does not require much from the user, the order is released and the supplier receives a notification by email and log into the web platform and confirm the order. (Webedi, 2017)

For the purchasing work to be as efficient as possible, the information regarding planning needs to be reliable and adequate. Weele (2014) mentions that working with for instance Materials Resource Planning systems which is common in purchasing departments, having the correct information is crucial. Some of the problems that may arise due to incorrect stock levels and wrong delivery information for instance lead-time could result in extra work. Weele (2014)

Haug et al., (2011) discuss the impact of poor data quality and stresses the important of having good data quality in order to avoid increased operational costs due to detecting and correcting errors that are both time and resource-consuming. O'Brien & Markas (2007) suggest exception reporting which is that the system alerts when something unexpected happen which is easier than dealing with all the excessive information. Mattsson (2002) suggest three perspectives from where the quality of information could be revised which is correctness, time-current and complete. Correct information

requires the information to be reliable and count for what it is supposed to. Furthermore, it is also argued that correctness means that the information should have high validity, accurate and trustworthy. For information to be time-current, it should be presented in time in order to not lose the value. With other words changes or order confirmations should will lose their value if not provided in time, this decrease the quality of information and increase the difficulties in make clear judgements. With complete information, Mattsson (2002) refers to lack of information between two parts. For instance, the potential information gap between buyer and supplier could concern sales or production delays, which is of importance for buyer in order to make good judgements. (Mattsson, 2002)

In order to understand the concept of data quality, one widely accepted definition is brought forward by Ballou & Pazer (1985) who divide the concept into four dimensions: accuracy, timeliness, completeness and consistency. Accuracy of data measures the difference between the correct value and the actual value. Timeliness of data can also be evaluated as similar to the approach as accuracy. Completeness of data is however more problematic when it comes to determining a certain level of completeness in percentage. However, if focus is on whether data is complete or not, less problematic. Consistency of data is hard to measure, as it requires multiple representation schemes in order to compare the data. Given the last dimension as complex, the two fist dimensions are easier to analyse and compare. (Ballou & Pazer, 1985)

Haug et al., (2011) develops a matrix showing costs caused by poor data quality. It is divided into hidden costs and direct costs where hidden costs are costs that the management of a firm is not aware of. Direct costs on the other hand are the costs that are present and visible immediately and example of that could be incorrect delivery addresses registered, which will result in wrong delivery. (Haug et al., 2011)

The effects of these two respectively is also viewed in terms of effect on either operational or strategic level. Effect of poor quality data on operational tasks could involve data on the operational level that are used on a daily basis for instance delivery addresses or prices of products. The data on the strategic level could involve the cost-

benefit analysis affecting to product profitability, which product is profitable and not. However, Haug et al., (2011) explains that whether data is strategic or operational differentiates between one firms to another. (Haug et al., 2011)

Figure 2 Four Types of Costs Incurred By Poor Quality Data (Haug et al., 2011)

IT systems and especially ERP-systems is one reason that firms nowadays handle large volumes of data and to make the most out of it and leverage the data Elbashir, Collier & Davern (2008) suggest the use of Business Intelligence (BI) Systems. BI systems enables firms to analyse the business information and data in order to support and assist in the decision making process throughout the firm (Elbashir et al., 2008). An argument that aligns well with O'Brien & Marakas (2007) suggestion of involving other systems to leverage information systems.

2.5 Performance Measurement

In order to manage the suppliers and their performance a firm must have a well-functioning and reliable measurement method with incentives to follow it (Andersson, Aronsson & Storhagen, 1989).

Measuring the performance is crucial for a firms' competitiveness and if a firm fail to measure they will not be able manage (Sink & Tuttle, 1989). Measuring performance in a firm will allow managers to evaluate and further develop the tasks and processes

in order to become more competitive (Pettersson & Segerstedt, 2011). Neely, Gregory & Platts (1995) argues that the actual performance of a business is the result of the efficiency and effectiveness of the actions it undertakes. Performance measurement is defined as the process of quantifying the efficiency and effectiveness of an action. Furthermore, a performance measure is defined as a metric and performance measurement systems are seen as the set of metrics that are used to quantify the efficiency and effectiveness actions (Neely et al., 1995; Neely, 1994). Effectiveness describe as to which extent the customer requirements are met while efficiency is how well the resources are utilized when a certain level of customer requirement is met. (Neely et al., 1995)

Leong et al., (1990) argues that the key dimensions of a manufacturers performance composes of quality, time, flexibility and cost. However, what these terms actually are referring to differs widely from one author to another but what is of interest for this study is that the delivery lead-time falls under the term time (Neely et al., 1995). Time has often been used as a tool for competition, mainly by increasing speed by reducing the lead times that is a part of supply chain excellence. (Pettersson & Segerstedt, 2011; Stalk, 1988).

de Waal & Counet (2009) argues that it is of great importance that the top management is onboard, support with the implementation, and informs about the benefits with measuring performance in order for it to work. The members of the supply chain need to understand performance measurement as the lack of awareness' is a big obstacle for introducing performance measurements (Charan, Shankar & Baisya, 2009; Keebler, 1999).

The aim with performance measurements is for a firm to reach supply chain excellence and to do so a firm need to measure both internal and external performance which Christopher (1998) define as cost leadership and service leadership. Having both these will allow the firm to evaluate its excellence of the supply chain (Pettersson & Segerstedt, 2011).

Forslund & Jonsson (2010) argues that if on-time deliveries are considered as critical there should be a big focus on measuring and improving them and that is where the performance management comes in. The performance management of on-time delivery can compose of four activities; defining metrics, target setting, measurement and analysis where the on-time delivery is the metric. Cooper, Lambert & Pagh (1997) do not consider performance measurement as an important process to integrate with customer and suppliers. Nevertheless, other authors identified a lack of understanding when it comes to the benefits of actually integrate the performance management on on-time deliveries together with suppliers (Forslund & Jonsson, 2007).

Defining the metrics has to be done together with supplier as the view of what on-time delivery is needs to be aligned between buyer and seller. Some metrics could be number of orders or time frames of on time deliveries (Forslund & Jonsson, 2010). Defining clear targets is of great importance, having clear targets even though it may be difficult will have a positive impact on the overall effectiveness of the performance managements (Basu, 2001; Soltani, Meer, Gennard, Williams, 2004; Forslund & Jonsson, 2010).

A good measurement is a basis for the analysis in the next step. The measurement reports can include either daily, weekly or monthly frequencies of performance data collected (Forslund & Jonsson, 2010). ERP systems can minimize the manual work of the data collection and the communication of the data could be provided either with web portal solutions or by contact in form of phone, mail or meetings in order to inform the supplier (Forslund & Jonsson, 2010). Contracts for regulating measurements for instance deciding which part is reasonability for finding the data is also an issue for measurement (Forslund & Jonsson, 2007). The analysis should be used to monitor and follow up past performance in order to form reactive decision as well as it could be used for input in improvement projects of different kinds (Forslund & Jonsson, 2010). Mentzer & Konrad (1991) highlights the importance of using analysis of logistics performance in order to critically review deviations from targets that have been set up. Forslund & Jonsson (2010) propose that these activities are more integrated as well as better managed in firms that have high-perceived deliver performance compared to the opposing firms.

Khairur, Talib & Tan (2007) also argues that performance measurements can be used by a buyer to select and evaluate a supplier. As a result of the need to not only measure the internal performance the method called "Delivered in Full on Time" (DIFOT) has been developed by Khairur et al., (2007). It was mainly developed for a firm to measure their delivery performance towards their customers. Khaurir et al., (2007) explains that this measurement measures the promised delivery date and quantity of products in an order compared to the actual date and quantity that the order was delivered. This only one way to show how the performance of deliveries can be measured.

The DIFOT can be calculated by summing up all orders that are not complete in terms of quantity or correct delivery day and divide it by the total number of orders as the equation below demonstrates. (Khairur, Talib & Tan, 2007)

$$DIFOT = 1 - \left(\frac{ONTIF + NOTIF + NOTNIF}{n\ of\ ORDERS} \right)$$

Khairur et al., (2007) describes three situations when an order is not complete:

OTNIF = Delivered On Time Not In Full
NOTIF = Delivered Not On Time In Full
NOTNIF = Delivered Not On Time Not In Full

OTNIF is when an order I delivered on time but some products are missing. NOTIF is when an order is not delivered on time but it is complete in terms of quantity. NOTNIF is when the order is either complete or delivered on the correct day, including if it is arrived to early. (Khairur et al., 2007)

However, it is not always the "sender" that should be accountable for the errors in the deliveries. This calculation does not account for that there Khairur et al., (2007) mentions the importance of excluding deliveries with errors that are cause by uncontrollable reasons since it does not make the measurement fair. One example is if the transport provider is the causing the errors in terms of delivery time. (Khairur et al., 2007)

Weele (2014) suggests ratios and key performance indicators (KPI) as an important tool in performance measurement and especially for purchasing departments. The author presents several critical performance measures concerning ordering, on-time delivery and supply chain performance. Key performance indicators can for instance be used by a firm to compare and measure performance from one period to another. Krauth et al., (2005) suggest that KPI are of great importance and can be used not only to evaluate past performance of a firm but can also be utilized in order to assist in the planning process. One challenge with KPI's is to select the right indicators to measure and keep it to a few since it will require less effort and costs. Additionally, the selected performance indicators need to be carefully selected, as they can be conflicting and offset each other. (Krauth et al., 2005)

2.6 Delivery Service

If goods arrive too late it could lead to an unhappy customer who maybe decide to purchase from a competitor that is great loss for the firm (Cerna & Bukova, 2016). Delivery service is widely used term that composes of several aspects of delivery. Bjørnland et al., (2003) mentions delivery time/lead-time, delivery precision, and information flow, which are the parts of delivery service that this study will focus on.

Delivery precision is the ability to delivery with precision in terms of the agreed delivery time for instance (Bjørnland et al., 2003). Researchers has listed delivery precision as one of the most important parameters for firms to consider in alongside with for instance quality, delivery speed, reputation and quality (Maskell, 1991; Vickery, Droge & Markland, 1993). Maskell (1991) continues by suggesting that the delivery precision is a trade-off for speed since longer delivery times often results in better deliver precision. Bjørnland et al., 2003) discusses several factors that can improve the delivery precision which includes alignment throughout the logistics process, plan effectively, engage everyone and of course understand the service needs and transform it to a figure to measure. Lewis & Slack (2002) provides a simple calculation for calculating the delivery precision that is the requested delivery date minus the actual deliver day.

