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Master Degree Project in Logistics and Transport Management

Management of Obsolete Products

A case study of a Swedish wholesaler focusing on product disposition
alternatives

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Abstract

Product life cycles have been getting shorter as a result of technological developments and increased customer expectations. A consequence of this is that subsequent product introductions overlap in time, which often times renders the previous version obsolete. Furthermore, this leads to total or partial loss of the value of the particular product, and therefore it is crucial for business to efficiently manage their product obsolescence process. The purpose of this thesis is to investigate how product obsolescence occurs and how it can be handled at a Swedish Electronics and HWS wholesaler. This is achieved by conducting a case study at Solar Sweden AB. The research approach for this thesis is qualitative and empirical results are primarily gathered through interviews and observations. The thesis highlights the challenges in the product obsolescence process, and specifically focuses on how different disposition alternatives should be utilized. The findings show that the process is complex which is determined by a large number of factors, both internally and externally. This requires a process that involves several departments within the firm, which in turn leads to a slow-moving process with many decision levels. To solve this issue, the authors provide a general framework with regards to the different possible disposition alternatives.

Key words: Product obsolescence, Inventory management, Lean, Electronics and HWS wholesale, Product disposition alternatives, Reverse logistics

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List of Abbreviations

Abbreviation	Full Name
EOL	End of Life
CW	Central Warehouse
CWM	Central Warehouse Manager
CWS	Central Warehouse Support
HWS	Heating, Water & Sanitation
KPI	Key Performance Indicator
MPM	Material Planning Manager
MPD	Material Planning Department
PMD	Product Management Department
PM	Product Manager
PMA	Product Management Assistant
SD	Sourcing Department
SM	Sourcing Manager
TLA	Team Leader of Analytics

1. Introduction

This chapter provides the reader with the necessary background information regarding inventory management, with special focus on the managerial challenges that are related to product obsolescence. The case company used in this thesis is then introduced and a background description to the specific problem is provided. Thereafter the research purpose and questions, delimitations and research outline are presented.

1.1 Background

Inventory management is a field of research with a long history that can be traced back to the early 20th century (David, 2013; Fiestras-Janeiro et al., 2011). As a result, many theoretical frameworks and models of practical relevance have already been mapped out and therefore many of the known issues within the field has already been covered by researchers (Mattsson, 2007). In broad terms, the success of companies depends on two functions, its ability to provide services or products to customers and to still remain financially viable (Mattsson, 2007). Many companies are set up in this way, by supplying goods to customers, to a reasonable price, within an acceptable timeframe (Wild, 2007). This is referred to by Esper & Waller (2014) as one of the key features in supply chain relationships, which they refer to as purchase, transfer and management of inventory. One of the main processes within this framework is as mentioned, to be able to continuously provide a steady supply for the customer. In order to facilitate this, inventory management is used to coordinate the availability of items throughout the different stages of the supply chain. The control process involves supply of current and new products, as well as consumables, spare parts and obsolescent items (Wild, 2007). Furthermore, the main purpose of inventory management is to provide customer service while also reducing inventory and operating costs (Esper & Waller, 2014). Even though the subject of inventory management includes a wide variety of theories, a number of issues can be found when it comes to the adaptation and application to real world conditions (Mattsson, 2007).

One of the complexities is related to product life cycles, which have been getting shorter as a result of technological developments and customer expectations (Santamaria, 2004). Therefore businesses now put more emphasis on decreasing the time that is required in order to bring new products to their specific market (Bayus, 1994). A consequence of this is that the number of products offered by many business has increased and often times successive product introductions overlap in time. There has also been a proliferation of product variety in terms of; customers segments, distribution outlets and country specific attributes, which consequently requires businesses to carry a wide product assortment (Santamaria, 2004). At the same time, businesses have begun to realize that not only is inventory an asset, but an asset that they do not want too much of. Therefore, inventory management can be seen to focus on the trade-off between service levels and inventory costs (Esper & Waller, 2014).

It is obvious that too much inventory is now seen as something unfavorable rather than just an asset and that excess inventory can effectively hide managerial problems (Cobbaert & Oudheusden, 1996). The decision to carry inventory always entails some kind of investment and a capital loss such as the inventory holding cost. Another important factor that make inventory more costly is the high risk of product obsolescence (Song & Chuin Lau, 2004).

1.2 Problem description and analysis

The term obsolescence and the associated adjective obsolescent originate from the Latin words *obsoescere* and *obsoletus* and translate into “to go out of fashion” and “worn out” (Bartels et al., 2012). In general, obsolescence can be defined as a loss or impending loss of suppliers, manufacturers or items and raw materials. When an item is no longer available from its original manufacturer it is given the status of obsolescence. In inventory management obsolescence generally refers to slow moving or excess items that have remained unsold during a certain time period, which in turn, leads to high capital cost (Bartels et al., 2012; Chae, 2009). These products or obsolete inventories are one of the main sources of increased inventory costs and is therefore seen as a major challenge (Chae, 2009). One of the main obstacles originates from the fact that companies need to make a trade-off between the level of

investment in stock which contributes to higher service levels and the risks of obsolete inventory, lost sales and write-downs (Wong et al., 2006).

The focus in this thesis will be on Solar Sweden AB, which is a Swedish Electronics and Heating, Water & Sanitation (HWS) wholesaler located in Gothenburg. Solar Sweden AB is part of the Solar Group, one of Europe's leading Sourcing & Service businesses and their product assortment includes; lighting, automation, installation, cable & ducting, communications & safety and plumbing (Solar, 2016). Currently, the company is having problems with management of obsolete products and needs to improve their process. A broad description of the problem is that the company lacks a clear framework for characterizing the process, and there is a need to find a more efficient management routine to reduce inventories that generates write-down of obsolete products. The definition of write-down in this case can be described as the stock value that exceeds 12 months of sales. This value must be deducted from the assets on the balance sheet and is therefore a high priority to keep at a minimum level (Solar observations, 2016). These types of obsolete products also claims inventory storage space at Solar's central warehouses which, creates two problems; inventory carrying costs and storage space requirement (Solar observation, 2016; Chae, 2009). Furthermore, Solar also has ambitions to reduce and streamline the number of items carried in order to increase customer experience and create an easier materials handling process. In the current situation, Solar carries approximately 1000 different items that are set to become obsolete and completely phased out. There are further around 2000 items that are set to be phased out from inventory storage with an option for customers to acquire at demand (Solar observation, 2016). These products accumulate to a rather large investment, which needs to be reduced in order to optimize the inventory storage process.

1.3 Research purpose & questions

The purpose of the thesis is to investigate how an Electronics and HWS wholesaler handle product obsolescence and provide basis for process improvements. In addition to this, the aim is also to contribute to the overall research field of inventory management, specifically within the area of product obsolescence. Solar is a suitable company for this study due to the fact that they carry a large number of products in

several different products segments. This in turn facilitates the need for a process framework in order to handle large quantities of products. Furthermore, the aim is also that the results from this thesis should be applicable to other companies that face similar problems when it comes to product obsolescence.

The following research questions has been formulated in order to achieve the research purpose:

- 1. What characterizes the product obsolescence process at an Electronics and HWS wholesaler and what are the main features?*
- 2. What are the most common challenges for an Electronics and HWS wholesaler when dealing with product obsolescence?*
- 3. How should product obsolescence be handled when it occurs and what factors need to be taken into account?*

These research questions will be answered through a case study conducted within four different management departments at Solar Sweden AB.

1.4 Delimitations

Due to the time restrictions for this thesis, several limitations needs to be made in order to achieve the research goal. A decision was made to use a qualitative research approach, which implies that the product obsolescence process will not be investigated through a quantitative research method. The research will exclusively focus on product obsolescence at a single company, and not on several Electronics and HWS wholesalers at an aggregate industry level. Furthermore, due to lack of access and resources the thesis will only investigate the situation at the Swedish branch of the Solar Groups organization. However, the situation is likely to be similar at the other branches, which means that the results will generalizable within the entire organization. This research will evaluate the current product obsolescence process and provide suggestions for improvements. Yet, the implementation of these process improvements will not be taken into consideration in this thesis.

1.5 Research outline



Figure 1. Research Outline

Introduction

This thesis is constructed in accordance to Figure 1. The first chapter introduces the reader to the topic of inventory management, which concludes with product obsolescence. In order to grasp the concepts, a general description is made, followed by a description of the company and the issue they face. The research purpose and questions are then presented along with the delimitations of the thesis.

Methodology

The methodology chapter presents the research practices that were applied when this study was carried out. Starting with an explanation regarding research approach, with special focus on motivating the choice of a qualitative study. Thereafter follows an explanation of the tools and processes that was used during the collection and analysis of the empirical findings. The chapter concludes with three sections concerning validity and reliability and generalizability, which include a description of how it will be achieved in this thesis.

Theoretical background

This chapter includes the theoretical framework and commences by providing general background information regarding inventory management, product life cycles and product obsolescence. Thereafter the chapter continues by describing subject areas related to wholesalers and the reverse logistics. The last part introduces Lean management along with measurements and cross-functional communication.

Empirical results

This chapter starts by providing a company profile of Solar Group AB, which includes a historical description and information regarding their current situation. The interviews that was conducted through four different management departments is then presented, with special focus on problems and possible improvements to the product obsolescence process.

Analysis

The analysis chapter will discuss the empirical findings in relation to the theoretical background. In order to achieve a comprehensible overview, the chapter will be structured according to the different disposition alternatives. The chapter concludes by introducing a suggestion for process improvements and new disposition process framework.

Conclusion

The final chapter will conclude the thesis by revisiting and answering the research questions. These answers are derived from the analysis and empirical findings, and their possible implications will be discussed further. Finally, a brief text concludes what the authors suggest for future research.

2. Methodology

This chapter gives an explanation of how the empirical data was collected. The selected research method is described and justified, which then leads to the data collection methods used. The methodology chapter concludes with a discussion regarding validity, reliability and generalizability.

2.1 Research approach

The purpose of this report is to investigate how obsolete products can be handled in an efficient way at an Swedish Electronics and HWS wholesaler. This is a business problem that reflects challenges that many companies in a multitude of industries are faced with. Bringing the issue to light could also help other wholesalers to cope with their own current and future situation in this particular field. Since the study is based on an individual company in a narrow market, it is very likely that the situation might be similar for other companies in comparable marketplaces, therefore the research can be said to provide a generalization of the problem for the wholesale industry.

When selecting data collection methods, there are two main approaches that can be used. These general methods are referred to as quantitative and qualitative data collection methods, which according to Collis & Hussey (2014) can be used to describe data rather than paradigms and the choice of method depends on the type of information required. As the terms suggest, the quantitative method concerns the collection of large amounts of data that is often based on various measurements and statistical methods (Patel & Davidsson, 2012). This approach generally requires a lot of resources and that the data is of specific and precise nature (Collis & Hussey, 2014). When using qualitative methods the emphasis of the research lies on the quality and depth of the collected data, which tends to keep the data nuanced and rich in detail. Furthermore, this allows the qualitative research to use small samples, as the goal is to gain rich and detailed insights of the complexity of a phenomenon (Collis & Hussey, 2014).

In an effort to gain further and a more in depth insight in how Solar works with the problem, a qualitative approach has been used in this study. Furthermore, the precise data collection approach used is a case study, this in order to gain understanding of a

single phenomenon in its natural setting through a wide variety of different methods further described in this chapter (Collis & Hussey, 2014).

2.2 Case study method

The choice of research approach for this thesis was to perform a case study. According to Yin (2012) a case study can be defined as an “*empirical inquiry that investigates a contemporary phenomenon in-depth and within its real context, especially when boundaries between phenomenon and context may not be clearly evident*”. In the context of this thesis, the case study can be described as a qualitative field-based description of a management situation (Ghauri & Grønhaug, 2005). The decision to use a case study is derived from the fact that the research question is quite specific, with limited previous research on the subject. Furthermore, Ghauri & Grønhaug (2005) mentions that case studies are preferable when questions such as “how” and “why” are to be answered, which correlates well with the research questions in this thesis. In addition to this, the fact that the company in question operates on a limited market with few large competitors, leads the research towards a methodology that explores a single phenomenon in a natural environment (Collis & Hussey, 2014).

Furthermore, the research approach will allow for the understanding of the dynamics in the precise setting. As described by Yin (2009), a case study investigates a contemporary phenomenon in its real context and also that it copes with many more variables of interests than just data. A case study also relies on multiple sources or aspects to describe the phenomenon with the aim of achieving a triangulation of resources, which leads to the acquiring of knowledge (Collis & Hussey, 2014).