The delivery time and lead-time has many definitions. Ohlager (2000) has a wide definition of lead-time defining it as the time from when a demand is created until it is meet. Bjørnland et al., (2003) has a more compact definition and sees it as the time from when an order is released until it is delivered, which will be used in this study. However, this is something that has gained a lot attention by researchers, especially short delivery times. Mattsson (2003) shred light on an issue with delivery times that has not gained the same attention and raise the question of what is most importance between short delivery times or accurate delivery times. Mattsson (2003) mentions that short delivery times always have been associated with actions of improvement, which has been prioritized. Even though short delivery times are important, to have accurate lead-times should not be overseen since that is important for a customer but that should not be done as a trade off on delivery time (Mattsson, 2003). However, in the manufacturing industry Mattsson (2003) can understand that the short delivery times are perceived as more important while in other industries that could result in extra inventory if they arrive to early. It is important that a customer clearly state what it prioritize since some customers maybe prefer shorter delivery time (Paulsson, Nilsson & Tryggestad, 2000).

2.7 Cross-functional communication

Krajlic (1983) highlights the issue of the isolation of purchasing departments from other business units as something negative since integration, strong relationships between departments including top management will strengthen the organization. The communication between the different departments are referred to as the cross-functional communication and it is said to be beneficial as it provides different perspectives, knowledge sharing, and sources of information which can help the different function tackle different problems. (Boerner, Schäffner & Gebert, 2012; Ghobadi & D' Ambra, 2012; Keller, 2001).

Having good cross-functional teams is extra beneficial when firms are dealing with process improvements for instance lean production, total quality management and continues improvement initiatives (Love & Roper, 2009). However, there are negative aspects of this and it is the risk of conflicts of interest and different opinions, stressed

employees and bad power balance due to loyalty to the own department they are belong to (Boerner et al., 2012;Keller, 2001). This is a challenge that should be managed by emphasize on team building (Keller, 2001).

2.8 Inbound Logistics

This study focus on the inbound logistics as mentioned earlier and it is compared to outbound logistics the internal logistic. Weele (2014) defines inbound logistics as the activities that are related to receiving and storing goods as finished products or as input for production. These activities could be inbound transport, inspection of incoming goods, materials handling, reverse logistics and inventory management. (Weele, 2014)

3 Method and implementation

This section explains how the study is constructed and briefly introduces the case company. The method of data collection will also be discussed together with research approach and design. The section will end with a discussion concerning the validity and reliability of this study.

3.1 Research Approach

This study is focused on a single firm in a specific market but it still makes it relevant to other firms in similar or comparable industries especially with the characteristics of a wholesaler with many suppliers. Hence, this research could be applicable and of relevance for other firms in the wholesale area.

3.1.1 Inductive

There are two traditional relationships between theory and research that decides whether the theory is guided by research or if theory is a result of a research. These relationships are also referred to as research approaches with the first one called deductive and the second one inductive. More specific, when undertaking the inductive approach, the author moves initially from observations to more wide generalisations and theories. (Bryman & Bell, 2015)

In this research, the inductive approach will be used and it implies that the author begins the research with specific measures and observations in order to at the end develop general theories. This approach also allows the author to use interviews as a quite individual and open way of collecting data. (Jacobsen, Sandin & Hellström, 2002). Additionally, when using this approach, it is common that the research is conducted in an exploratory nature since it contributes to the research field with new insights and findings. However, according to Collis & Hussey (2013) that could be an issue since it is seeking information about a certain topic in advance.

In this case, the observations were conducted at one specific firm, which has its specific characteristics due to its nature as a wholesaler. The knowledge was collected from the observations that was made upon deciding on the literature, which naturally makes it an inductive research.

3.1.2 Qualitative Research

With regard to the given purpose of this research, the qualitative method was found to be the most suitable and is therefore used. Jack & Dodd (2005) suggest that a research is qualitative in its nature when the purpose is to understand a process rather than measuring it in form of statistics, which then makes it quantitative. The qualitative method aims to explain the *why* and *how* rather than *what*, *where* and *when* which is the case in the quantitative method. Also, with the qualitative method, interviews with open responses that are referred to as low structured data is analysed and provides a deeper understanding of the subject in the context. Qualitative research methods also enable the author to go back and forth with the questions in order to secure the understanding of the collected information. (Saunders & Lewis, 2009; Ghauri, 2004).

The author interpretations of the collected data are a basis for the qualitative research that allows the author to elaborate on the chosen purpose and handle complex subjects and processes in the likes of delivery times deviations (Saunders & Lewis, 2009; Marschan-Piekkari & Welch, 2004). This will fulfil the purpose of the qualitative approach which is to understand ideas and attitudes of human interactions and decision-making instead of just identify something that is static (Holme & Solvagn, 1997).

Given the complexity of the subject in this research, a qualitative approach will be taken which is the most appropriate approach since it can allow full interpretation and understanding in details, which is not possible with, for instance quantitative. The qualitative method will also allow the author to continuously gain more knowledge about the actual subject by looking at the situation as it is today and how it should be. It also allows for flexibility as authors with the use of semi-structured interviews in combination with observations can go back and fourth by asking and observing to receive deeper knowledge of the context.

3.1.3 Case Study

Yin (2012) describes a case study as a bounded entity, which is taking the form of an organization, event, person or other phenomenon where the boundaries between the case and its contextual conditions may be blurred. A case study can also be defined as the empirical investigation, which examines an existing phenomenon in-depth, and within its natural context especially when there is a lack of boundaries between the phenomenon and the context. (Yin, 2012). As the aim of this research is to develop a better understanding of the management of on-time deliveries and the process of it. The choice of case study aligns well with the given research questions as they answer *why* and *how's* which aligns with Ghauri & Gronhaug (2005) suggestion about case studies as suitable option when questions to be answered are of the *how* and *why* nature.

Additionally, the nature of the firm and its industry as a wholesaler with few but very competitive competitors and many suppliers guides the research towards an approach that examines a single phenomenon in its natural setting, which is suitable for a case study since it copes with more variables than only just data. (Collis & Hussey, 2014; Yin, 2009). Yin (2012) mentions that that one major risk when using case studies is the lack of the possibility to make generalisation from it in order to apply to other examples. Especially a small sample, as in this case with one company, is not enough to generalize about the larger population (Yin, 2012). However, this research is not looking into making generalizations about every firm but rather only to specific firms with similar characteristics to this one. Wholesalers with the similar characteristics in the likes of the big amount of suppliers and the dependency of them in the competitive industry wholesalers are in.

3.2 Research Design

The design of the research highly important as it aims to attain the reliability and validity, which determines the research's quality. The research design aims to frame the data collection and analysis with the goal to correctly respond to the research questions. (Bryman & Bell, 2015).

3.2.1 Research Unit

The emipircal findings for this study was collected from the Swedish branch of a multinational wholesaler within electrics and heating, water and sanitation (HWS). There are several reasons for why this firm have been chosen but mainly it is because of its nature are a wholesaler which have several implications that are of interest in a study likes this. First of all, the nature of a wholesaler where they have many suppliers that they are dependent on and at same time as they have to deliver customers on time. There for delivery times are vital both up- and down-stream. Furthermore, it is said that the inventory is the biggest investment for a wholesaler that also justifies the choice of firm given the relationship between delivery times and inventory. Additionally, it is a good fit in terms of size as they have clear routines, tasks and roles that have been documented which allows the author easily get a good picture of the company and understand the problem in a simple manner. With that said it can be considered as a quite mature firm and given that, they also have complex systems that handles data which has been shown to be an important aspect in delivery times.

Finally, the author happens to work at the company, which allows for personal views and insight that have been observed from the authors working experience. The relationship between the author and the firm can hopefully also result in a trust that hopefully can open up the firm more. Besides that, the author already understands the systems and much of what is being done which can be helpful in the reflection.

3.2.1.1 Company profile

Solar Sweden AB is the Swedish branch of the Danish company Solar Group A/S that is one of Europe's leading sourcing and service company. Solar Group A/S offers a great variety of products and services aimed towards the electricity, heating, plumbing and ventilation technology. The group was founded in Denmark in 1919 and the head quarter is located in Vejen, Denmark. Solar Group A/S is listed on the OMX Nordic Exchange with revenues around 14 billion SEK in year 2016. Solar Group A/S employs 3000 employees in Denmark, Sweden, Norway, Netherlands, Belgium, Poland and Austria where is operates. Their vision which is is to work in close collaboration with

customers in order to increase their productivity and efficiency in order to proactively offers their customers the best solution, is called “stronger together”. (Solar AB, 2017)

Solar Sweden AB (Solar) was formed in 1989 and employs around 650 employees today and a turnover of 3 billion SEK. Besides the headquarter that is located in Gothenburg they have three warehouses and 37 sales offices and stores that supply supply Sweden from north to south. To cope with the tough competition a digitalization strategy has been implemented which makes them one of the largest e-commerce company in Scandinavia. Solar estimate that 50% of their operations is digitalized as and they innovate their offerings with a focus on e-commerce and services like *Solar Fastbox* with a promise of delivering products within an hour. On the service side they offer industrial solution in the likes of holding inventories for their customers. Today approximately 90% of the products goes straight from the warehouse to end-customers that can be seen as a result of the digitalization strategy. (Solar AB, 2017)

Solar offers around 40 000 items in stock with 20% composing of heating, water and sanitation products and 80% being electrical components in the likes of lightning, installation, cable, automations, communication and safety. These items are sourced from around 400-500 domestic and international suppliers. (Interview MPM, 2017; Solar, 2017)

Solar has a traditional hierarchical organizational structure as visualized below, this study will focus mainly on the supply chain, sourcing, master data management and commercial market.

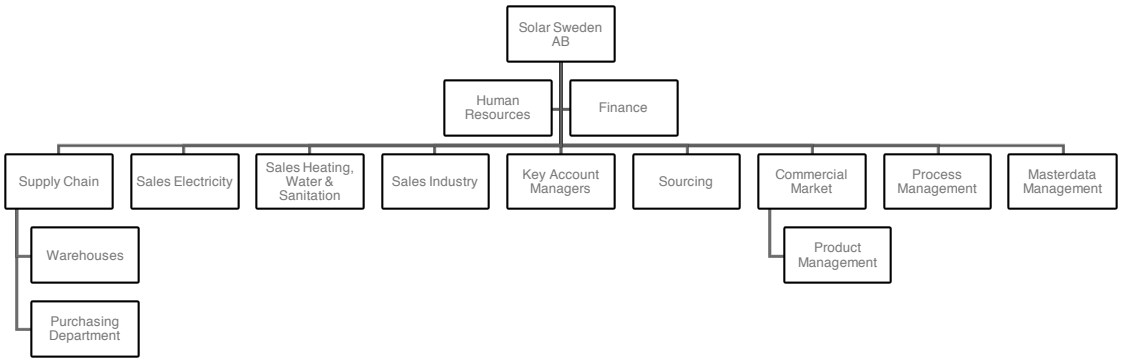

Figure 3 Organizational structure of Solar Sverige AB (Solar, 2016)

3.3 Data Collection

3.3.1 Snowball Sampling

The sample selection for this study is the snowball sampling method, which is used when the identification of a desired population is difficult (Saunders & Lewis, 2009). One obstacle is always the first contact but when that is made, the first contact assist in identifying other contacts of interest and it goes one like that until the desire sample is achieved. The name for this method is intended to describe this as the process of a snowball that is continuously rolling and growing bigger (Saunders & Lewis, 2009). The snowball sampling method helps the author to identify the appropriate people to involve in the study (Bryman & Bell, 2011).

Bryman & Bell (2011) highlights an issue with this sampling method, which is that it can fail in being representative enough. However, this only concerns quantitative studies and not qualitative studies as they point out that qualitative studies are a good fit. This can be explained by the fact that the orientation to sampling is guided by preference for theoretical sampling which is not the case with the statistical sampling that is made with the quantitative approach for instance (Bryman & Bell, 2011).

The sample for this study will include eight employees with various roles that are exposed to the delivery times in one way or another at the chosen wholesaler. The initial contact will be with the manager of the materials planning department, which will guide the authors to the relevant persons for this study. In the certain case the authors want to identify the purchasing process and the process of delivery times and how it affects the organisation and thus involve people that are either working with delivery times or are being affected by delivery times. Since the actual study will be based on the actual process, the actual individuals behind the titles are not important as the process itself is of importance. Therefore, even though individuals change, this sample is representative of the process itself and it makes it more generalizable.

Saunders & Lewis, (2009) defines the sample frame as the complete list of the potential cases in the population where the sample will be derived from. In this case the sample consist of the manager of the material management departments and then also one

sourcing manager, one product managers, one master data specialist, one purchaser, one order confirmer and the central warehouse personnel. Thus, the sample frame for this study includes the whole organization of Solar. However, during the time the process we have realized that the frame changed as external actors could be involved for instance suppliers and transport providers.

After the first interview with the material planning manager, the relevant persons that was suggested to be relevant for the study was contacted after. Part of the process of selecting them included to discuss their role and daily work tasks with the manager to get an initial idea of what they are doing. When that was done the material planning manager helped us to pick the most experienced and relevant in terms of experience of this issue to the extent that it was possible. The authors tried to follow the purchasing process from start to the end to identify the person's e.g. from sourcing to the warehouse where the goods is received. However, during the process the authors were also introduced to others that was not appointed directly by the material planning manager for instance the order confirmer that the materials planner suggested us to interview. Our main contact was the materials planning manager, assisted us in scheduling all the interviews that we intended to have within a timeframe of two weeks. The manager assisted in the contact, scheduling and booking of rooms at the headquarter.

3.3.2 Observations

Observations can be executed in various forms where observers could be participants or non-participants which is determined by the aim to the observations (Eriksson & Kovalainen, 2008). In this research the author performs non-participant observations which implies that the the author only observes without participating in what is happening (Bryman & Bell, 2011). Ghauri & Grönhaug (2005) suggest the author to study the phenomena in its natural setting, which is done when not intervening.

Prior to the interviews, observations were made in order to collect information and data about the lead-time process at the purchasing department. By having one employee from the firm assigned to the author, it allowed the author to get an overview of the work concerning lead-times. How the tools and system works and how they are being utilized was among other types of data collected from the observations. Besides that,

access to employees and especially the assigned employee was guaranteed which allowed the author to have continuous dialogue in order to avoid memory inadequacies and the risk of overlook valuable information (Bryman & Bell, 2015).

Observation was also conducted as a complement to the interviews when respondents introduced the author to a new concept or tools, one example was the PLPTools that the product management used when adding information to the master data management that introduced it in to the system. Solar is using Standard Operating Procedures (SOP) which are documents with flowcharts that visualise the workflow for each task and guides the employee systematically. These SOPs will be observed as a complement to the interviews in order to really understand the workflow and tasks. Example of a SOP can be found in the appendix. Additionally, the author was invited to attend a supplier evaluation meeting with a supplier that the firm had experienced some trouble with recently. This allowed the author to take in and understand much better if it only would be described in an interview.

3.3.3 Semi-structured Interviews

In order to gain a comprehensive understanding of the process regarding the lead-time and the involvement of the different departments and how they act accordingly in relation to lead-times. Additionally, the aim is also to gain insights that we may not be aware of. Daniels & Cannie (2004) argues that semi-structured interviews are the most suitable method for qualitative data collection, therefore in this study the primary data will be collected through semi-structured interviews. Semi-structured questions allow the interviewer to get a good insight in the subject as the questions cover several varieties of examples that can grasp the problem from many perspectives. This allows the author to focus on the main topic as in this case is the lead-times and still get a clear and comprehensive picture of the big picture of the process of lead-times at the firm in terms of understanding the different roles and their views. (Yin, 2012; Bryman & Bel, 2011)

As mentioned earlier, initial contact was made with the manager of the material management department, which introduced us to relevant people and departments that might be of interest. Prior to the interview, a few pre-decided questions were formulated that is important in order to distinguish everyone's role. After allowing them to describe their department and their roles, questions emerged naturally, as the discussion guided respondent and interviewer through the interview. Eight face-to-face interviews were conducted at Solar's headquarter (HQ) in Gothenburg, ranging from 30-60 minutes. Moreover, additionally interviews took place through telepresence (videoconference) and besides that mail and phone communication was used as a complement if other questions emerged post-interview session. During the interviews, the author recorded the whole session in order to have the opportunity to firstly, listen and engage fully in the discussion without disturbing the flow and secondly to have full access to what have been said post-interview. Recording is recommended for qualitative researches since it minimize the risk of missing important details of what have been said (Bryman & Bell, 2015).

The respondents included of the material planning manager, product manager, sourcing manager, purchaser, order confirmer, warehouse team-leader and master data specialist.

Table 1 List of Interviews

Respondents	Abbreviation	Interview Method	Date	Place	Duration	Department
Material Planning Manager	MPM	Face-to-Face	22-03-2017	Solar Sverige AB HQ	60 min	Purchasing
Product Manager	PM	Face-to-face	23-03-2017	Solar Sverige AB HQ	45 min	Product Management
Sourcing Management	SM	Face-to-Face	24-03-2017	Solar Sverige AB HQ	40 min	Sourcing Department
Team Leader Warehouse	TLW	Face-to-Face	25-03-2017	Solar Sverige AB HQ	60 min	Central Warehouse Halmstad
Materials Planner	MP	Face-to-Face	25-03-2017	Solar Sverige AB HQ	60 min	Purchasing
Order Confirmer	OC	Face-to-Face	25-03-2017	Solar Sverige AB HQ	50 min	Purchasing
Team Leader Materials Planning	TLMP	Face-to-Face	24-03-2017	Solar Sverige AB HQ	60	Purchasing
Master Data Specialist	MDS	Face-to-Face	23-03-2017	Solar Sverige AB HQ	30	Master Data

3.3 Validity and Reliability

Validity and reliability is used in order to quality control that a research has been conducted in a reliable way. When talking about validity in this case, it implies that the research has measured what it was intended to measure and simply that the method is coherent with the purpose of the study. Reliability refers to the trustworthiness of the research as a whole and in order to reach have a trustworthy research, same result should appear again if the the same method is used which implies that it has been executed in correct way. (Saunders & Lewis, 2009; Yin, 2009)

To achieve high validity in a research is a big challenge but also crucial and one example for achieving validity could be to make sure that the questions are well designed in order to grasp what the researcher really wants. Additionally, Collis & Hussey (2013) mentions two approaches to achieve validity and calls them face and construct validity where face validity implies that the methods used measure the actual thing that is being researched. Construct validity is about issues concerning the phenomenon that cannot be observed but have an effect on the parameters and the result of the research. When conducting a qualitative research like in this case, having multiple interviews with several people could be one way to ensure validity. (Esaisaoin et al., 2007; Collis & Hussey, 2013)

Cooperation with the purchasing manager was conducted in order to ensure high face validity, it helped the author to pick out the right interviewees for the interviews. With relevant interviewees the author is referring to people with roles interesting to the topic which allows the author to get a holistic view of the operation, processes and the people involved in it.

Tsang (2014) mentions another challenge with the external validity and it concerns the generalizability e.g. the applicability of the result into other contexts. However, it is also said that due to the possibility to establish observed patterns, qualitative research and especially case studies can be more generalizable when compared to quantative studies. In order secure the external validity and generate a generalizable result the author decided to go with a case study and believe that the result is applicable on firms with similar characteristics. The specific characteristics could include wholesalers or

firms with a high number of suppliers. One method that is supporting this is the analytical generalisation, which is done by illustrating how findings and result from case studies relates to the theories, which could then be applicable to other events with similarities (Yin, 2012).

Collis & Hussey (2013) suggests that having a trustworthy research implies that other researches can use the research's method and expecting the similar result, which is a research with high reliability. However, there is a slight difference between the importance of reliability in qualitative research compared to quantative research since it could be easier to reproduce quantitative studies. A qualitative research is more dependent on the researcher's ability to explain how the research has been concluded, observed and interpreted (Collis & Hussey, 2013; Ghauri & Grönhaug, 2005*)*. In this case the secondary data included theoretical framework has carefully been selected from reliable sources that been appointed to author by either supervisors or university in forms of databases etc. However, one challenge with the theory was to find appropriate theory for this particular situation, e.g. not manufacturing firm. Additionally, the author was also exposed to several internal reports and databases at the firm, which included very reliable data, but however it was a challenge to interpret everything which was time-consuming.

4 Empirical Findings

In this section, the empirical findings that have been gathered at the company through observations and interviews will be presented. The section begins with a introduction of the involved departments and the main IT systems and tools that are being used. Then it will continue to present the purchasing process where the findings have been divided into two parts of the purchasing process namely the tactical and operational.

4.1 Company Overview

4.1.1 Involved departments

In order to understand who is involved and in what way the author identified which groups that was involved in one way or another in the purchasing process and the supporting activities for instance data management and warehousing with regards to delivery times.

4.2.1.1 Sourcing Manager

The sourcing manager's works on a strategic level with contracts and negotiations with all of the suppliers. When someone in the organization has any doubts about anything relating to contractual agreement and suppliers the sourcing mangers steps in. Except finding suppliers, one of the main task is the negotiations regarding the price adjustments that takes place twice a year as they have agreed on. The contract also focuses on transport terms, who pays the transport and when. However, during the interview it the sourcing manager stated that the delivery times are not considered in negotiations at all. The busiest period for the sourcing department is in December/January when most contracts are renegotiated and evaluated. (Sourcing Manager)

One thing that was interesting was the SM's view of his role when it comes to delivery times which according to him was very far away from his table. In the beginning the sourcing manager gave the expression that he was not relevant as a participant in this study do to his very limited involvement in determining delivery times but after the interview went on it became evident that the sourcing manager realized the importance of delivery times and how his role can have an impact on them.