2.3 Data Collection

Empirical data for this report has been collected through a number of different methods such as; document analysis, interviews and observations. One of the objectives with using different types of data collection methods is to achieve triangulation, which in turn determines the consistency of the findings (Yin, 2012).

2.3.1 Primary data

Primary data can be defined as the kind of data that is generated from an original source, and it is commonly collected from surveys, interviews, observations and own experiments (Collins & Hussey, 2014). There are several benefits that can be achieved by conducting primary research. Firstly, it allows the researcher to address issues that are specific to the situation at hand and thereby shape the design of the study according to the research question and objectives (Ghauri & Grønhaug, 2005). In addition to this, using a primary data collection method also implies a higher level of control of how the empirical findings were collected (Collins & Hussey, 2014). Ghauri & Grønhaug (2005) also mentions several disadvantages in using primary data collection methods such as that it is difficult to find suitable respondents, it is resource intensive and the fact that the researchers is fully dependent on the willingness and ability of respondents. In the case of this thesis, several of these drawbacks were managed by the help of the external thesis supervisor at Solar. This implied that trust was put into the competence and ability of the supervisor to provide suitable respondents that possessed in-depth knowledge regarding the product obsolescence process. The objective to gather primary data in this research was mainly to understand what factors that contribute to products becoming obsolete and to find possible solution in order to minimize its problematic consequences. The primary data that was collected in our case includes interviews and observations.

2.3.2 Secondary Data

Secondary data can be defined as “*data that is gathered from existing source such as publications, databases and internal records*” (Collis & Hussey, 2014). The main advantage of using secondary data is that it provides the researcher with a broader understanding of the subject at hand, which makes it easier to formulate the research problem and draw scientific conclusions (Ghauri & Grønhaug, 2005). In this thesis, secondary data was mainly gathered when establishing the theoretical background. The objective of the literature review was to obtain knowledge within the academic fields that was relevant to the case study, for example inventory management, product life cycle, product obsolescence, lean management and cross-functional communication. Journal articles and relevant literature was gathered using scientific databases such as; Emerald, Business Source Premier, ScienceDirect among

others. The reason for using these databases was due to the fact that they contain a considerable amount of articles within the academic fields of logistics, supply chain management, lean and inventory management. Examples of some keywords that was used during the literature review search were; *product obsolescence, product lifecycle management, product recovery, lean, inventory management and cross-functional communication.*

Ghuri & Grønhaug (2005) mentions several disadvantages in using secondary data such as the fact that the data is collected for a study with different objectives and it is difficult to determine if the findings are accurate. These drawbacks were handled by exclusively using well-known scientific databases and studying a large number of articles from recognized academic journals. However, when studying the academic field of product obsolescence the authors felt that most current research related to companies receiving disposed goods and not how they should handle the disposition themselves.

In addition to the material that was collected through the literature review, secondary data was also obtained using internally produced spreadsheet documents and working procedure instructions. These files mainly contained information regarding the current state of product obsolescence and operating procedures within the company.

2.3.3 Interviews

Semi-structured interviews were primarily used as a data collection tool in this research. The logic behind using this type of interview structure was to allow the interviewee to be able to express themselves more candidly, while still assuring that all relevant aspects were covered (Collis & Hussey, 2014). Ghauri & Grønhaug (2005) mentions that semi-structured interviews require greater skills from the interviewer compared to structured interviews. This is due to the fact that the aim is to obtain information about personal, attitudinal, and value-laden material, which often times imply that the interviewer has to deal with a sensitive social situation.

In practice, the interviews were conducted by preparing a number of interview questions in advance, but still allowing for additional questions to be asked during the interview situation. The questions themselves was formulated in line with what Yin

(2012) mentions, as specific questions and follow up questions that should be presented as though the researchers do not have any detailed knowledge regarding the subject at hand. This was done in order for the interviewee to provide new insights, which would be more difficult if leading questions were posed. Furthermore, this also gave the employees more leeway in how to reply too, and interpret the interview questions. In many cases, this led to situations where an open discussion took place and information that was beyond the scope of the initial interview questionnaire was gathered. These types of benefits are also acknowledged by Ghauri & Grønhaug (2005), who state that in-depth interviews with open-ended questions facilitate a situation where respondents are free to answer according to their own opinion.

The interviews were performed at two different locations; Solar's headquarters in Gothenburg and at one of their main central warehouses located in Örebro. They were conducted through four different management departments; Material Planning, Product Management, Sourcing and Warehousing. This was done in order to get a multi-faceted perception of how obsolete products are perceived and what countermeasures that can be used to minimize their negative impact, both from a strategic and operational viewpoint. The interview respondents were pre-selected by the external supervisor in order to provide the best source of information in accordance with the research question. To achieve validity and minimize the risk of misunderstandings and bad recollection, all interview situations were recorded and later transcribed. All interviews were conducted in Swedish, which could impact the way the answers are perceived once they are translated into English. Therefore a decision was made not to use direct quotations in the empirical results, since that might impact the validity of the thesis.

In regards to the interview questionnaires, the different respondents were given questions suitable for their own involvement in the product obsolescence process. The interviewees consisted of four groups where the respondents in each functional group were given similar questions. The questionnaires were reviewed by the external supervisor at Solar in order to receive feedback and suggestions for improvements prior to the actual interview sessions. Below follows Table 1 with a list of the interviewees.

Table 1. List of interviewees

Respondents	Abbr.	Nationality	Interview Method	Date(s)	Place	Duration (Total)
Material Planning Manager	MPM	Swedish	Face-to-face	March 30, 2016	Gothenburg, Sweden	60 Min
Team Leader, Analytics Group	TLA	Swedish	Face-to-face	March 31, 2016	Gothenburg, Sweden	65 Min
Product Manager	PM	Swedish	Face-to-face	April 1 & 4, 2016	Gothenburg, Sweden	60 Min
Product Manager Assistant	PMA	Swedish	Face-to-face	April 4, 2016	Gothenburg, Sweden	60 Min
Sourcing Manager	SM	Swedish	Face-to-face	April 1, 2016	Gothenburg, Sweden	30 Min
Warehouse Manager	CWM	Danish	Face-to-face, videoconference	April 20, 2016	Gothenburg, Sweden	30 Min
Warehouse Support Staff	CWS	Swedish	Face-to-face	April 12, 2016	Örebro, Sweden	30 Min

2.3.4 Observations

To use observations as a data collection method implies that you are studying the phenomenon in its natural setting (Ghauri & Grønhaug, 2005). It is seen as a favorable method due to the importance of context within the interpretivist paradigm and how it influences the phenomenon being studied (Collins & Hussey, 2014). The underlying reason why observations were used in this thesis was to be able to gather empirical data that can not be collected through interviews. Ghauri & Grønhaug (2005) mentions that observations is preferable when the researcher aims to gain an

understanding of the dynamics in a social situation and to grasp the behavior of those involved, which is difficult to attain through interviews or questionnaires. There are two different types of observation approaches that are common within business research; non-participant and participant observation. In this study, non-participant observation was conducted during a Lean workshop that took place during two working days. The purpose of the workshop was to review the returns management procedure and uncover waste in term of resources within the different processes included. Thereafter current and a proposed future state of the situation for 1 and 10 years ahead respectively were mapped out and an associated action plan was formulated. The participants of the workshop were the head of material planning, the two employees of the analytics group and one lean-facilitator. Observations were also conducted at the central warehouse in Örebro with guidance by the local inventory manager. This was primarily done in order to gain an understanding of how obsolete products impact the working situation and how it might lead to a lack of storage space. When conducting observations, it is crucial to be aware of the problems that might arise, such as observation bias and demand characteristics (Collis & Hussey, 2014). The latter mentioned problem is not likely in our study due to the fact that the observations were not focusing on daily operations but instead on process evaluation during the workshop and the inventory storage space condition at the central warehouse. Observation bias could however occur due to the fact that it is difficult to assure that the author's interpretation of the situation would be similar to other researchers views.

2.4 Validity

Validity is a term in literature often described by any of the following three ways; consistency between theory and empirical data, the absence of systematic errors and measuring what it actually claims to measure (Esaiason et al., 2012). An example of what validity means may include how well the questions in a questionnaire is designed to measure what the researcher wants (Collis & Hussey, 2014). To obtain a high validity in research is perhaps the most difficult and crucial problem in empirical science (Esaiason et al., 2012). In order to increase the validity, researchers can use different methods or try to approach the problem from different perspectives. From a qualitative perspective, an example can be the number of interviews occurring in

different places, with different people and in different timeframes (Esaiason et al., 2012). The two most common ways to assess validity is face and construct validity (Collis & Hussey, 2014). The first establishes that the measures used by the researcher actually measures what they are supposed to. The second describe the problem of phenomenons that can not be directly observable but affects the parameters and outcome of the study. Collis & Hussey (2014) lists motivation, satisfaction, ambition and anxiety as factors that influences construct validity.

In order to achieve high face validity, interviews where held with management in four different departments of the company responsible for the overall product lifecycle management. These departments include Product Management, Material Planning, Sourcing and Warehouse Operations in order to get a broad picture of the management of obsolete products and processes involved. The interview respondents were chosen by the thesis supervisor at Solar, in order to acquire the right sources of information. Furthermore, secondary data in the theoretical background has been carefully collected through approved sources in order to triangulate the appropriate fields of interest. However, there is a scarcity of academic material focusing on how to handle product obsolescence among wholesalers. Most research within the field tends to instead focus on more precise areas such as inventory management and environmental aspects.

2.5 Reliability

If a study contains a high reliability, it means that several other researchers can reproduce the study's methodology without the result differing significantly (Collis & Hussey, 2014). In other words, the reliability of the study refers to how accurate and at what precision the measurement has been conducted (Ghauri & Grønhaug, 2005). Collis & Hussey (2014) argues that reliability is of lesser importance in qualitative research compared to studies using a quantitative approach, since it is difficult to identically reproduce these kinds of studies. To establish reliability in qualitative studies, it is instead more important that interpretations and observations are clearly explained and understood. Ghauri & Grønhaug (2005) makes a similar point when they state that the reliability in qualitative studies is highly influenced by the conclusions and interpretations made by the researchers.

To obtain a high level of reliability, this thesis is based upon published secondary data accessed through a variety of databases previously mentioned in this chapter. The collection of primary data has been validated by the company itself, which has further strengthened the reliability. The interviews have throughout this thesis been semi-structured and followed a broad guideline. However, it is important to note that every interview is unique and as a semi-structured approach was used, the outcome might differ somewhat when a replication is made. Furthermore, as the subject of this thesis is quite company oriented, the level of knowledge and opinions within the company is likely to change and develop, which might alter the outcome if a future study is to be conducted.

2.6 Generalizability

The term generalizability refers to the extent with which the research finding can be extended to other cases. Most qualitative studies are based on a sample of a population, due to restrictions when it comes to time and access. It is therefore crucial to reflect on whether the characteristics present in the study would be prevalent among the entire population or if it is restricted to the sample (Collis & Hussey, 2014). It can therefore be said that the degree of generalizability for the study is determined by the extent to which results from the chosen sample is similar to the entire population (Patel & Davidsson, 2012). Collis & Hussey (2014) mentions that it is possible to generalize results from very few cases and that researchers do not necessarily need to consider the entire population to achieve high generalizability. The important aspects are instead that the study clearly captures the interactions and characteristics of the phenomenon that is being investigated.

The authors believe that the challenges illustrated in the case study are common for many companies who keep stock, especially when it comes to the trade-off between service-levels and inventory carrying costs. Furthermore, the disposition alternatives can be seen as rather general and available for most companies, which means that the results from this thesis could also be applicable for other companies who store supplier bought products.

3. Theoretical background

This chapter provides the theoretical background that constitutes the basis for this thesis, which will later be used in the analysis of the empirical results. The chapter commences with a description regarding inventory management, product life cycles and product obsolescence. Thereafter the areas of wholesaling, reverse logistics and disposition alternatives are introduced, together with associated concepts. Finally, there is a description of measurements, Lean management and cross-functional communication.