4.2.1.2 Product Management Department

The products management is involved both on a strategic and operational level. According to the product manager, they are the product owners with the main task to introduce new products to the assortment. They are responsible for the product data, which is basis for the possibility to sell and market the product. On the operational level, they work alongside for instance purchasing department in order to support and assist the min product specific questions. Each product owner is assigned as certain product group.

The product manager that was interviewed understood the importance of delivery times but also stressed that it was not something that he worked with on a daily basis as he has his focus which concern the commercial side of the product. However, the product manager discussed some challenges and the main challenge according to him was that it is hard to know who is responsible for the delivery times and that the data from the database they use is not always 100% correct. The biggest challenge is to get the supplier to actually update the data so that Solar can retrieve the correct data, especially for the delivery times.

4.2.1.3 Master Data Department

Master data are responsible for the material master, which includes all the important information concerning the products. They own the data and are responsible for it as they own the systems that stores the data. Business Intelligence (BI) is one tools that is brought forward in order to process the data into information that helps the purchasing department. They have also introduced as tool called PLC that simplifies the flow of data from supplier, departments and master data.

The master data specialist that was interviewed stressed the importance of having good data as it can affect delivery times. From the master data department, they do, according to him, what they have to do to maintain good data quality but the source of the data could however sometimes be questioned.

4.2.1.4 Purchasing Department

The purchasing department holds highly operational task and control and owns the stocks. The different subgroups within the purchasing department is all responsible for the purchasing, monitoring and support when it comes to purchases. Material planning is a vital subgroup within this department, which plans, and order material on a daily basis making sure that Solar can meet the customers demand. The purchasing department covers the activities in the "operational purchasing" that will be presented below. It was from this department that the research originated from as they are the ones that are most exposed to the issues with delivery times together with the central warehouses.

Just as the product managers are responsible for the commercial side of products, the purchasing department is responsible for the logistical flow of the products. Meaning that they they are the ones responsible to take action against suppliers who are causing problems for them. Solar does not know how their supplier progress and do not look into it until the deviations becomes to obvious and when that happens they contact the supplier and initiate a meeting where they present the performance. When discussing with one material planner, it again became evident that there is an awareness of bad data quality that needs to be dealt with. There were suggestions where they expressed an interest in collaborating between the different functions when dealing with the problems of delivery times.

4.2.1.5 Central Warehouse and Good Reception

In this research, only one of the three central warehouses was included which is the one in Halmstad. However, they still have the same characteristics and the only thing that differs is region that they are supplying. The central warehouse and especially the group that receives the goods are working on an operational level with everything from receiving and storing the material. The CW is also the ones that have least to say when it comes deliveries but are important since they are the last outpost which can see what goes wrong with the deliveries. One challenge with the variety in the deliveries is that they are not able to accurately plan the workforce due to the wrong deliveries.

Sometimes goods come to early and sometimes too late creating both backlog and shortage in workforce one day and the opposite the next.

When discussing this issue with the team leader of the warehouse it became quite clear that they are very exposed to this problem but at the same time holds a very important position as they see the actual product and are close to the problems. The team leader at the warehouse suggested more cooperation and transparency in order to be better prepared on what actually is coming in. The team leader of the warehouse believed that if they would be getting more knowledge and empowerment the whole firm could benefit.

4.2.1.6 Summary of Departments involved in this study

Here is a table that briefly summarize each department's roles and tasks.

Table 2 Summary of Departments involved in the study

Purchasing Department	Product Management
- Operational tasks - Owns stock - Control stock levels - Monitor deliveries - Ordering - Handles return order - Support sales and customer service	- Strategic and operational tasks - Product owners - Introduces new products - Manages the catalogue
Sourcing	Central Warehouse
- Strategic tasks - Find suppliers - Negotiate and contract - Contact with suppliers	- Operational tasks - Receiving and delivering goods - Reporting to Material Planning
Master Data	
- Operational tasks - Owns the data - Responsible for new data	

4.2.2 The main information systems and tools

4.2.1 Enterprise Resource Planning System

A new ERP-system was introduced at Solar in year 2014, which is SAP. SAP is an important tool for the purchasing department that allows them to order and monitors the stocks there. SAP also provide all the product data and to some extent delivery data in terms of delivery times. Master data management is responsible for maintain and update the data. Until a year ago SAP played a big role in the purchase department as they planned after re-order points, which SAP calculated. However, it is still very important today as it is widely used in the work with order confirmations among many other things. Today Solar has changed to a forecasting system that is based on historical forecasts. It is in SAP that the purchasing department can see that products have arrived.

4.2.2 Serviceoptimized99+

Serviceoptimizer99+ (SO99+) is a software that was introduced during the spring 2016 at Solar. SO99+ is developed to optimize the service level, reduce inventory and tied-up capital, provide more accurate forecasting and the possibility to optimize the warehouse in the whole distribution chain (Toolsgroup, 2017). SO99+ has taken over the role as a materials planning system from SAP that was used earlier. SO99+ bases the forecast on historical data and an advantage with it is that it takes seasonal products and demand variation over the year into account. SO99+ also allows to see the consumption of products can be divided in different levels for instance per materials planner, warehouse, product group or product manager. The safety stock is calculated by minimum safety stock and the consumption during the delivery time and that is called the “tunnel”. While SAP calculates working days, SO99+ calculates the calendar days but the recalculation is done automatically in the system. (Toolsgroup, 2017; Solar, 2017)

4.2.3 Business Intelligence

Business Intelligence (BI) is a database that act as tool for Solar where they can keep track of several processes and help them make right decisions. BI derives data from SAP and others systems and stores it for analysing and decision-making. Solar understand the importance of BI but they are lacking clear routines for how and when to use it properly. Today only a few people have learnt to use it as it is not fully integrated in everyone roles.

4.2.4 Standard Operating Procedure

Solar uses standard operating procedures (Appendix 8.2) which are documents that provides a description of each role and the most common workflows. These standard operating procedures (SOP) describes the standard procedures of each work moment in the various processes and they are designed so that everyone should be able to complete the work by just following these SOPs. These SOPs are very helpful in the purchasing departments and Solar has managed to cover most of the tasks and workflows in the department, from purchasing to order confirmation among others. (Solar, 2017)

4.2.5 Other tools

Apart from the previous three tools and the Microsoft Office package some departments have their own tools for instance warehousing uses VMS when handling the goods in the warehouse. VMS is used when receiving goods, register goods and used for order-picking. PLC tools is a tool that is developed by an employee at the master data department which makes the flow of data from supplier, product managers and sourcing to master data management much more efficient and simple.

4.3 Purchasing Process

4.3.1 Tactical Purchasing Process

New products are constantly being added to the assortment and when a new product is introduced in Solar's assortment both the product, management and sourcing team is involved. The product management team as the product owners has the main responsibility for the commercial side of the business where introduction of new products is a main task. The product managers are responsible for scanning the market for the newest trends, find new products, price them, add them to the systems (price and data) and market them. Occasionally, demand for a new product can come from a customer and lead to introduction of a new product. In that case the sales personnel contact the product management department which will investigate if its worth to meet this new demand.

When the product managers find a product that they are interested in they contact the sourcing department, which assign a sourcing manager to find a suitable supplier and negotiate terms and contractual agreements making a deal possible. The sourcing departments consist of two sourcing managers and one responsible for the department and they are responsible for all the contract and contact with the suppliers. The sourcing manager that is assigned to work out the new deals get the product specifications from the product managers selects a supplier and sign a contract. The contract provides details about the products, price and the most important thing according to the sourcing manager is the delivery agreement. Who is responsible for the transport, supplier or Solar and whether it is a minimum order value to avoid paying the transport costs. Besides this the sourcing managers is responsible for the price adjustments that takes place twice a year from the supplier side which is also something that is agreed in the contract.

When the contract is done the product managers can continue their work to introduce the new product and is responsible for adding the data about the supplier into the system if it is a new supplier. Product data is also the product manager's responsibility and they pass it forward to the master data management who add it to the material master. Product data includes material number, units, measures, weight, lot size, packaging

size, sales parameters and financial data. PLC tools is a tool that Solar is working with together with the master data management who developed it in order to collect this data from a database provided by the Swedish Electric Wholesalers trade association (SEG), similar ones exist for other product groups. The database is supposed to be enriched by the supplier but that is not always the case as many suppliers have very limited data there (Sveriges Elgrossister, 2017). This is something that both the product manager and sourcing manager raised as an issue during the interviews. Some suppliers prioritize the information when requested, the big and mature suppliers are often more keen to provide the correct data.

The purchase and logistic parameters for instance delivery times are collected from SEG and when it cannot be collected from there the supplier is contacted. There is lack of a routine when the delivery times are being determined when introducing a new product. Beside delivery times, ordering days and receptions days are also of great importance parameters for purchasing. The sourcing managers do not put an emphasis on the purchase parameters when negotiating and contracting suppliers and product managers focus on the commercial side and activation of the product. It was quite clear that compared to product management department the purchasing department was not very involved in the sourcing part, at least not according to the material planner we spoke to. While the product manager witnessed about the good relationship and cooperation with clear routines with for instance the PLC tools between them and for instance sourcing.

When the data related to the products changes for various reasons which happens, both product managers and material planners contact the master data management in order to update the data. The motive for these updates can come straight from a supplier or as a result of a problem that have been identified by Solar for instance wrong original data.

4.3.2 Operational Purchasing Process

Figure 4 The purchasing process

The purchasing department at Solar consist of 17 employees divided into material planning, analysis, drive-in replenishment (stores) and support. These employees are managed by the material planning manager (MPM) and three team leaders (TL) that assist the MPM at each function of the purchasing department. The material planning group consists of seven material planners (MP) that are responsible for the planning of the inventory, monitor the inventory at the CWs and the ordering process of the stocked products referred to as green material. The support group consist of six persons and are responsible to handle the material that is not stocked, called yellow and red material that can be purchased on demand. They are also responsible for confirming the orders and provide assistance when it comes to questions around purchasing from (RLT) which is the basis for the available to promise (ATP) that indicates the availability suppliers, customers, sales and CWs. They are also responsible for the support box where all the questions that are directed to MP's are placed. Each MP have their own support box in their email where they receive complaints and other question that may arise about a purchase. The other subgroups within purchasing is not of interest in this study and will therefore not be further examined.

The purchasing department mainly use SAP and SO99+ in the ordering process where SAP is the ERP-system with all the product information and ordering tool. SAP is where the actual purchases takes place as it sends the order to the supplier with automated emails. The data in SAP is provided by the material master, which includes material number, units, measures, weight, packaging size, purchase and sale-parameters, and financial data.

SO99+ is a material planning software that was implemented in may 2016 and it uses historical forecasting instead of reorder-point when it calculates the demand. SO99+ takes both seasonal variety and the stores replacement into account when forecasting which, usually was conducted manually before by the MP. SO99+ uses the

Replenishment Lead Time to the sales/customer. RLT is the sum of the planned delivery time and the goods receiving processing time (GR) which is the time it takes the CW to handle the goods. The planned delivery lead-time is collected from SAP and includes the transport time when supplier is responsible for the transport and when that is the case GR time is always set to one day. But when Solar is responsible for the transport from the supplier the transport time is not included in the planned delivery lead time as it is added to the GR time making the GR>1. Each MP is responsible for a number of suppliers and the purchasing process of these products to each of the CWs. The workload is divided by specific order days for each supplier, and it is accordingly to these set ordering days that SO99+ creates the purchase requisitions (PR). These ordering days are important as they link with the lead-time which determines which specific weekday the good can be expected. SO99+ orders to avoid stock out by calculating safety stock, which is based on minimum inventory level and the consumption during the lead time. PR from SO99+ goes to SAP on the closest day to the ordering day for each supplier. Besides these two systems they also use excel and sometimes business intelligence (BI) where they analyse data. When communicating the normal mean of communication is email and phone. When Solar order something they request in on an expected delivery date and then the supplier confirms. It is based on the confirmed date that Solar and their customer can expect to receive the goods.

4.3.2.1 Demand

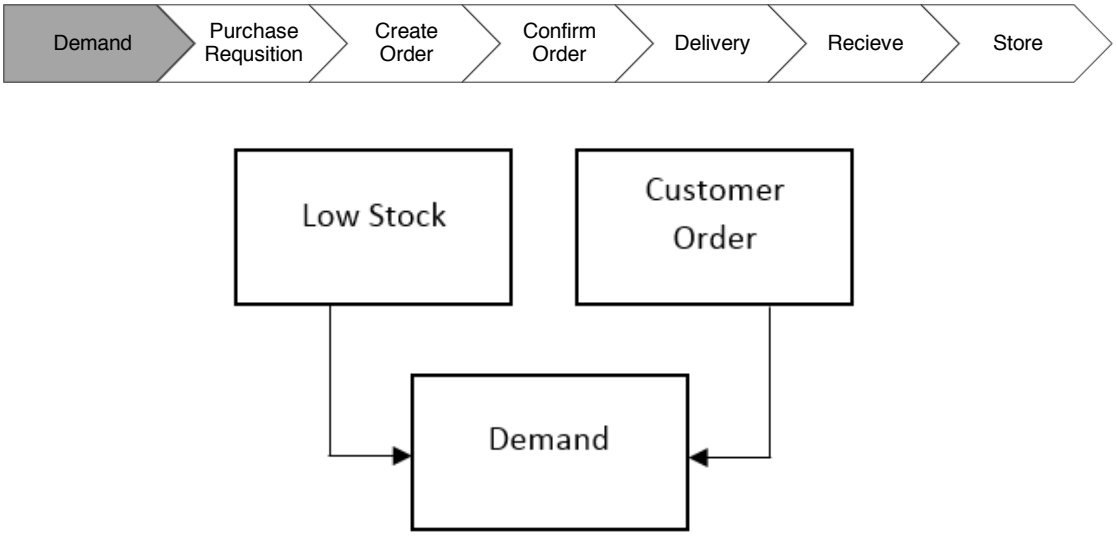

Figure 5 Visualisation of demand-creation

A demand could be triggered by two ways, one is by a customer order and the second is when the system indicates that their inventory levels are low. A customer order comes from the sales department who sells directly to a customer who will receive the products either at one of the stores or directly at wherever it is requested. The sales department place the order in the system, request it for a certain day with an expected delivery date, and can expect it to be delivered that day unless the order confirmation indicates something different. When discussing with the material planner one problem here was the communication with the sales personnel as they place the order and then complain to the purchasing department when it has not arrived.

Second type of demand is created when the system notice that the inventory levels are about to run low and it is based on re-order point and forecasting. The forecasting is made with a forecasting system called SO99+ and it forecasts every product separately at each CW. When SO99+ creates a demand it takes into account both the delivery time and the current inventory level in order to not go under the safety stock. SO99+ is connected to Solar's ERP-system, SAP where it collects the master data about the product such as delivery time and other important information. This is the most common type of demand and is what the material planning is working toward on a daily basis.

4.3.2.2 Purchase Requisition

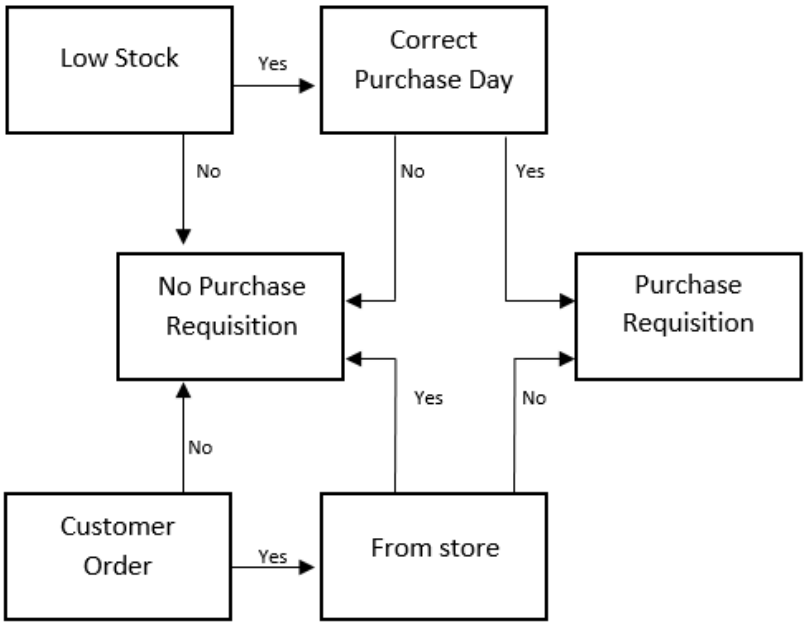

Figure 6 Visualisation of Purchase requisition process

A PR is created by SO99 based on historical forecast as mentioned earlier. The MP receives PR everyday respectively for each supplier on their ordering day. For some suppliers the MP can purchase from every day while some can only be ordered from on specific days. Theses specific days are as mentioned earlier integrated in the system that suggest when to purchase based one the specific days. If SO99+ identifies a demand and that supplier has ordering day, the PR will be released. A PR can also be released by a customer order but that is a customer order from a store and an example of a scenario would be if a customer needs 10 of a product but there are only five in the store and two in the CW. Another scenario is when a customer requests a product that is not stocked which is common. These orders are being dealt with by a certain group of MP that are responsible for the stores where these orders often come from.

4.3.2.3 Create Order

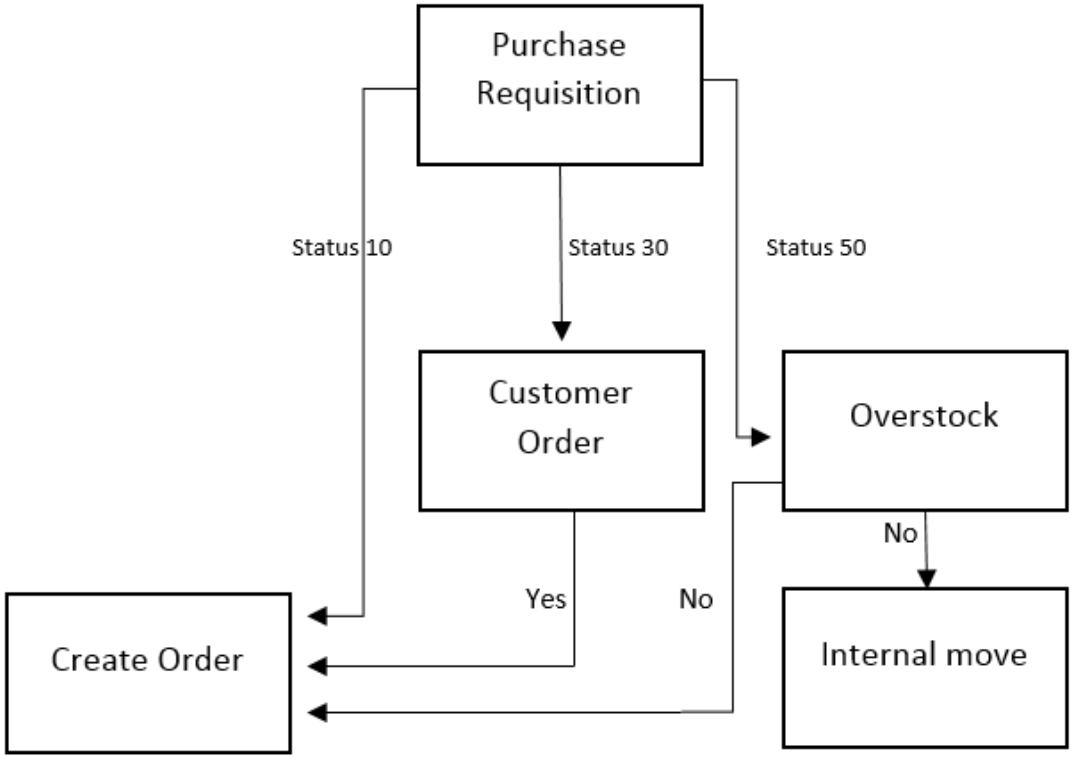

Figure 7 Visualisation of the order creation process

As shown in previous step, a PR will be released by SO99 if it is the right ordering day and if there is a customer that order more than what is stocked. This is a crucial step and requires effort from the MP as they have to justify the PR by looking at several things in order to convert it to a purchase order (PO). Each product is granted with a status. A PR cannot be released if a product is expiring (status 30/35) or if a product is overstocked in one CW (status 50). If the product has status 10, the MP is free to create a PO but in status 30/35 the MP is only allowed to create an order if it is a customer order since that product is not wanted by Solar. If it is status 50, it is overstocked at one of the CWs and therefore the MP is required to manually check the stock levels and try to reallocate to meet the demand and thus rejecting the PR. Products are frequently sent between CWs because of overstocking and in some cases, a product is only purchased to one CW in order to come up in purchase volumes and reallocated after that. The MP

have to make some small changes in the PR and make sure that the PO has the correct volumes that are accordingly to the packaging sizes if that exists and add a requested delivery date.

When an order is ready, the MP checks minimum order value, since some suppliers requires a minimum order value in order to offer free transport. If there is a minimum order value and the order is not reaching that value, the MP has two choice increasing the order or removing. If it is a customer order, it has to be purchased no matter what but in the other case if the MP fails to increase the value of the order they can order those products next time since products are ordered frequently on a weekly basis. Suppliers will automatically receive the orders when the PO's are released in SAP, either by Electronic Data Interchange (EDI) or Email.