3.1 Inventory Management

A company relies on its own ability to provide the desired services to specific customers and within this frame remain financially viable. Many different departments work simultaneously within this scope, with the marketing and design departments at one end, followed by purchasing. When an item reaches the marketplace the focus objective is to be able to provide a steady stream of supply to secure the demand (Wild, 2007). This is where inventory management comes in. The origin of inventory management can be traced back to the early 20th century when the manufacturing industry grew rapidly (Fiestras-Janeiro et al., 2011). Managing inventory is challenging since there are many factors to take into account when it comes to the customer service and cost trade-off. Businesses are required to keep enough inventories on hand in order to satisfy customer demand, while still recognizing that storing these items implies a certain inventory carrying cost. It can therefore be said that the ultimate objective of inventory management is to identify the quantity of inventory that will cover customer demand, while still avoiding excess stock (Wild, 2007; Plinere & Borisov, 2015). Furthermore, Plinere & Borisov (2015) mentions several reasons why inventory is needed;

- To fulfill anticipated demand
- To prevent stock-outs
- To use economies of scale
- To lower risk against price increases
- To smooth out production requirements
- To take advantage of order cycles

- To permit operations
- To decouple components of the production-distribution system

A consequence of not fulfilling all or at least some of these motives of inventory management could result in production delays, shortages or even dissatisfied customers (Wild, 2007). In short, the objective of inventory management is to be able to keep just enough inventory to meet customer demand, while the purpose is to determine the amount and at what time to order and stock inventory to keep the costs to a minimum (Plinere & Borisov, 2015).

3.2 Product Life Cycle

The period in time when a product can be sold on a market is for different reasons limited, this can be attributed to the product or service life cycles (Jonsson & Mattsson, 2005). A products life cycle is associated with the period in time from the introduction to the exit from the marketplace and can be split into different phases (Kominos, 2002). It is during these periods that the product sales volumes can be characterized in specific ways and this is referred to as “the product lifecycle”. Figure 2 illustrates the concept further.

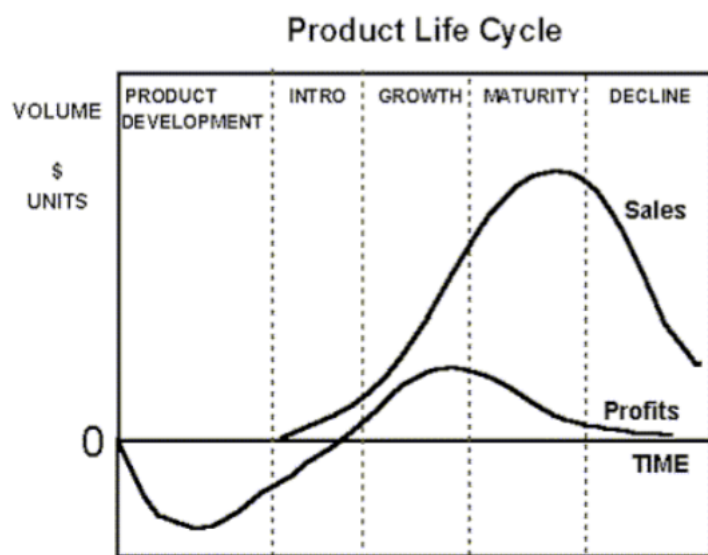


Figure 2. Product Lifecycle (William & McCarthy, 1997)

As seen, the product lifecycle be divided into four different phases that describes the way the product is perceived by the market. The first phase is referred to as the introductory stage, which is characterized by limited knowledge of the product and customer group. Secondly is the growth stage, where knowledge and acceptance of the product increases which in turn often times results in an increase of sales. The two following phases are called the maturity and the saturation/decline and these phases are usually ongoing for a longer period of time and are therefore the stages where the true potential of the product is unfolded (Östlin et al., 2009). Depending on which phase an item currently is in, the product strategy becomes crucial for determining how to handle the circumstances, for instance, forecasts of sales and production. The first two phases are mainly characterized by a willingness to get the product accepted on the market. Therefore, it is crucial to be able to deliver according to the demand as to not create a shortfall. It is also crucial to be able to acquire market shares through increased sales, which in turn demands considerable flexibility from the production and distribution systems in place (Jonsson & Mattsson, 2005).

It is crucial for businesses to develop strategies and methods in order to manage products through their lifespan. This understanding will accommodate the company into doing the right choices in terms of when to introduce and withdraw a product from the market (Kominos, 2002). One of the key decisions in the decline phase is when to remove the product from the assortment (Saaksvouri & Immonen, 2008). Kominos (2002) argues that the definite decision for ending a product lifecycle is a very complex task and that it is dependent on a lot of issues before the arrangement can be made. Some of the primary characteristics in the decline phase is described by Steffens (2002) as; declining sales, repeat and imitative customers and declining profits. This view is shared by Saaksvouri & Immonen (2008) who also states that the effect of competition in regards to, trends, price erosion and new technologies often defines this stage.

According to Orbach & Fruchter (2014) the length of time for each product life cycle phase is dependent upon the motivation behind the repeat purchase, whether it is to replace or upgrade the specific product. A business income is highly dependent upon the replacement of existing products. However, due to longer expected lifetimes, replacement decisions are often times delayed by the consumer, which creates a

paradox. Thus, manufacturers try to accelerate their new product launch in order to advance customers replacement decisions (Bayus, 1988). Examples of products that are usually replaced once they are worn out are cars and home appliances, whereas mobile phones, computers and television, which are still fully functional, tend to be upgraded (Steffens, 2002). The motivation behind the former alternative is often times related to technological progress and customers desire to derive higher utility from products (Orbach & Fruchter, 2014).

3.3 End of Life

A definition of an End-of-Life (EOL) product is provided by the European Economic Community as “*any substance or object which the holder discards or intends or is required to discard*” (Ziout et al., 2014). The importance for companies to efficiently manage EOL products has increased in recent years. This is in part motivated by the fact that a number of different legislations has been implemented in order to put more responsibilities on companies (Toffel, 2004). Examples of recently enforced legislation in order to facilitate sustainable production and consumption are; RoHS Directive 2002/95/EC, WEEE Directive 2002/96/EC, End-of-Life Vehicles (ELV) Directive 2000/53/EC (Ziout et al., 2014). The management of EOL products commonly involve choosing between the following different EOL solutions; direct reuse, repair, remanufacturing, recycling or disposal (Joshi et al., 2015; Bashkite et al., 2014). These EOL recovery options is according to Ziout et al. (2014) impacted by several factors related to engineering, business, environmental and social factors. The influence of these factors are often times conflicting, due to the fact that stakeholders perspective are often times varied when it comes to decisions regarding EOL solutions.

3.4 Product obsolescence

Cobbaert & Oudheusden (1996) makes a distinction between deterioration, perishability and obsolescence. The first mentioned considers inventory items that have an unknown lifetime, which implies that a certain portion of the stock will deteriorate per time unit. On the other hand perishability refers to products with a fixed lifetime, which subsequently renders it useless. Obsolescence on the other hand,

deals with inventory items that during a time period show a decline in demand. Obsolescence of a specific product or item appears when the function served by that item is no longer required. The obsolescence can originate from a number of different factors such as; units that are replaced by a substitute item which performs similar functions, because of a program of systematic replacement by a substitute item or simply that the item is no longer demanded by the customer (Brown et al., 1964). Therefore, obsolescence leads to total or partial loss of value in the item inventory (Song & Chuin Lau, 2003). As mentioned, product obsolescence can emerge from external factors such as customer demand, but it could also occur due to internal operations.

According to Wild (2007) there are four different catalysts for internal product obsolescence, which all lead to self-inflicted obsolete inventory but can be avoided by improved communication between internal departments. Two of them commonly arises from the marketing department and the remaining, either from the sales- or design department. The first situation arises from lack of communication between the marketing department and inventory controller, Wild (2007) gives an example of a promotion that is initiated but not clearly communicated. The promotion escalates demand, which in turn creates a stock shortage. This leads to a situation where the inventory controller orders more according to the new demand. As the stock arrives, the promotion ends and the company face severe stock excess. The next example of product obsolescence involves the release of a new version of the business product range, where it has exchanged some old with new and improved products. However, there are still high inventory levels of the old or deleted items that remain in stock. Wild (2007) continues by mentioning an example of when a new improved product replace an older one, which leads to a situation where the sales team start selling the product immediately even though there are still old products still in stock. Finally, Wild (2007) gives an example of an individual within the firm who place an order of a product without informing the related departments. As stated, all of these examples of how product obsolescence occurs can be solved by improved communications. However, Wild (2007) states that the responsibility for organizing this primarily lies with inventory controllers since other departments seldom understand the challenges related to inventory management.

3.5 ABC-Analysis

The ABC-analysis method is a principle that has been used in inventory management for a long time. Its origin can be traced back to the Pareto principle, which states that roughly 80% of the effects come from 20% of the causes, often referred to as the 80/20 rule (Kiremire, 2016). The ABC method has traditionally been based on one criterion, dollar usage per inventory item, which equals to the value times annual usage (Flores & Whybark, 1987). However, there may also be other cost-based criterion that can be used in determining the classification such as; volume value per article, contribution margin per product, sales per customer or acquisition value per provider (Jonsson & Mattsson, 2005). There are also several non-cost criterion, for example; lead-time, obsolescence, availability, substitutability and criticality. These criterias justifies the classification of products to the categories A, B and C, which in turn affects the inventory management principles for the products (Flores & Whybark, 1987). As stated, the method, similar to the Pareto principle, categorizes the most important products based on the mentioned criterias in a 80/20 fashion, in this case 70/10 (A), 20/20 (B) and 10/70 (C). For example, the A category items are those equaling 70% of the company's business but at the same time only taking up 10% of the inventory. Furthermore, category B accounts for 20% of the business and 20% of the inventory, and finally category C stands for 10% of the business and 70% of the inventory (Wan Lung, 2007).

As previously mentioned there are several different criterias that can be used to categorize inventory items. The cost-based criterions are the most commonly used but the non-cost can also play critical roles in how managers operate. Flores & Whybark (1987) however suggest that the overuse of criterias leads to a large number of combinations, which in turns creates a complex managerial system, whom each would require different sets of rules. This implies that, to keep the inventory policies manageable, the different combinations of criterias need to be kept to a minimum.

3.6 Wholesaling

Wholesaling can be broadly defined as the selling of products to anyone other than a end-consumer (Britannica, 2016). These actors handles a number of different intermediary functions, where the primary being to connect distant buyers and sellers

of specific items (Rosenbloom & Andras, 2008). It can essentially be said that wholesalers add value to product by bringing them closer to the end consumer. Rosenbloom & Warshaw (1989) describes the wholesaler's function as that to conduct the marketing functions that are necessary in order to provide flow of products through the channels of distribution. To manage this flow, wholesalers need to have effective control of their stock levels, in order to achieve high service levels. For wholesalers, the main operational performance measure is product availability, however it is still important to acknowledge the cost of keeping stock, and therefore effective inventory management is crucial for wholesalers (Syntetos et al., 2010).

3.7 Reverse Logistics

Rogers & Tibben-Lembke (1999) defines reverse logistics as *"The process of planning, implementing, and controlling the efficient, cost effective flow of raw materials, in-process inventory, finished goods, and related information from the point of consumption to the point of origin for the purpose of recapturing or creating value or proper disposal"*. To describe the concept further, Grabara et al. (2014) mentions that the aim of reverse logistics is that companies can become more cost-efficient by promoting alternative uses of resources. The underlying idea is that a well functioning reverse logistics process should facilitate a situation where obsolete items are replaced in an cost-effective and environmentally-friendly manner. This has in turn encouraged manufacturers to design products that can easily be dismantled and regenerated, which means that there is an opportunity to reclaim value of the returned item through recovery, reuse and repair processes (Grabara et al., 2014). However, a common challenge within reverse logistics is that it is difficult for companies to forecast how many products will be returned and the quality of the items and reverse logistics should be seen as a framework to handle these kinds of challenges. The focus within reverse logistics research was initially primarily on manufacturing companies, although Genchev et al. (2011) mentions that the academic field has recently expanded to also include retailers, wholesalers and third-party logistics providers.

3.8 Consumer Disposition Alternatives

In order to understand disposition alternatives, researchers have for many years studied consumers and their behaviors. Jacoby (1976) defines consumer behaviors as

acquisition, consumption and disposition of products and services. In accordance to this, the academic field within marketing have focused largely on acquisition and consumption (Raghavan, 2010). The third behavior of disposition has been overlooked up until recent years when a growing importance of sustainability and environmentalism has arisen (Gabara et al., 2014; Raghavan, 2010). Jacoby et al. (1977) discussed the different consumer disposition alternatives and Hanson (1980) provided a framework by which consumer disposition alternatives are related to their decision-making process. As explained by Raghavan (2010) “*The decision that the product is redundant is a subjective decision made by the discarder, even if the decision is based only on perceived redundancy and not on utilitarian redundancy*”. The framework described by Jacoby et al. (1977) can be seen below in Figure 3.