4.3.2.4 Confirm Order

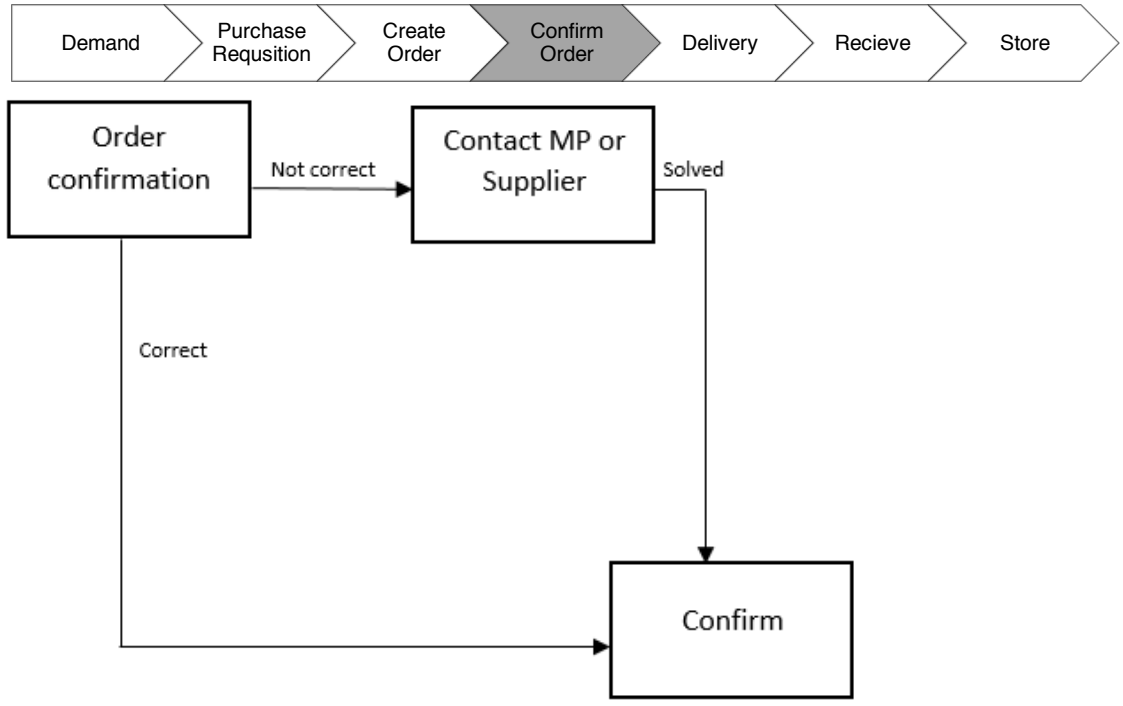

Figure 8 Visualisation of the order confirmation process

When the PR is converted into a PO and released the next step is to await the order confirmation, which should arrive instantly where the supplier confirms the delivery. The support group is the responsible for confirming every orders, which they receive

by email, a task that they do parallel to their main tasks. Solar receives up to 700 order confirmations by email on a daily basis that needs to be manually checked by the support group, this is time-consuming since the confirmations do not have the same format. Additionally, around 50 order confirmations arrives through EDI that does not require any work. The confirmations are dealt with according to the first in first out principle as the support group tries to register as many as possible. Before registering the order confirmations, they make sure that the supplier has the right delivery address, PO-number, delivery date for each lines, correct quantity for each line and other information concerning the order in the likes of substitute products or delays. When this is done, the confirmation is registered in SAP.

If there is any question regarding the deliver, they will put the email in the support box, stocked material to MP and non-stocked to the purchasing support. Then the responsible one will continue take action depending on what is missing. Normally the MP is in contact with both suppliers and master data in order to solve the problem depending on what type of problem it is. If other deviations occur for instance when no confirmation arrives, a reminder will be sent the following day, same thing when some information is left out. If something is delivered but not received, it will receive *"investigation-date"* which is 30.12.2019 in the delivery field and forward to MP or Support. When everything is done and corrected, the MP or Support confirms the delivery. Direct customer orders from sales is handled differently as they are only forwarded to the sales offices without any intervention or control by purchasing department.

The order confirmer that was interviewed mention that one big challenge was the stress since there is a huge amount of order confirmations that has to be dealt with which does not allow the confirmers to analyse the confirmations.

4.3.2.5 Delivery, Receiving and Storing

The last three steps of the purchasing process mainly involve the employees at the CW, in this study the focus is on the CW in Halmstad that consist of 50 employees. However, if something unexpected happens the MP or support is involved in order to help solving

it. Deliveries arrives on a daily basis throughout the day whole day but the CW which operates between 07:00-16:00 only accept deliveries until 15:00, everything that arrives after 15:00 will be received the following day. The team leader that was interviewed plan the workforce on a day-to-day basis based on what they expect will be delivered making the delivery precision important. One factor that is a basis for the planning is to how much of the good that is supposed to come is small goods or pallets. Each supplier has their certain days that the CW can expect the deliveries to come, which are based on the ordering day and delivery time.

The CW and good reception measure their own internal lead-time which earlier was referred to GR time which is maximum one day but the average internal lead-time is a half workday day from delivery to shelf availability for the CW in Halmstad. Transport providers deliver the goods and sometimes Solar book the transport and sometimes it is the supplier's responsibility. When the goods arrive, it undergoes an inspection to make sure that nothing is damaged or missing. When everything is ok they divide the goods, pallets and bulky goods is being put aside in order to be taken to their picking location where it will be scanned. The smaller goods will be put in boxes and the robot system take cares of it, which is an automatized process. The GR time ends when the last product of a shipment is at its location and stored and then the ERP is notified that the product is available for sale.

Except from the internal lead-time the good receivers also register when shipments arrive and the data is available for the MPs. If the CW receives incorrect units, they send complaints to the MP to notify them however only when the incorrect value exceeds 20% of the value of the shipment. No complaints are made for wrong deliveries. However, the good receivers and CW do not know if things arrive when they are supposed to arrive except from big suppliers that are familiar to them. Sometimes the sales contact them for information but they cannot help them simply because they only have information of what goods they actual have not any information about incoming goods. The CW uses a VMS-system, which is a warehouse management system where they register and pick products which is connected to SAP but the CWs only use SAP for return logistics. BI is used to monitor what is coming in short-term and it can change from day to day.

5 Analysis and discussion

This section will be used to analyze the findings and examine them based on the theoretical background. The analysis consist of four themes that will be discussed and they are the role of tactical purchasing, impact of bad data quality, measuring the performance of delivery times and cross-functional communication. This section will later be used to assist in answering the research questions.

5.1 The role of tactical purchasing in the purchasing process

The purchasing process at Solar is constructed accordingly to the wide definition brought forward by Weele (2014) which is the purchasing process divided in two parts, tactical with product managers that specify the product specifications and sourcing managers that are responsible for managing the supplier contact. In sourcing both supplier selection, contracting, and negotiation is included and that is also their main task. The empirical findings also align with Weele (2014) statement that the purchasing process is divided into several roles, since the purchasing department is divided in subgroups but also that the sourcing managers belongs to another department other than the purchasing.

However, in terms of delivery times the sourcing manager admitted that the delivery times did not receive any substantial attention from his side and the sourcing mangers declared that they have nothing to do with the delivery times. The last statement is contradicting the idea of the purchasing process by Weele (2014) and the tasks that are included. When it comes to delivery terms the only focus is on which type deliver, the goods will be delivered with. Forslund & Jonsson (2007) is stressing that when it comes to follow-up and measurement, it is sometimes hard to decide who is responsible for what for instance which data that should be used and provided. With this said, one can assume the importance of including this in the initially contract as the purchasing department relies on the information that comes from the tactical purchasing side and in Solar's case form product management and Sourcing managers.

Krajlic (1983) argument about isolation of the purchasing department holds true here but is limited to one function, namely the sourcing. There is a lack of knowledge sharing here between sourcing department and the purchasing department since they do not seem to be aware of what parameters are important and not. However, the

communication between the product managers and sourcing managers seems to work better. Additionally, since shorter delivery, times are costly and it is not more than right to introduce a late-fee when deliveries are late as Cachon & Zhang (2006) suggest. But this requires communication and cooperation throughout the purchasing process in order to evaluate and follow up.

5.2 Impact of bad data quality in the purchasing process

However, the issue with delivery times was something that obviously attracted a lot of attention during every interview that was conducted, as most of the involved people did not share the same picture of what the source of the delivery times was. The importance of delivery times taken into account the existing problems and Haug et al., (2011) statement that bad data leads to increasing cost, tied-up capital and time-waste on correcting mistakes. Almost none of the interviewees did know exactly where the data came from and if they did, there were still some questions concerning of the validity of the data. Haug et al., (2011) uses a matrix to describe the effect of poor data quality both on operational and strategic decisions. In the strategic decision both sourcing and product management is involved and some of the cost that occurs when using bad data is fewer sales, poor production planning, low efficiency and of course fail to keep promised deliveries to customers (Haug et al., 2011). Mattsson (2012) uses three perspectives to revise the quality of information, these includes correctness, time-current and complete. Using these perspectives to revise current source for instance SEG clearly shows how unreliable that is for some suppliers as Solar mentioned that only a few suppliers update the information on a regular basis, making the data incorrect, not time current and in some cases incomplete as everything is not included there.

On the operational level, the effects of poor data results in long lead times, wrong deliveries and stress among employees, as they have to correct the effects of the bad data quality (Haug et al., 2011). Which is the case with Solar where all these three factors are something that the CW is exposed to in terms of planning personnel and the frustration of not being able to forecast the volume incoming goods. Hammer (2001) argues that the main goal with information system is to support the integration between different organizational processes and the use of information systems in the purchasing

process is central. All the data is added into the ERP system, the product management uses it for the product data, and the purchasing department is using in the forecast and planning process with SO99+. The CW on the other hand uses these systems to try to identify the incoming goods, but are admitting that the data is not reliable. It is very rarely that they receive what they expect on time. Both the team leader at the warehouse and product managers admitted that they allocate some time on trying to solve issue that could have been avoided. For instance, one mistake at the warehouse takes about 10 minutes to deal with in average, not including the solution.

SO99+ as mentioned earlier is an important tool which work as a complement to SAP which provide data for BI which produce reports for the CW. Suddenly these extra systems that are supposed to assist in managing the excess information is deteriorating the operations (Eppler, 2015; O'Brien & Maraks, 2007).

To sum it up, it is obvious that Solar has followed what the literature suggest concerning data volumes. Both Watts & Shankaranarayanan, (2009) and Haug et al., (2011) connect the issue of bad quality data to the big data volumes that exists today and the large information systems that manages data, which is a direct result of the recent developments of IT. Solar has both SAP and SO99+ that provides data that is stored in BI. Which again makes it important to have the correct and accurate information input.