Figure 3. Consumer disposition framework based on Jacoby et al. (1977)

Raghavan (2010) argues that in accordance to this framework, that companies are faced with several challenges, in order to meet consumer expectations and also regulations.

3.9 Lean

In a historical view, efficiency has usually been measured by the resource that adds value to the object. This is called resource efficiency and can be attributed to most of the industrial history and its progress. The concept revolves around using the resource as much as possible during a specific time period. The other way of defining efficiency is flow efficiency. This concept instead, focuses on the actual unit that is getting value added (Modig & Åhlström, 2012). The main difference between the two is that the focus of measurement shifts between resource and unit. As the market has become more customer oriented (Myerson, 2012), the unit has become more of a focus than the actual resource adding value, centering the work on continuous improvements in flow efficiency. Lean as a concept is basically a form of continuous improvement that focuses on eliminating waste through the value-adding stream. In this case waste can be described as non-value adding activities (Myerson, 2012).

The continuous improvement mentioned is derived from Lean by improving new or existing processes throughout the organization (Sonnenberg & Sehested, 2011). This is done through optimum planning of the work process that leads to the concluding solution. Many problems found are often new and therefore rely on individualized processes, which in Lean is called value streams (Myerson, 2012). The value stream can be said to be the same as a project plan. In order for this concept to be successful continuous improvements needs to be made through evaluation of the work process. Sonnenberg and Sehested (2011) argue that there is not only a need for significant improvements but also that minor improvements can result in improved results.

3.10 Measurements

In order for companies to monitor their performance there are several different measurements that can be used. Parmenter (2010) states that there are four different performance measurements; Key Result Indicator (KRI), Result Indicator (RI), Performance Indicators (PI) and Key Performance Indicators (KPI). A KRI is the measurement of a result of many actions. These are most commonly used over long periods of time and they provide information ideal for senior management. The RIs and PIs are the connectors between KRIs and KPIs, which the latter are built upon. The main difference between the two is the RIs measures activity and financial performance while the PIs focuses on non-financial matters (Parmenter, 2010).

The KPI is a range of measurements critical for the current and future success within the organization. Parmenter (2010) has found seven characteristics of the measurement:

1. KPIs are non financial
2. They are measured frequently
3. The CEO and senior staff are involved
4. Clearly indicate what action is required by staff
5. KPIs tie responsibilities down to a specific team
6. Have significant impact
7. Encourage appropriate action

In order to reach some of the characteristics Buzalka (2010) argues that gathering and analyzing large amounts of data through comparable statistics that can be measured and benchmarked is crucial. Buzalka (2010) continues by stating that there are key characteristics found in his studies as well, which correlates with Parmenter (2010). These characteristics are; making units accountable, incremental expectations, retrieving correct data and taking inventory.

Parmenter (2010) continues by stating that the usage of KPIs in evolving or changing companies is built upon a foundation of four critical aspects. These involve that there need to exist a partnership throughout the organization, both internal and external. The power needs to be present in the teams that are responsible which, requires empowerment of the organization's employees. The third foundation requires that only measure and report what matters in accordance to the specific KPI. The last requirement is that the measured KPI can be linked towards the organization's strategy.

3.11 Cross-functional communication

Cross-functional communication can be defined as the communication that occurs between employees from different departments who have a different functional background (Boerner et al., 2012). The cross-functional composition can achieve different benefits in from of multiple sources of information, communication and

perspectives (Keller, 2001). In essence, the ultimate goal of cross-functional communication is that knowledge sharing should give individual members of the group better understanding and capability to resolve complex tasks (Ghobadi & D'Ambra, 2012). The teams are commonly assembled with employees from many different functional areas with the objective that each member should bring unique perspectives (Patrashkova & McComb, 2004). Daspit et al. (2013) gives several examples of situations where cross-functional teams are frequently used such as; use to develop new products, transform organizations, increase speed to market. In addition to this, Love & Roper (2009) also point out that the importance of cross-functional teams is increasingly highlighted in concepts such as lean production, total quality management and continuous improvement. There are however still risks and drawbacks with cross-functional teams, Boerner et al. (2012) mentions the fact that relationship conflicts often times occur due to differences in opinion. Furthermore, Keller (2001) point out that the use of cross-functional teams might also lead to stress among employees, lower group cohesion and increased costs. In addition, loyalty towards previous functional units can lead to group members treating knowledge as a private matter belonging to a specific department rather than the whole organization. Hence, this can result in a situation where team members are unable to exploit the group's diverse expertise and knowledge (Ghobadi & D'Ambra, 2012).

3.12 Summary of Theoretical Background

The theoretical background starts broad by discussing Inventory Management and related topics such as Product Lifecycles, Product Obsolescence and ABC analysis. Furthermore, the introduction of the wholesaler perspective follows with a introduction of reverse logistics and also the view of disposition alternatives from a consumer's point of view. The theoretical field of disposition alternatives from a company perspective was considered to be insufficient, and instead the authors found that the consumer view could be more suitable for this thesis. Furthermore, a similar problem was found in the reverse logistics literature, were the majority of the articles focuses on the company receiving products. As a wholesaler can be viewed as a consumer in the specific supply chain, both these parts are argued to be appropriate to combine the two subjects. The last part focuses more on internal procedures found within the studied company where KPIs and cross-functional collaboration and

communication is discussed. As the company has implemented a Lean mentality, the need to understand the mechanisms behind it also furthers why the subject is discussed. Figure 4 illustrates the sequence of the theoretical background.

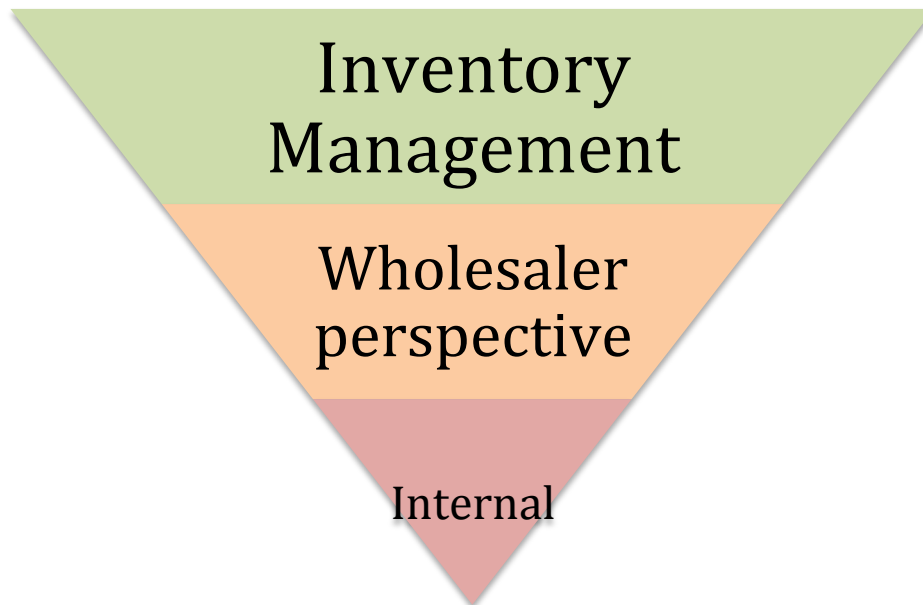


Figure 4. Summary of the theoretical background

4. Empirical results

This chapter presents the empirical results that were gathered at Solar through interviews and observations. The chapter starts by providing the reader with a company profile of Solar, which includes both a current and historical description. Thereafter follows an explanation of the four current disposition alternatives for obsolete products; returns to supplier, discounted sales, deals with suppliers and scrapping. Then results from the seven interviews are presented, with special focus on the participants involvement and the challenges they perceive. The chapter concludes by the interviewees providing solutions in terms of strategic and cross-functional aspects.

4.1 Company profile

Solar Sweden AB, which from now on will be referred to as Solar, is part of the Solar Group, one of Europe's leading Sourcing & Service businesses. The Solar Group offers a wide range of products and services, mainly in the electricity, heating, plumbing and ventilation technology. The group was founded in Denmark in 1919 and is listed on the OMX Nordic Exchange and the group's total net sales in 2014 were around 14 billion SEK. Its head office is located in Vejen, Denmark and have operations in northern Europe in countries such as; Denmark (including the Faroe Islands), Sweden, Norway, Netherlands, Belgium, Poland and Austria with approximately 3000 employees. The company's vision is "stronger together" and it is based on close collaboration with customers to increase their productivity and efficiency, in order to proactively offer the customer the best alternative (Solar, 2016).

The Solar Group began their operations in Sweden in 1989 and their product assortment includes; lighting, automation, installation, cable, ducting, communications, safety and plumbing. The headquarters is located in Gothenburg, and in 2014 employed 636 people (Allabolag, 2016). Solar serve their customers from 48 sales offices spread throughout different parts of the country, from Gällivare in the north to Malmö in the south. There are three central warehouses, which are located in Örebro, Halmstad and Alvesta. These central warehouses are divided into regions where Örebro serves customers that is located north of Jönköping and the other two delivers material in the south of Sweden (Interview MPM, 2016). The three

warehouses currently keep around 40 000 items in stock with 80 % being electrical components and the remaining 20 % HWS, which is purchased from approximately 500 suppliers (Interview MPM, 2016). Solar's organizational structure is a traditional hierarchy, which is organized as shown in the following figure. This thesis will not investigate the entire organization but focus on interviews with the departments highlighted in green in Figure 5.

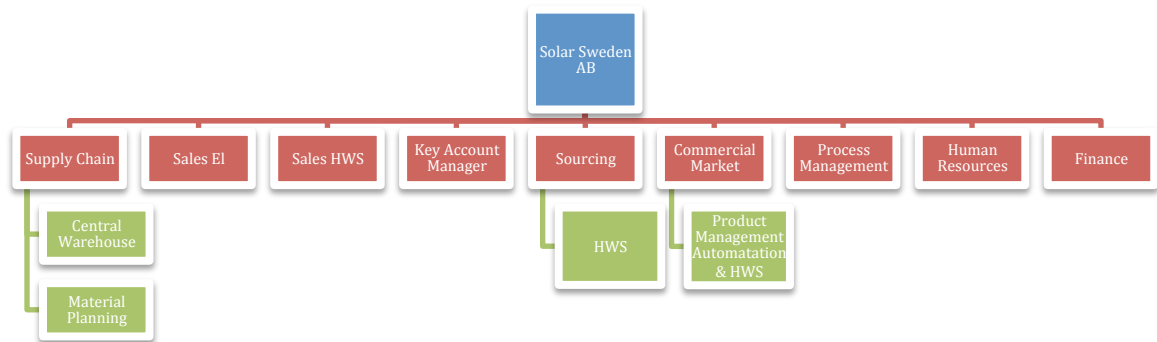


Figure 5. Organizational Structure

Table 2 further breaks down each department and their main obligations within the company.

Table 2. The departments main obligations

Material Planning Department (MPD)	Product Management Department (PMD)
<ul style="list-style-type: none"> • Operational duties • Owns the stock value • Controls stock levels • Monitor deliveries • Handles return orders 	<ul style="list-style-type: none"> • Strategic & operational duties • Owns the product assortment • Introduces new products • Handles discounted sales
Sourcing Department (SD)	Central Warehouse (CW)
<ul style="list-style-type: none"> • Strategic duties • Negotiate supplier agreements • Contact with suppliers 	<ul style="list-style-type: none"> • Operational duties • Picking, packing, delivering • Handles scrapping

4.2 Current disposition alternatives

Solar currently have four different disposition alternatives implemented when dealing with products that have become obsolete, which are shown in Figure 6. These different approaches facilitate both positive and negative aspects in regards to handling time, handling cost, return on investment and lead time among others. Furthermore, this chapter will describe the current disposition alternatives with regards to how each method is used in daily operations and what kind of data that is used in order to take action.



Figure 6. Current disposition alternatives

In order to be able to analyze the current state of Solar’s obsolete product portfolio there are several different approaches used to identify possible items for disposition. The first course of action is to generate a excel spreadsheet of products that are either low frequent or have redundant stock. In regards to the former, low frequent items are controlled by Solar’s stock policy, which dictates that items that are picked between 0-8 times during a 9-month period are to be either phased out completely or become an non-stock item. These articles usually end up as write-down or obsolete items. The former consists of articles that have excess stock in one or more of the three central warehouses, which are to be redistributed or disposed of (Solar observation, 2016). In conjunction with this information the spreadsheet also provides other necessary data regarding the items that can be of help. Examples of data provided by the document is; article numbers, price, stock balance, stocking date, item status, product manager and finally comments made by all departments regarding specific product related inquiries not contained within the working file. With regards to this information, the decision is made by the analytical group to form a plan on which disposition alternative that is most suitable for the specific item or supplier (Interview TLA, 2016).

4.2.1 Return to supplier

As of now, return to suppliers is the preferred disposition alternative from Solar’s perspective (Interview TLA & MPM, 2016). Returns are performed by the analytics department, which is a sub-group to the Material Planning Department (MPD). Figure 7 illustrates each of the ten current steps taken, both internally and externally, which explains the return process in detail.



Figure 7. Return handling process (Solar Observation, 2016)

In the current state, the analytical group combines items together by supplier in order to maximize the number of products returned for each order. A number of larger suppliers are handled on a more frequent basis as their product portfolio is vast. However, as of now Solar has 500 suppliers, which means that a large number of smaller suppliers are often neglected due to small batch sizes, inconvenient order processing or unfamiliarity with the supplier from the analytical group’s perspective. Furthermore, there are currently no set guidelines on how to choose supplier more than the team member’s experience and instincts (Interview TLA, 2016).

In addition to this there are other departments that are affected by the return process, primarily the Product Management Department (PMD) who plays a key role in the product life cycle. This implies that there is a lot of internal communication prior to and during the process to receive approvals and directives on how to handle specific items. Furthermore, as excess items are a cost, there are directives from the board of directors at the end of each year to maintain a low stock of obsolete items, which increases the amount of return proposals created by the analytical group prior to half- and full-year financial statements (Interview TLA, 2016).

An external factor to take into consideration is the quality in which Solar return the items to the supplier. The most common reasons for return rejections or delay are related to packaging, which mainly consists of broken or unsealed boxes. Another issue that can occur is that the quantities returned do not match the return order (Interview TLA, 2016).

4.2.2 Discounted sales

Solar handles a significant share of their sales through their web shop, which also includes a subsection that handles discounted sales known as Marknadstorget (*Translation: The Marketplace*). The main purposes are to be able to sell outdated products and excess stock from campaigns in order to facilitate newer items (Interview PM, 2016). The items that are marketed are often times those that have excess stock after a campaign, or items that are phased out because of newer substitute products but still are demanded by specific customers. The PMD, specifically the product managers, are in control of all discounted sales through the web shop portal (Interview PM, 2016). There are several guidelines, which dictates what kind of product that is suitable for discounted sales, for instance the pricing strategy, time of visibility and demand on the market. Furthermore, what kind of product that is introduced is often based on attractiveness for Solar's customer segments, which means that only items with a known customer base, for instance lightning or installation products is available. Less common product segments are industrial and HWS equipment, which are often too specific for impulse buying customers (Interview PM and PMA, 2016). When a product is introduced to The Marketplace, there is a limited time period of two weeks when it is available, the guidelines state that items that exceed this are either sent back to the supplier or destined for scrapping (Interview TLA, PM and PMA, 2016).

4.2.3 Deals with suppliers

In some cases there are no return agreements with suppliers, in order to facilitate a return Solar can arrange special deals (Interview TLA, 2016). These types of deals is conducted through the sourcing department, which is a rather new department and is made possible when both parties agrees to make a business move outside of their contractual obligations (Interview TLA, 2016). For instance, Solar agrees to make a support purchase in order to get the supplier to comply and allow the return of goods. Currently, there are not many suppliers working in this manner and it is also not a process Solar relies on in its daily operations. However, there are situations where the procedure is used and relied upon in order to minimize the write down value, to clear storage space or to reduce the return fee (Interview TLA and SM, 2016).

4.2.4 Scrapping

The final disposition alternative currently in use by Solar is scrapping. This is the only disposition alternative with no monetary exchange involved, making it the least preferred out of the four disposition alternatives. The decision to scrap a product is made by the analytics group within the MPD along with the PMD (Interview TLA, 2016). There is a set limit of 100 SEK for items that can be scrapped directly. If the items that are set for scrapping exceeds this value they need to be forwarded to product management in order to reach a final decision (Interview TLA, 2016). The scrapping itself is carried out by the Central Warehouses (CW) and follows the agreements set with the suppliers on how their products should end their life cycle. It also follows Solar's current ISO 14000 standard, which regulates their environmental standard. The procedure at the CW itself does not have any particular set process but instead is carried out based on the kind of material that is destined for scrapping (Interview CWM & CWS, 2016).

4.3 Interviews

Several interviews were conducted in order to attain a holistic view of the product obsolescence process and its problematic consequences. The objective was to potentially uncover how Solar could handle the problems and thereafter provide basis for process improvements. In total, seven semi-structured interviews conducted with representatives from four different departments; Material Planning, Product Management, Sourcing and Warehousing.

The awareness of the term product obsolescence and the closely linked write-down policy could be considered to be widely known throughout the departments but at the same time, not equally prioritized by all. While material planning, product management and warehousing were aware of the terms, sourcing did not have much knowledge regarding the subject when approached during this study. In order to highlight these findings, a segmentation has been made to cover each department through four designated sections. These are further divided into two different focus areas, their involvement in and the problems they recognize with the product obsolescence process.

4.3.1 Material Planning Department

The interview participants from MPD were Maria Gustafsson, Material Planning Manager and Therese Mård, team leader of the Analytics Group, which is a sub-group within Material Planning. Maria Gustafsson has further responsibilities, which includes; resource planning and monitoring of KPIs such as; stock value, excess inventory and follow-ups on customer orders. Therese Mård on the other hand has more operational responsibilities such as creating several supporting documents for material planning. From now on, Maria Gustafsson and Therese Mård will be referred to as MPM (Material Planning Manager) and TLA (Team Leader Analytics) respectively.

Involvement

The MPM's main responsibility in the obsolescence process is to work on a strategic level with an overview approach. This is achieved by following up certain KPIs through different documentations such as excel spreadsheet files and through the enterprise resource planning system. One of the main indicators is write-down value, which directly impact the bottom-line result, making it a prioritized area. Furthermore, the MPM is also involved in the work with process improvements, both within the MPD and also cross-functional with other departments. This is done through a Lean management approach called Toyota Kata where workshops, A3 documents and value stream mapping are key features. The purpose of working with these kinds of improvements within the obsolescence process is to create more rigid daily routines and to facilitate improved workflows.

The TLA is responsible for a team of two employees, and their main involvement in the obsolescence process is to facilitate return and scrapping orders for the entire Swedish branch. In addition to this, the team is also responsible for creating supporting documents for the obsolescence process in order to monitor write-down values and other important indicators. The team processes approximately 40 return orders per month, which is done on a supplier level. This in turn facilitates frequent communication with the PMD who are responsible for the product assortment.

Challenges according to the Material Planning Manager

According to the MPM the underlying problems within the product obsolescence process stems from the fact that there are no clearly defined guidelines of how to handle write-down items or products that has been phased out and still remain in storage. Specifically, the products that Solar has tried to return but were rejected by the suppliers tends to remain in storage for long periods of time since there is no set framework on how to process them further. Additionally, obsolete items create confusion for customers, according to an example given by the MPM. Products which are set to be phased out are still shown as available to the customer, meaning that if a customer orders five of a particular product, and there are only three left in stock, a lot of unnecessary work is needed and the customer might become dissatisfied. The MPM believes that all of these issues mentioned above are mostly due to a lack of proper frameworks and processes and not in correlation with how much resources that is allocated to the current product obsolescence process. It can also be said that the handling of obsolete products has not been a prioritized focus area until recently, which explains the lack of well-established guidelines. Furthermore, there has been an increase in workload in the build-up to half- and full year financial statements in order to minimize write-down values even further. Even without an increase in resources the output has been increased, which according to the MPM is evidence that the current situation can be resolved through better processes and guidelines only.

The MPM further states that a problem area can be related to cross-functionality between different departments within the company, in particular with the PMD. One of the main challenges is related to the phase in of new products where the MPM feels that up until recently, there has been a lot of supplier leverage and “gut feeling” involved in the selection of products, skewing the focus of the customer as the focal point. Furthermore, the MPM has felt that the PMD prioritizes new procurements options over current stock and this in turn creates an unclear situation over who actually possesses ownership of items set to become obsolete. On the question regarding which other functional departments that are involved in the obsolescence process, the MPM states that it is mainly a concern for the MPD and PMD. The idea is that the Sourcing Department (SD) is to be included in the future, however since it is a rather new department, their focus has up until now been solely on supplier agreements. One interesting finding is that according to the MPM, the CWs are also

involved in the obsolescence process by creating inventory lists of products they deem to be surplus. However, the intriguing discovery is that headquarters does not adopt these lists into their work as of now as they consider them excessive. This is mainly because the lists only functions to erase already occurred problems and not solve the underlying issue.

The MPM also mentions that obsolete products can be a contributing factor to the CW's overutilization of storage space, which is considered to be a major challenge. As the company currently has over 2800 products that are set to be phased out and removed from storage, these items occupy a significant amount of inventory space that could be used for new procurements. A consequence of this is that the CW is not able to prioritize new products which affects the end customer. Finally, the MPM mentions that products that are currently viewed as obsolete in one country, could be demanded by customers in another country where Solar operates. In theory these items could be redirected to where the demand is prevalent, however this is technically hard to facilitate due to cultural and process differences between the subsidiaries. The MPM does however state that this kind of arrangement would be beneficial, as it would create revenue for Solar.

Challenges according to the Team Leader of Analytics

The TLA starts of by mentioning that the analytics group creates around 40 return orders per month. One of the challenges in the return order process is that around 10-20 % of those are rejected. This is derived from a number of factors with the primary being related to the agreement in place with the specific supplier. The agreement can state that the supplier either does not accept returns at all or that they only accept a fixed number during a limited time period. The TLA states that this can be attributed to the SD as they in some cases negotiate an agreement without return clauses, in order to receive discounts or more favorable deals. Other times when there are no return agreements in place, it can be ascribed to either the suppliers size or that they simply are not willing to accommodate returns. The procedure of selecting a supplier to which a return are to be made, are not covered in any guidelines which means that the group operates according to what the TLA describes as “gut feeling”.

One of the fundamental challenges within the analytics group is the distribution of workload. The group consists of only two employees, with different areas of expertise, which makes the group sensitive to external factors such as; maternity- and sick leave but also meetings and other work related duties. Furthermore, the TLA is responsible for, and the only team member with knowledge of how to create the necessary supporting documentation, which is required for the product obsolescence process to function. The TLA argues that there is a need for education both within the group and cross-functional for the process to become less sensitive to external factors. When discussing the question whether the problems are caused by lack of processes or resources, the TLA states that it derives from both. There is a feeling that the analytics group would be more efficient with additional resources, as there are several other factors influencing their ability to focus such as meetings and workshops. However, the TLA also states that the product obsolescence process needs further improvements in order to facilitate a smoother work-flow.

The TLA mentions that the PMD has previously not put a lot of interest in the subject of obsolescence as they have not seen it as part of their own operations, and therefore not under their ownership. However, recently there has been an increase in their efforts as a new manager of Commercial Market, who controls the PMD, was appointed. Furthermore, the TLA thinks that one of their new goals are to narrow down the product assortment in order to create more storage space. The TLA states that the accountability and ownership issues involving the obsolescence process needs to be addressed but that there are current signs of improvement. However, there has been difficulties in the cross functional communication. An example is given, where the Supply Chain Manager orders the MPD to return a certain product but at the same time there are plans from the PMD to launch a promotion regarding the same product. The TLA thinks that these problems can be attributed to senior managers own KPIs, which create a situation where the MPD is more prone to work by and for themselves instead of cooperating with PMD.

Another disposition alternative brought up by the TLA is the option of trading internally with other Solar countries. Furthermore, the analytics group has a monthly routine to generate all of the data that is needed to make the process function. However, as of today there are only a few examples of occurrences where it has

actually been put into place, this is because it is not a prioritized alternative. An estimation is given that approximately 4-5% of the items currently regarded as write-down could be moved to better selling markets. The TLA points out that the most suitable subsidiary would be Denmark, since their operations are quite similar to that of the Swedish branch. Furthermore, the business culture is quite similar and geographically it is suitably located for this kind of operations.

Summary

Table 3 summarizes the involvement and the perceived challenges from the MPD.