5.3 Measuring the performance of delivery times

Sink & Tuttle (1989) mention performance measurement as a critical part of a firm's competitiveness since if they fail to measure the performance they will most likely end up without being able to manage their business properly. Solar is aware of this and with the help of BI they can keep track of past and current performance of different activities and processes. For instance, the CW uses a form to report deviations in the volume of arrived goods, which the purchasing department can use to evaluate their deliveries in terms of quality. However, when it comes to measuring the delivery times which falls under the time dimension provided by Leong et al., (1990) no standard routine exists. When something extra ordinary is noticed and when problems with delivery times becomes too obvious the purchase department take action by contacting and setting up

a meeting with the supplier. Often the damage is already done when these initiatives, which could be, avoided with continuously measurement. Neely et al., (2005) states that measuring performance means that a firm quantifies the efficiency and effectiveness of an action and by quantifying the delivery times e.g. too late or too early delivers in a metric these issues could be discovered earlier.

The CW has an important role as they have a position where they can validate data in terms of delivery as they are they receives the products and reports it to the system. However, the CW is not aware of which specific days each supplier delivers therefore the wrong deliver weekdays can be wrong for many times without being followed up as the purchasing only sees in the system that the products arrived. The purchase department do not request information of when everything arrives; they are satisfied as it is stored. This removes the opportunity to use exception reporting which alerts when something unexpected happens which is especially important when dealing with big amount of data (O'Brien & Markas (2012). Order confirmations could also be seen as a type of exception reporting but as the process is today it is impossible to spend time on analysing according to the order confirmer. This is since about 700 order confirmations are received on a daily basis by email in various forms. EDI makes it possible but today only 50 order confirmations comes with EDI that automatically alerts when something is wrong. Solar has communicated the difficulties with implementing the EDI for all their suppliers as it takes long time and not every supplier is developed and capable in the investment of an EDI-system. However, the importance of it since it makes things efficient and saves money and now also can be used as a way to validate data, web-EDI should could be considered (Lyson & Farrington, 2012). When implementing it is important for all members of the supply chain to understand the purpose of performance measurement before introducing them in order for them to be fruitful as they are a basis for operational excellence (Christopher, 1998; Charan et al., 2009; Keebler, 1999). Today Solar has many opportunities to have good performance measurement but they are not utilized. One good example is as mentioned earlier, that purchase department make more use of the data that the CW collect. For instance, they can easily measure what comes in on the correct day and they are today measuring when something actually arrives and not only when it is put to it is picking location. When

talking about the necessity for all members to understand the importance of it, the top management place a huge role in support and implement it. (de Waal & Counet 2009).

However, when Christopher (1998) discussed the aim of performance measurement and mentioned that both internal and external performance should be included which is defined as cost leadership and service leadership. Suppliers are highly involved in these two aspect therefore performance measurement should be used for them to. Again, today most of the follow-ups is done when the damage is already made. Forslund & Jonsson (2010) argues that if on-time deliveries are critical, which they are, there should be a focus on measuring them. They suggest that the performance management regarding on-time deliveries, which includes four activities, defining metrics, target setting, measurement and analysis, should be gone through earlier. This is also important for the supplier as they can clarify what they can be held accountable for when a third part is involved as a transporter for instance (Khairur, et al., 2007). Now it is the purchasing department that introduce these when something goes wrong which can be explained by the lack of understanding of the benefits of integrating this earlier with the suppliers as Forslund & Jonsson (2007) says. These four activities should be examined with the supplier earlier in the process, as it will have a positive impact on the efficiency of the performance measurement (Forslund & Jonsson, 2007; Soltani et al., 2004; Basu, 2001). When determining the measurements, metrics and targets, analysis is the next step. For a successful analysis, continuous flow of reliable data is required and Forslund & Jonsson (2010) mentions ERP-systems as a good tool for this as it automatize the collection and communication of data, which saves the organisations from the manual work. Solar has already good systems and IT infrastructure to develop good performance measurement but again as mentioned earlier, the data quality is a concern as it is today.

These types of analysis are very applicable to logistics performance as they can be used to critically review deviations from targets (Mentzer & Konrad, 1991), which delivery times for instance falls in under. Solar has some measurements today but they are not well integrated which is why they fails to deliver value for them. The BI is one example since it contains good data and information that is not integrated in their daily work. The good content of data in BI was noticed during our observation of it but it was very

complicated to derive something of value of it as it contains many parameters and variables. Only handful employees can master the BI and they are free to interpret the collection information.

Khairur et al., (2007) suggest that performance measurements can also be useful for a buyer when selecting and evaluating a supplier making it relevant for the sourcing manager on a strategic level as well. Which can be realized only if the top management support informs about the benefits and implement it as mentioned earlier (de Waal & Counet, 2009).

Solar is also using KPI's, mainly for their internal performance measurement and present the different performance metrics for instance service levels on a weekly basis for everyone. So far, they have successfully integrated KPI as measurements of their performance internally. However, there is nothing suggesting that they should not be used externally also, both on activities measuring past performance in order to assist in the planning process. KPI's should be used, but it is very important to select the right indicators to measure and keep them aligned and to a few numbers only in order to be efficient. (Krauth et al., 2005) When having too many KPI's, conflicts might occur that offset them against each other one example from Solar is how they document received goods. The CW measures when something arrives while purchase department focus on when it is handled and stored.

5.4 Cross-functional communication

Since the purchasing process consist of several roles with their own tasks it important to coordinate them so that the process work (Weele, 2014). The cross-functional communication is in terms of normal communication is working without problem since none of the respondents indicated that it was a problem. However, the interviews provided a holistic view allowing the author to see it from another perspective and it is obvious that there is room for improvements when it comes to cross-functional communication. This can be said when looking at what cross-functional communication really is. Keller (2001), Ghobadi & D'Ambra (2012) and Boerner et al., (2012) all agrees on the following; benefits of cross-functional communication is when communication leads to knowledge sharing, new perspectives and sources of

information in order to overcome obstacles. Involving the purchasing department in the sourcing activities in order to provide logistical parameters just as product management specifies the commercial parameters. That is a pure example of a successful cross-functional communication since the integration of purchasing department can strengthen the organization (Krajlic, 1983).

With that said, the lack of clear cross-functional integration at Solar is not a consequence of the downsides of having cross-functional team which are that they increase stress and conflicts as Boerner et al., (2012) and Keller (2001) mentioned. During the interview with CW and MP it was clear that the cross-functional communication works nearly perfect when a problem occurs that needs to be dealt with, which is also a reason for why the interviews indicated that cross functional communication was good. The author believes that support for this is needed from the top-management just as Krajlic (1983) suppose in order to have good cross-functional relations that takes the organization forward.

6 Conclusion

In this very last section the author will present the answers to the research questions together with conclusions that have been drawn from the analysis and discussion. This section is structured after the three research questions and will be ended with suggestions for future research.

1. Why do the delivery times deviate from the expected delivery time?

A combination of several reasons causes the deviations in the delivery times for Solar. First, looking at the purchase process and how it is constructed shows weaknesses in the process of determining the correct data. One clear evidence of this is that for instance the sourcing managers do seem to only focus exclusively on the delivery terms instead of including also including the aspects of delivery times. The interaction with the product management is working well in terms of product specification and providing the correct data. One tool for this is the PLC tool that allows for efficient communication between product management, sourcing managers and master data management. The delivery times are based on a database called SAG which have shown varied quality from one suppliers data to another. There is a lack of clear routine when it comes to gather the purchasing parameters in the introduction phase of a product thus a solution could be to involve the purchase in the process for the beginning. This issue can also be referred to as lack of cross-communication between the departments.

This study argues also for the importance of having the correct data from the beginning since it will help utilized the processes and system that are used. However, with bad data quality systems like ERP, SO99+ and BI will not be of any use, as they would lack accuracy. When it comes to correct data, referring to it do not only suggest that the data itself is correct. It is more about deciding on which type data should be used in evaluation.

2. How does a wholesaler manage and following-up on the deviations of delivery times today?

As for today, measurements in terms of performance of the delivery times by the suppliers is not a standard routine that is done on a regular basis. However, Solar and especially the purchasing department has showed how great responsibility when a problem occurs as they take care of it instantly and involve whoever should be involve. Meetings together with suppliers and employees from for instance warehouse or product managers is initiated as soon as problem occurs where Solar thoroughly goes through the problem and visualize the problem with data. These meetings use to end with setting up targets and follow up the performance further, no matter if it is about delivery lead times or any other quality issue with the suppliers.

However, managing and following-up is still a problem as there is a lack of appropriate tools and routines for the purchasing department. Actually, the tools and data exist but there is a lack of knowledge in how to use these and leverage. Business Intelligence is a great tool that allows the employees at the purchasing department to go in and retrieve data on for instance expected delivery date and when a product actually arrived. It also allows the purchasing department to see many key figures regarding evaluation from service levels and delivery times. Again, it is complex and needs to be simplified. By developing a routine, evaluation can be done on a regular basis which is more proactive than "*extinguishing fires"*.

3. How can performance measurements be used by a wholesaler in order to control and evaluate suppliers in order to increase their performance?

Several ideas have been discussed tackling the issue from the different aspects that are included regarding the problems with the delivery times. Having the correct data is crucial, both interviews with sourcing managers and observation of the source of data (SEG) shows that in many cases there is a lack of accuracy, completeness, time-current and reliable data. Many authors stressed the importance of measure data to be able to manage, this makes makes the source of data very critical. There is also of great importance to understand what data to require and communicate it, for instance decide the metrics and measurement together with supplier when setting up contracts. This should be either done by the involvement or input from someone who has the knowledge about this and preferably be the one that will perform the actual

measurement. This could be someone from the purchasing department. Adding these parameters to the contracts can be controlled by a late-fee imposed on the supplier when delivery times deviates or also as a mean for negotiation during the price adjustments twice a year. This can be justified as many supplier's charges for fast deliveries, which many firms are paying for, therefore it should be a sort of punishment when that do not hold. Involving other is crucial as for instance the good reception can be used to perform many measurements as they for instance are documenting when things actually arrives and not only when it is store in the location which purchasing department use as a metric.

Exception reporting was also recommended as good tool to be notified when something is not correct. The current EDI system allows it but it just a small share of the order confirmations that goes through EDI due to the requirements of the system. However, a suggestion to implement a light version of EDI called web-EDI was suggested which do not require much from supplier and will benefit Solar. Order confirmations are an issue since they arrive in various formats and with the high volume, it is impossible to analyse the data properly.

Besides that, a simple calculation can also be applied in order to evaluate the deliveries, the one proposed by Khaurir et al, (2007) that measures the Delivered in Full on Time is quite simple to grasp and is one out of many that can be used. Since the data, collection is already made with the help of BI and ERP-systems this activity should be pretty applicable. Using this to measure the performance over a certain time period that is clearly communicated to the supplier.