Table 3. Summary of the Material Planning Department

Respondent	Involvement	Challenges
Material Planning Manager (MPM)	<ul style="list-style-type: none"> • Strategic overview approach • KPI follow up • Process improvements 	<ul style="list-style-type: none"> • Lack of guidelines • Lack of prioritizing • Skewed work load • Inadequate cross functional communication • Supplier leverage • PMD prioritize new over old products • Inventory space shortage
Team Leader, Analytics Group (TLA)	<ul style="list-style-type: none"> • Create supporting documents • Monitor write-down values • Create return orders • Create scrapping orders 	<ul style="list-style-type: none"> • Insufficient information regarding supplier agreements • Distribution of workload • Lack of education • Need of resources • Lack of knowledge in PMD regarding write-down • Unclear product ownership

4.3.2 Product Management Department

The interview participants from the PMD were Jonas Sjö Dahl, Product Group Manager for Automation and HWS and Annelie Johansson who is a Product Management Assistant for the product segments Communication, Security, Tools & Cable. Jonas Sjö Dahl has further responsibilities such as; local process specialist within the process of product lifecycle. Annelie Johansson is involved in a number of different areas, for example; support in the product management process, phasing in- and out of products and also updating the product assortment online. From now on, Jonas Sjö Dahl and Annelie Johansson will be referred to as PM (Product Manager) and PMA (Product Management Assistant) respectively.

Involvement

The PM is highly involved in the product obsolescence process, since one of the main responsibilities is to make decisions regarding the product assortment. It is the obligation of the PM to monitor the products during its life cycle, and through the information received by the supplier and the MPD, make decisions on the future product assortment. During the end of the life cycle, the phase out process, the PM works together with the MPD in order to reach optimal solutions. As stated by the PM, their department has authority over the product assortment and the MPD is responsible for the stock value, which requires involvement from both parties. The PM can receive information regarding products at the end of their life cycle from two different sources, either from suppliers who themselves are phasing out the product or from the MPD who make proposals of products which can be set for obsolescence. It is thereafter the PM's obligation to find either a substitute or make the decision to discontinue the use of the specified product.

The PMA acts as an assistant to the product managers within the product segment Communication, Security, Tools & Cables. The main responsibilities consist of support questions directed towards the assistant's own department at a second level, which means question that can not be handled by the primary support are directed towards the PMA. The position does not include any direct product ownership, but is involved in the administration at the beginning and end of the product life cycle with related support questions. The PMA does not have any work duties that is directly

related to values such as write-down but works along with suppliers in a product-oriented fashion.

Challenges according to the Product Manager

The PM mentions that historically the issues within the product obsolescence process has been handled after they have occurred and on a case-by-case basis. This is due to the fact that there has not existed any set guidelines on when to handle obsolete or write-down items, this in turn has made the area prioritized according to what spare time the PM's have been able to find. The PM goes on to state that a large number of items could have had disposition actions taken, but there have historically been tendencies from different product managers to defend their own products as they deem them crucial to stock. In addition to this, there has been a relatively low level of understanding of the impact of write-down in the PMD, which has further increased the desire to keep stocks intact. However, the PM does not think the problem is due to a lack of processes, rather that the ones that exist are not followed. In fact, the Swedish group's work with the obsolescence process is, by the PM considered to be one of the most well functioning within the Solar Group, yet there are areas that needs to be improved. For example, the PM believes that there is a lack of product-ownership, which creates a situation where follow-ups are neglected.

According to the PM, there are also several internal problems related to the product obsolescence. First of, the PM believes that the general stock policy is too rigid for Solar's current wide product assortment. An example of the complexity is a comparison between two widely differing products, a wall socket and a programmable logic controller. The current stock policy is suitable for standardized products as the first example. However, items such as a programmable logic controller might not be a high frequent item, but require a short lead time as it is such a crucial component in a larger system. Another internal issue that is identified is related to the current dispositions alternative for realization, The Marketplace. There have not been any general department wide attempts to specifically focus on offering obsolete items in order to reduce the number of obsolete items. Furthermore, there are no general guidelines entailing what kind of products the PM's department can introduce and no specified follow-up procedure for what to do with items that are not sold.

When discussing internal cooperation between different departments, the PM maintains a view that there has been a lack of formal communication between the PDM and the MPD. The standard procedure has been that communication has occurred between specific individuals, which add to the lack of transparency between the departments and further cementing the idea of a “Us against them” mentality. One of the main aspects in what the PM describes as a “Us against them” mentality derives from the very general reasoning that the PMD wants to keep a relevant stock and the MPD wants to keep the stock levels in accordance to the stock policy. This comes from the responsibilities of the departments, which are that the PMD owns the assortment and MPD owns the stock value. Furthermore, the PM mentions three more obstacles that hinder the daily operations between the departments. First of there are no real connection between the KPIs the different departments work towards. The MPD relies more on numbers generated by the enterprise resource planning system whereas the PMD relies heavily on the products themselves. This leads to a situation where a number of different work files dealing with obsolete products and write-down is used by the departments. Finally, the PM states that the departments have two completely separate systems for naming the products, which in turn can create confusion. PMD uses a national number specified by a industry association while, the MPD uses an article number that is generated by the internal enterprise system. Hence, a lot of extra work is put into understanding the different numbers between the departments.

Challenges according to the Product Manager Assistant

The PMA mentions that a problem with the product obsolescence process is that it comprises of many manual working tasks and is highly dependent on the human factor and the individuals involved. Furthermore, the communication is crucial both in terms of how it is given and received and that there needs to be openness, especially cross-functional. The PMA points out that most cross-functional communication has tended to be based on individual contact between specific employees.

Furthermore, another challenge is related to strategic directives and how they are supposed to be followed. The PMA believes that sometimes, the directives are not entirely correlated between the departments, for instance if a product should be kept

in stock or not. It is therefore important that all KPI's of the different departments are coordinated towards the same goal.

Summary

Table 4 summarizes the involvement and the perceived challenges from the PMD.

Table 4. Summary of the Product Management Department.

Respondent	Involvement	Challenges
Product Manager (PM)	<ul style="list-style-type: none"> • Product assortment • Product life cycle management • Collaboration with MPD • KPI follow up 	<ul style="list-style-type: none"> • Limited time resources • To many items to take into consideration • Cross functional communication & goals
Product Manager Assistant (PMA)	<ul style="list-style-type: none"> • Support errands • Product life cycle administration 	<ul style="list-style-type: none"> • Human factor in processes • Cross functional communication & goals • Conflicting strategic directives

4.3.3 Sourcing Department

The interview participant from the Sourcing Department (SD) was Tommy Vuori, Sourcing Manager for Heating, Water & Sanitation (HWS). Tommy Vuori is responsible for the suppliers, both through negotiations and the structure of agreements. The SD is a relatively new unit, with responsibility of work duties previously performed by the PMD. Tommy Vuori has previously been a product manager within the PMD for five years, which entailed work duties connected to the obsolescence process. From now on Tommy Vuori will be referred to as SM (Sourcing Manager).

Involvement Sourcing

The SM's main responsibilities involve contractual agreements with suppliers. These are based upon a standard-format contract of five pages consisting of aspects such as; laws, regulations, scope, service levels, return clauses, return provisions, payment conditions and other important factors. Furthermore, when asked about the involvement of return clauses the SM mentions that it is only a minor part of the complete agreement, the main focus is to make sure that the company receives a full right to return new products during the first year.

Challenges according to the Sourcing Manager

The SD was created primarily to change how Solar deals with procurement and suppliers in order to get a holistic view. So far the department has handled approximately 100 agreements, which is due to the fact that the department has focused on already existing stock when renewing agreements. One of the main reasons not all agreements are reviewed is that the SM believes that there is a resource deficiency in the department. This in turn creates a high work-load which means that a prioritization needs to be made about what to focus on.

In regards to the question concerning cooperation between the functional departments, the SM believes that there have previously been different agendas. However, it is clear that it has become better in recent times, and the SM points out that it is important to view all functions as support to the sales department. In relation to the returns agreement, the SM thinks that it is easier to handle the larger suppliers compared to the smaller ones. This is due to the fact that the larger suppliers commonly have a rigid process for how to handle returns, whereas the smaller are not used to deal with returns agreements. Furthermore, the SM mentions bargain power also impacts the return agreement negotiations, meaning that Solar is able to state demands when a supplier is dependent on their business. When asked the question whether return deals could be traded away for a discounted purchasing price, the SM makes it clear that it is not common practice. However, the returns deduction could in rare cases be increased in order to facilitate a discounted price or other positive factors. Yet this is not possible for all product segments and an example is given of lightning products which is mostly produced specifically for Solar, and therefore difficult to return to the supplier. Furthermore, the SM believes that returns are generally not highlighted within the firm, which creates a situation where there is a lot of focus on the subject during full- and half-year financial statements, in order to reduce the write-down impact. This in turn creates other problems down the line such as difficulties in fulfilling customer orders due to workload prioritization.

Summary

Table 5 summarizes the involvement and the perceived challenges from the SD.

Table 5. Summary of the Sourcing Department.

Respondent	Involvement	Challenges
Sourcing Manager (SM)	<ul style="list-style-type: none">• Contractual arrangements• Handles return clauses	<ul style="list-style-type: none">• New mentality in procurement• Resource deficiency• Cross functional communication & goals

4.3.4 Central Warehousing

The interview participants from the Warehousing Department were Carsten Sörensen, Central Warehouse Manager and Thomas Larsson, team member of the Support Group at the CW in Örebro. Carsten Sörensen's responsibilities include; control over the three warehouses, both on a strategic and operational level and KPIs such as stock value, excess inventory and workload. Thomas Larsson on the other hand has more operational responsibilities, which includes; warehouse management on a operational level, stocktaking and dealing with support issues from the headquarters. From now on, Carsten Sörensen and Thomas Larsson will be referred to as CWM (Central Warehouse Manager) and CWS (Central Warehouse Support) respectively.

Involvement

The CWM is involved in the strategic aspects that cover the operations of Solar Sweden's three central warehouses. This entails a responsibility over the daily operations with tasks such as; procurements, agreements with suppliers and arranging services for vehicles used in the daily operations. The manager is not directly involved in the obsolescence process but is often called upon when decisions are to be made regarding inventory, space shortages or other impacts that can be derived from obsolete items.

The CWS is part of a workforce that handles all of the CW support errands. This includes tasks such as stocktaking, inventory phase-in, general stock care and contact with headquarters. The only involvement the support group has with obsolete

products is on an operational basis, where picking and packing return orders to the supplier are among the primary responsibilities along with scrapping.

Challenges for the Central Warehouse Manager & Support

The primary challenge for the CWs concerns storage utilization, which is clearly stated by both the CWM and CWS as a major problem. This is due to the fact that obsolete and non-selling items are occupying large areas, which could be used for new products instead. Furthermore, this has led to the CWs having to acquire additional storage space units, either by building new pallet racking or rent additional facilities. A consequence of the storage shortage is that there is a need to constantly rearrange existing inventory to create space, which increases the overall workload. The CWM goes on to state that this is largely due to the fact that the process for handling obsolete items is rather prolonged and inflexible. A reason why is a belief from the CWS that the process involves many actors who each has authority of the product during its different stages, resulting in a lot of communication. Both the CWM and the CWS gives an example that the CW actually sees the products in storage, including both storage allocation and sale rates, while the headquarters only focus on items generated through their different work-files. This is considered a problem by the CWS as for example, headquarters can advise that an item should be returned, without knowing that the item at hand requires extra capacity vehicles in order to be transported, which results in higher handling costs. Furthermore, one of the challenges that is stated by both parties revolves around the absence of clear cost information. There are no real predetermined values which states what it costs to stock an item, at least not in the operational setting. By implementing a cost perspective for stocking each item, both parties believe that the process would be simplified.

When discussing challenges within the process, both the CWM and the CWS mentions that the suppliers have certain standards for what kind of returned items they accept. For instance, suppliers often times demand unbroken shipment packages, which can be problematic as the items commonly are sold one by one. The information regarding supplier terms is handed down from the TLA to the CWs when the return is processed. When an item is deemed to have no disposition option that can generate value, it is decided that the item should be scrapped. These decisions are

made by headquarters, and more precisely the TLA along with the PMD and not by the CW itself.

Summary

Table 6 summarizes the involvement and the perceived challenges from the CW.

Table 6. Summary of the Central warehouses.

Respondent	Involvement	Challenges
Central Warehouse Manager (CWM)	<ul style="list-style-type: none"> • Strategic and operational level • Managing three warehouses • KPI follow ups 	<ul style="list-style-type: none"> • Storage space utilization • Inflexible obsolete item process • No clear cost information
Central Warehouse Support (CWS)	<ul style="list-style-type: none"> • Operational level • Warehouse management • Stocktaking • Support issues 	<ul style="list-style-type: none"> • Storage space utilization • Communication from different departments • Returns might demand special handling • No clear cost information

4.4 Solutions suggested by the interviewees

Several suggestions of how to improve the product obsolescence process emerged during the interviews. The interviewees had a wide variety of answers and solutions to the challenges they are facing but a clear connection towards two different areas could be identified. The solutions that were discussed can broadly be categorized into Strategic and Cross-functional improvements.

4.4.1 Strategic

One of the main objectives is to create a leaner process, which requires less administration in order to identify disposition alternatives faster. There have previously been attempts to develop the product obsolescence process, specifically focusing on write-down. However, even though improvements were made, after a couple of years the results stagnated and did not persist due to lack of follow-ups. This was according to the MPM due to the fact that the feedback and follow up after the project was minimal. Participants from both MPD and PMD shared the idea of a leaner process and to reach this goal, many different suggestions were presented. Firstly, the need to limit the product assortment was mentioned by both MPD and PMD. The TLA argues that procurement is currently derived from a supplier perspective, which has led to a situation where unnecessary stock has been held. This view was shared by the MPD and the SD and was seen as a challenge for the whole company. Furthermore, the PMD is actively working on this aspect through a process called assortment-fitness. By doing this, the PM believes that a great bulk of products that are currently considered unnecessary can be reduced by a large amount. The TLA goes on to suggest that through the assortment-fitness process, a new mindset also needs to be introduced regarding how they view low-frequent items. By the guidelines that exist today these products are set to be phased out, but in some cases the view from the MPD and the PMD are not in line with each other. There were also several suggestions for how to improve the product obsolescence process that concerned the suppliers. First of, because the SD is a relatively new department with only three members, a shortage of resources was recognized by the SM. This in turn has created a situation where they have not been able to review all existing agreements as they focus on the larger suppliers first and foremost. The SM proposes that agreements should span over a longer period of time in order to facilitate an easier workload for all departments, which in turn affects the processes for both the MPD and the PMD.

The TLA states that the process requires transparency in regards to supplier information and agreements, which today can be held within the boundaries of the SD. In order to facilitate an improvement, a suggestion put forward by the TLA is to improve the supplier database that exists with more information regarding the supplier agreements linked to the obsolescence process, specifically in order to facilitate clearer supplier follow ups. The PM also suggests that in order to shorten the obsolescence process, there needs to be more alternatives linked to the disposition of obsolete products such as scraping deals, which as to date only exists with some suppliers. However, this alternative was discussed with the SM, which agreed to some extent but also points out that it is not suitable for all product categories.

Both participants from the MPD recognize that there is a disposition alternative in place for cross-country trading of products. However, the process itself requires a lot of manual processing from all involved parties. This in turn has generated a negative attitude towards utilizing the process even if it would benefit the Solar group as a whole. The TLA believes that a process improvement might improve the conditions for the dispositions alternative to be considered feasible. Furthermore, the MPM suggest that a possible improvement to the scrapping process would be to identify actors who are willing to purchase raw materials from products in order to extract additional value.

4.4.2 Cross-functional

Cross-functional collaboration was a subject that was discussed with all interview participants and everyone agrees that it needs to be improved. The SM described that the departments previously acted as solitary “silos” with limited collaboration. All departments shared this opinion but they also agree that it has been improved in recent times. However, the MPD indicated that there is a need for better communication, primarily with the PMD. In order to achieve this, improved guidelines needs to be implemented. Especially this is evident when it comes to ownership and responsibility of obsolete items. Both parties believes that ownership is a key concept, and the PM suggests that MPD should have mandate to take greater responsibility according to guidelines set by the PMD. A possible solution to the problem mentioned by the TLA regarding resource allocation in the Analytics Team

is that each different product manager should devote approximately 5 % of their time to specifically handle work duties related to obsolete products. The TLA believes that this might improve the situation since the product managers would then be involved on a routine basis. This would possibly further a situation where issues are resolved more swiftly, thereby decreasing the number of obsolete items without proper action taken. However, the PM states that each product manager has limited time on their schedule since they are busy with all of their current job obligations. These include customer visits, sales support and product related tasks, where the latter involves management of obsolete items. Their primary concern is instead to limited the number of obsolete items in the working files produced by the TLA, which they need to take into consideration and make decisions regarding. The PM mentions that there has been a tendency for the working files to contain too many products due to backlogs, and specifically state that it would ease their working situation if it were possible to distinguish the items that are not eligible for return. The PM also mentions that increasing the allowed scrapping limit for the MPD would be another option of how to limit the number of items that needs to be taken into consideration. Currently the MPD is permitted to scrap materials with a total value of 100 SEK, and a suggestion is made to increase this value to around 500 SEK. However, there are several aspects that needs to be taken into consideration when making these kinds of decisions such as; how critical the item is to the customer, for how long it has been in stock, raw material included among other things.

5. Analysis

In this chapter the empirical findings will be analyzed and discussed based upon the theoretical background. A framework for the product obsolescence process will be presented in context to the findings. Furthermore, this chapter aims to derive the arguments, which in turn will answer the research questions in the conclusion chapter.

5.1 Overall attributes

It became evident during the interviews that all the participants agreed that there are a lack of clear guidelines and directives within the product obsolescence process. There also seem to be some kind of distribution where each department involved is responsible for different disposition alternatives. However, all departments are dependent on each other in order to achieve optimal results and there is a requirement for cross-functional communication in all alternatives. These types of complex situations are something that is discussed by Ghobadi & D'Ambra (2012), who argues that cross-functional communication is crucial in order to solve complex tasks. Another important finding during the empirical study shows that Solar does not have any clear cost structure in regards to the different disposition alternatives. There is no formal cost attributed to activities involved in the process. For instance, the different costs involved in creating, managing and processing a return order, from start to finish. This in turn leads to a lack of monitoring and follow-up possibilities where costs can be put in context of benefits.

Another topic that was discussed by several interview respondents was the question of product ownership, which can be considered to be quite unclear. There is a tendency that the departments do not agree on where ownership boundaries are drawn, which furthers a stalemate situation where decisions regarding the next process step are not taken. Furthermore, similar to the issue of product ownership, the question of mandate within the disposition alternative can be considered to be unclear. This is especially the case when it comes to the handling of returns and strategic directives. The strategic directive can be imposed on another department's jurisdiction and therefore cause inconvenience and confusion between departments. This is a consequence of the departments and their senior managers specific KPIs which can be contradictory. According to Parmenter (2010) KPIs should be formulated to clearly indicate the

desired action taken by the employees and also that senior management is involved. The authors therefore believe that there is a need for the management to streamline the KPIs in accordance to each other.

It is possible to see similarities in the disposition alternatives that have been identified with the consumer behaviors identified by Jacoby et al. (1977). There are three general choices in the model where two of them are prevalent in the work conducted by Solar today. These propositions are “Keep the product” and “Permanently dispose of it”. In this case the former, products that are still demanded by the customers will continue to serve its original purpose. The latter involves three disposition alternatives with the first regarding throwing it away, which in this case is correlated to the scrapping alternative. The second approach is to sell the product, which Solar can achieve by the discounted sales alternative. Finally, the last option is to trade the product, which includes the option to arrange either a return to, or a deal with the supplier. To conclude, all of these disposition alternatives are used in order to recapture or create value but also to dispose of inventory properly. This is in line with Rogers and Tibben-Lembke (1999) who describes the purpose of reverse logistics in the same manner. Furthermore, Grabara et al. (2014) states that one of the main aims within the field of reverse logistics is for companies to become more cost efficient. In order to achieve this in the context of this case study, the current and potential disposition alternatives are analyzed. Thereafter a framework is presented with the aim to reduce costs but also to create value, in line with the theory.

5.2 Current disposition alternatives

5.2.1 Creation of supporting documents

In order to handle the product obsolescence process within the company, supporting documents are created and managed by the analytical group. As stated by the TLA, there is only one employee who has the knowledge to extract the information and therefore making the entire process dependent on a process step that as of now, is sensitive to external factors. It can be said that “the chain is only as strong as its weakest link”. Furthermore, the entire process is dependent on the work that gets done at this stage making the analysis of the data crucial.

As it stand now, the disposition alternatives that follows does not have attributed cost factors which lessens the way the analysis can allocate the best practice available. In order to further improve the process the company needs to implement a cost factor to each available disposition alternative in order to reach further process improvements and improve the flow efficiency, which is crucial to lean management (Myerson, 2012).

5.2.2 Return to supplier

Several challenges with the current returns process were identified during the empirical study. However, it stands clear that returns are the preferred and strategically the best disposition alternative available. Returning to the challenges, it is clear that there has been a habit within the analytics group to operate by their personal experience. This has had a negative impact especially when it comes to choosing suppliers, which have created a situation where not all suppliers are reviewed on a regular basis. Myerson (2012) states that for a process to be effective, there need to be a continuous improvement in the workflow to eliminate waste through the process, which have not been implemented in this case. As of now, the analytics group has primarily focused on the larger suppliers, due to smoother return processes and more products, which implies a greater total value. This can be attributed to the Pareto principle which implies that 20% of the effects comes from 80% of the causes (Kiremire, 2016). So it is theoretically practical to work in this manner. However, a lot of products and value can still be found among the surplus suppliers that are not reviewed. Furthermore, this way of working can be explained by the fact that smaller suppliers do not have as detailed agreements nor developed return processes, which furthers a situation where improvements to the current state are not made.

An interesting finding is that there is a clear divide between how the strategic and operational parties within MPD perceive the problem of resource allocation within the return process. The MPM holds the belief that the problems are exclusively due to process deficiencies while the TLA considers it to also be caused by lack of resources. As the TLA explains there is an uneven workload in the return process prior to half- and full year financial statements. This furthers the belief that both the MPM and

TLA do have a point in stating that the problem can both be attributed to a process and resource point of view. The process would improve the overall execution of return handling over a year, which would decrease the pressure for quick fixes at financial key moments. This could also be said regarding resource allocation, as it would increase the overall number of orders handled during a set time period. It is difficult for the authors of this thesis to judge what view is correct in regards to resource allocation or process deficiencies. Especially since there has been a lack of follow-up and daily routines within the return process, which makes it difficult to determine where the problem lays.

Several departments in the study also identified cross-functional communicational problems with the returns process. This is particularly evident in situations where ownership of the issue is changed between the departments involved. For example when return proposals are rejected, there is a tendency that these items receive no further processing and remain in stock since the MPD then consider the issue to be beyond their scope. Another cross-functional issue was mentioned by the CW who stated that return orders could be created that is not suitable for returns. These types of problems are common when there are several actors from different functional departments involved in a process, and this makes communication crucial. This can according to Keller (2001) be mitigated by operating in a more cross-functional composition, where information through different perspectives are shared. The suggestion by the authors of this thesis would be to determine clear ownership boundaries, which would create a situation where each department would feel more involved in the process.

5.2.3 Discounted Sales

It became evident that discounted sales through the marketplace can be considered to be an underutilized disposition alternative. In the current situation, the PMD is exclusively responsible for the management of this disposition alternative, without much influence from the other departments. Similar to the returns process, there are no daily routines or set guidelines on how the marketplace should be managed and it is in many ways controlled by the personal experience of the product managers.

What has been concluded is that the marketplace has in no way been used as a disposition alternative specifically for obsolete and write-down articles but rather to sell excess items from campaigns. However, as the disposition alternative is available, the authors believe that a proper guideline could develop the marketplace into a preferable tool used to lower write-down and obsolescence throughout the value chain. In order for this option to be viable, cooperation between the TLA and the PMD needs to be constructed, where the supporting documents should constitute the basis for decisions surrounding the choice of products. The authors believe that another approach is needed in order to use the disposition alternative for obsolete items. The TLA creates all the necessary supporting documentation, which includes important aspects such as; inventory value, write-down value and other important information previously described. This means that the TLA is in good position to determine products based upon monetary values, whereas the PMD can include their product knowledge in the process. With cooperation both departments can have a disposition alternative that helps them in reaching their own specific KPIs and goals.

5.2.4 Deal with supplier

Specials deals with suppliers were identified as a disposition alternative for obsolete products. It is however quite difficult for the authors to determine how this alternative should be improved. This is primarily due to the fact that the each deal is conducted strictly on a case-by-case basis and is influenced by factors such as; product segment, the supplier and current agreement. Furthermore, this implies that it would be difficult to establish set processes and guidelines for making deals with suppliers, unlike the improvements that are needed for the other disposition alternatives. Each deal of this type is unique and requires specific detail knowledge regarding the above-mentioned factors, and it is therefore difficult for the authors to provide suggestions for improvement. These types of arrangement generally concern two departments, the PMD and SD, where the former is in charge of initiating the deals. The authors does not think that there is a great need for improved cross-functional collaboration in this disposition alternative due to the fact that it is currently considered a marginal option.