6.1 Future research

An interesting aspect during this thesis that did not achieve fully attention was the cross-functional communication and cooperation. Results indicates that working together over functions is important especially within purchasing as the process have been divided up to the several roles as it has today. It would be interesting to see a study of the impact on cross-functional teams and how they cope with delivery times. For instance, at Solar, many employees sit together with colleagues from their own department but the most need of communication regarding their tasks is executed with other departments for instance product managers.

Future studies could also look into the actual costs of deviations in lead times. Since this was a qualitative research, it did not include impacts of the deviations of lead times in terms of costs. This could be interesting in order to justify the importance for the top management which is an important ingredient in a successful implementation of for instance performance management.

And finally it could also be of interest to bring in the perspective of the suppliers in a study like this since there is a trade off between fast and accurate delivery times. Are the deviations a result of to demanding customers?

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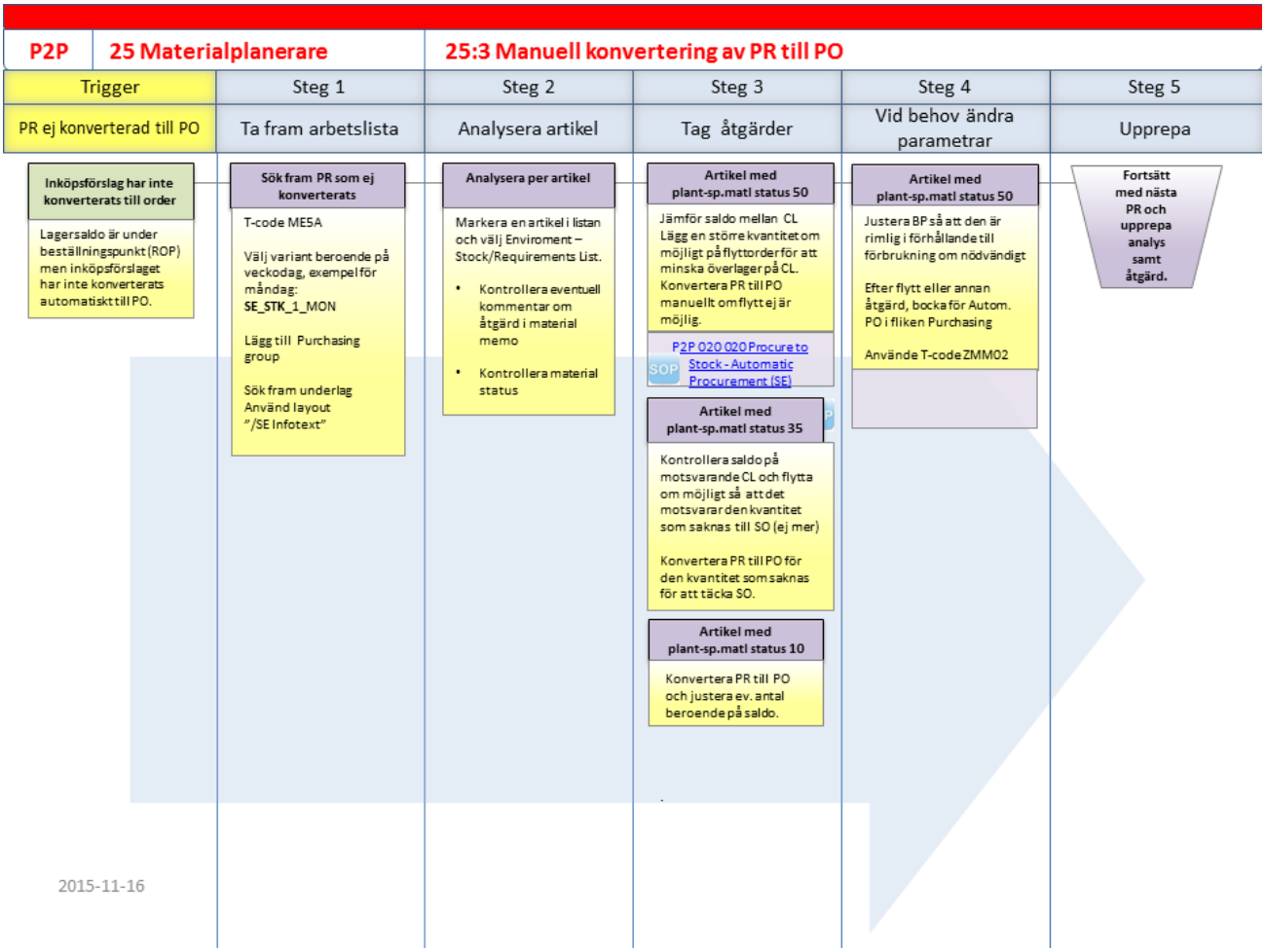
8 Appendix

8.1 Interview Guide

- Which department do you belong to?
- What is your title and job description?
- What are your responsibilities?
- How is your role related to the work with delivery times?
- Do you know where delivery times comes from?
- Are you aware of the importance of delivery times?
- Does your work get affected by delivery times?
- Where do you think the delivery times comes from?
- What do you believe are the main challenges with delivery times?
- Do you have any suggestions for improvements?
- Are you cooperating together with other functions at the firm?
- How well is the cooperating working according to you?

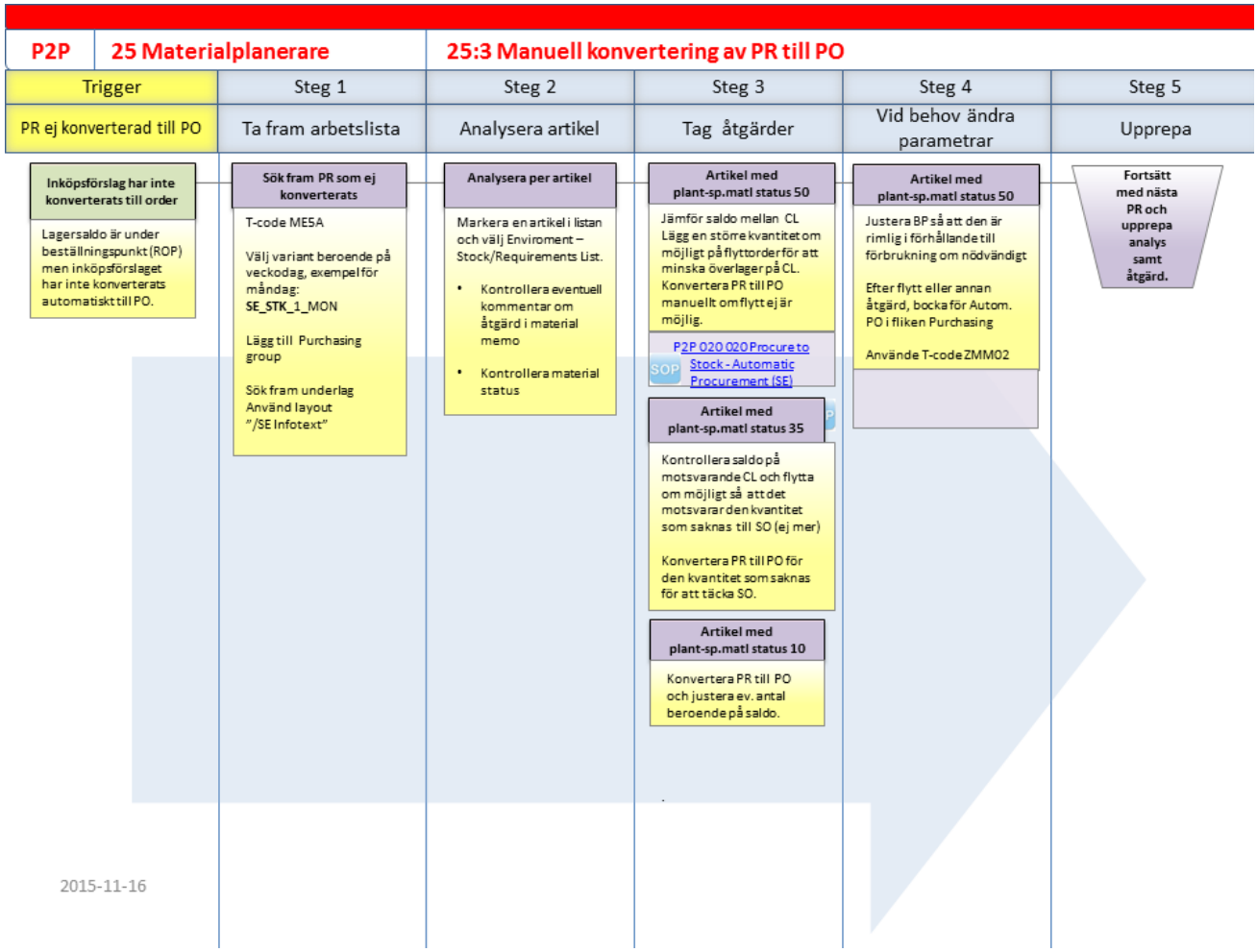
8.2 Standard Operating Procedures (SOPs)

8.2.1 Converting Purchase Requisition to Purchase Order



8.2.2 Check and Send Purchase Orders

References


P2P
25 Materialplanerare
25:3 Manuell konvertering av PR till PO
Trigger
PR ej konverterad till PO
Steg 1
Ta fram arbetslista
Steg 2
Analysera artikel
Steg 3
Tag åtgärder
Steg 4
Vid behov ändra parametrar
Steg 5
Upprepa
Inköpsförslag har inte konverterats till order
Lagersaldo är under beställningspunkt (ROP) men inköpsförslaget har inte konverterats automatiskt till PO.
Sök fram PR som ej konverterats
T-code ME5A
Välj variant beroende på veckodag, exempel för måndag:
SE_STK_1_MON
Lägg till Purchasing group
Sök fram underlag
Använd layout
"/SE Infotext"
Analysera per artikel
Markera en artikel i listan och välj Enviroment – Stock/Requirements List.
Kontrollera eventuell kommentar om åtgärd i material memo
Kontrollera material status
Artikel med plant-sp.matl status 50
Jämför saldo mellan CL
Lägg en större kvantitet om möjligt på flyttorder för att minska överlager på CL.
Konvertera PR till PO manuellt om flytt ej är möjlig.
P2P 020 020 Procure to Stock - Automatic Procurement (SE)
Artikel med plant-sp.matl status 35
Kontrollera saldo på motsvarande CL och flytta om möjligt så att det motsvarar den kvantitet som saknas till SO (ej mer)
Konvertera PR till PO för den kvantitet som saknas för att täcka SO.
Artikel med plant-sp.matl status 10
Konvertera PR till PO och justera ev. antal beroende på saldo.
Artikel med plant-sp.matl status 50
Justera BP så att den är rimlig i förhållande till förbrukning om nödvändigt
Efter flytt eller annan åtgärd, bocka för Autom. PO i fliken Purchasing
Använde T-code ZMM02
Fortsätt med nästa PR och upprepa analys samt åtgärd.
2015-11-16