5.2.5 Scrapping

The alternative to dispose of products without any monetary gain is thought of as the last resort in the disposition chain at Solar. This is undoubtedly the right reasoning as all other alternatives can generate some sort of revenue on obsolete items. However, as the PM states, there is a procedure called a scrapping deal, which means that an agreement with the supplier can be made regarding shared costs of scrapped products. As further stated, the proceeding is not widely used, however it can limit losses and should therefore be a process to look closer at. The procedure itself was not vastly covered in the interviews, which, according to the authors seemed to depend on a lack of understanding and different opinions regarding if the underlying process actually generates positive results in the end.

One clearly identified option in order to improve the process is introduced by the MPM. It involves collaboration with external parties who are willing to purchase waste material. As the company deals in electronics and HWS equipment, a lot of raw materials that value could be extracted from is currently being disposed. This could create revenue in an otherwise exclusively cost based disposition alternative and should be investigated further.

In order to achieve a smoother work-flow and in accordance to what the PM saw as problematic with the overall product obsolescence process, the working-files need to be trimmed down. This can be achieved through the scrapping process, but in order to attain this goal the MPD needs to receive greater authority to scrap items. This is in line with what Wild (2007) states, that inventory controllers should have greater responsibility since other departments seldom understand the challenges related to the subject. These guidelines need to be set in accordance to what the PMD deems to be reasonable from a product management perspective. This will decrease the needed communication regarding low value items and implies that the product managers can focus on managing a smaller amount of items. The current limit of 100 SEK is considered to low, both according to the PM, MPM and the authors. The plan to increase this figure is already in consideration within the company and this is in line with Wild (2007) who argues that costs should not exceed benefits. According to the authors, this figure should be set in accordance to the cost of handling a return order. This is due to the fact that returns are seen as the primary disposition alternative,

which bears a specific cost for each order. Hence, there is no additional value in returning items with a lower value than the total cost of the return process. However, the actual figure depends on such a large number of different factors that it is difficult for the authors to provide accurate suggestions regarding the limit.

5.3 Potential disposition alternatives

5.3.1 Intra Company Trades

Intra company trades were discussed with both the MPM and the TLA during the interviews, and it is a disposition alternative both the authors and the interviewees believe is underutilized. In accordance to Jacoby (1977) the choice of trading products was recognized as a disposition alternative. Instead of returning an item to the supplier, which is then later purchased by another Solar branch, the possibility to intra trade should be considered a major opportunity. In fact, as stated by the TLA the data and guidelines that are required is already in place, which, implies that it is an untapped resource. Specifically the data that is produced by the analytics group on a monthly basis, which includes information regarding what items each country demands could be seen as valuable. Yet, this data is not taken advantage of in any structured manner and can currently be seen as a waste of resources. Furthermore, this disposition alternative is mostly applicable on write-down items since obsolete items often are phased out from all country specific markets. There were several obstacles mentioned by both the MPM and TLA, such as cultural issues and manual processes. However, the authors believe the gains of using this alternative will have a greater benefit on the company than the drawbacks mentioned

It was estimated that 4-5% of the total write-down value could be traded internally, which would greatly impact many areas such as, working files, storage utilization and write-down value. By reducing the write-down, more resources could be used to conduct follow-ups on obsolete items, which leads to a better functioning obsolescence process throughout the departments.

5.3.2 Direct Sales

A disposition alternative that was not discussed throughout the interviews but could be a secondary approach is the concept of targeting customers for direct sales. In

accordance to Jacoby (1977) and Hanson (1980) the choice of selling products, similar to discounted sales, was seen as a disposition alternative. This would imply that the PMD would identify obsolete items, which could be suitable and then contact relevant sales personnel. This disposition alternative would be compared to the previous alternatives which require detailed customer knowledge. The right customers and regions could be pinpointed by using sales statistics.

However, it could be problematic to focus targeted sales on write-down and obsolete items since the status of these is continuously changing. Another drawback in using direct sales as a disposition alternative for obsolete items is that it could also be conflicting with Solar's current strategy of focusing on certain products. Hence, it could be confusing for the sales personnel if they are asked to specifically focus on obsolete items. The authors therefore believe that this alternative would only be applicable to items with a high value, since there would be a cost attributed to identifying items, contacting sales personnel and allocating customers. The cost of putting items through these different targeted sales efforts is difficult to estimate in precise terms. Similar to the suggestions regarding the scrapping alternative, the monetary limit for using targeted sales on obsolete items should be set by the PMD.

Table 7 below describes the significance of each discussed disposition alternative and the actors involved. This information is derived from the case study.

Table 7. Summary of disposition alternatives

Process Step	Involved Departments	Significance
Analysis	Material Planning	<ul style="list-style-type: none"> - Create working files - Establish viable sequence of disposition alternatives
Return	Material Planning	<ul style="list-style-type: none"> - First priority - Return product to supplier
Intra Company Trade	Material Planning	<ul style="list-style-type: none"> - Reduce stock by trading - Internal cooperation - Write-down applicable
Discounted Sales	Material Planning Product Management	<ul style="list-style-type: none"> - Low cost factor - High involvement to discern product viability
Supplier Deal	Material Planning Product Management Sourcing	<ul style="list-style-type: none"> - Involves support purchase - Case-by-case
Direct Sales	Material Planning Product Management Sales	<ul style="list-style-type: none"> - Products with high value or specific demand - High involvement to discern product viability
Scrapping	Material Planning Product Management Central Warehouses	<ul style="list-style-type: none"> - Universal alternative - “Last resort” in the disposition alternative sequence - Decision based upon Costs vs. savings

5.4 Disposition Alternative Framework

Based upon the analysis of Solar’s obsolescence process and how they can handle obsolete items, the following framework has been produced. Based upon findings throughout the thesis the authors have compiled a decision framework that describes in what order and how the different alternatives should be put into use.

The fundamental reasoning behind the sequential ranking of disposition alternatives derives from the increase in complexity, monetary gains and number of actors involved in each step further described in Table 7. However, the authors acknowledge

that the rankings could be altered to fit different company profiles. Bearing in mind that Solar carries an extensive product portfolio with different requirements, this framework can be seen as a general model. Hence, the need for the framework to be further adjusted according to the different values, limits and levels that correspond with each department's goals. Furthermore, the framework should include monetary limits for each process step in order to establish which process steps that are viable for each specific item. When the costs versus savings limit has been reached the final alternative, which is scrapping, will be performed in order to completely end the life cycle of the product. This will reduce costs in terms of inventory but also improve the process in which obsolete items are handled in a cost effective way. The framework will facilitate what the theory states about reverse logistics, which is that the disposition should create value and also be cost effective (Grabara et al., 2014; Rogers & Tibben-Lembke, 1999) Figure 8 shows the disposition framework composed by the authors.

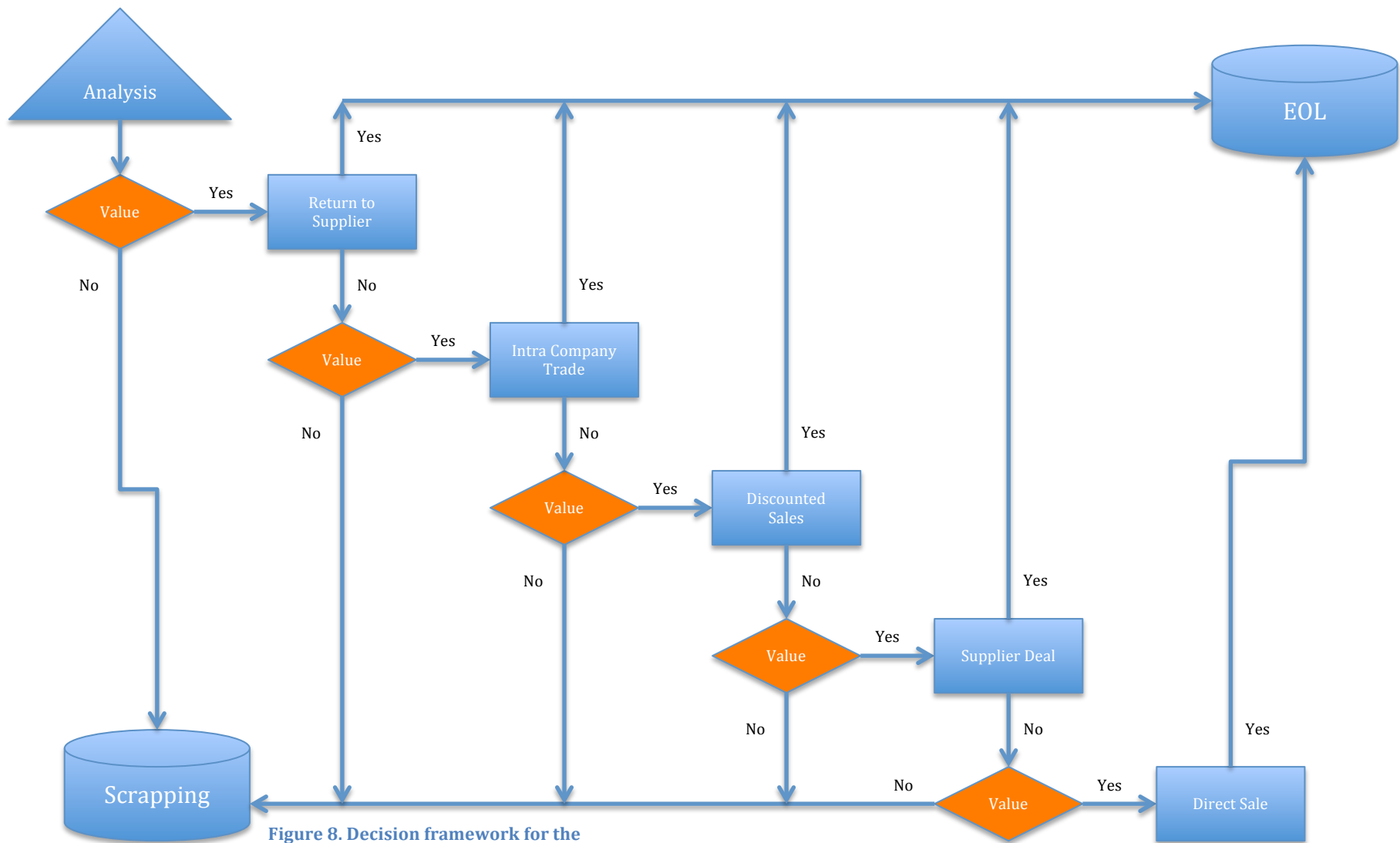


Figure 8. Decision framework for the product obsolescence process

To describe the framework in detail an explanation of the figures illustrated in Figure 8 will follow.



Figure 9. Analysis

Figure 9 illustrates the Analysis process which is described in chapter 4.2. This step initiates the product obsolescence process and several aspects of the products are taken into consideration such as, time in inventory, value, time as obsolete and so forth. The analysis also determines if the products should continue through the process steps or if the product will remain in the original product assortment. For instance, if it is deemed that the customer demand for the product will continue, the item is then disregarded.



Figure 10. Value determination

In the analysis phase a value will be determined for the product based on set premises by the company. This value illustrated in Figure 10, will have a deciding impact on what route the product will take in the process framework. For example, if the products value is below the cost of the following process (No), the decision will be made to not proceed and instead scrap the product. If the value exceeds the cost (Yes) the product will be processed through the following disposition alternative. The Yes/No alternatives in Figure 8 from the value process step is therefore based on if there is perceived value or not that exceeds the cost of proceeding through the following disposition alternative.



Figure 11. Disposition alternative

Figure 11 illustrates the different disposition alternatives that have previously been discussed. The process have two different outcomes, either it is successful (Yes) and the product will thereby reach the end of its lifecycle (EOL) or the disposition was unsuccessful (No). In case of the latter, the product is reassessed in the process framework and the cost versus savings is once again considered for the next process step.



Figure 12. End of Life (EOL)

If a disposition alternative is successful (Yes) the product will end its lifecycle, which is illustrated in Figure 12. If a product reaches this solution a monetary value will be gained through the disposition alternative.



Figure 13. Scrapping

Figure 13 illustrates the scrapping alternative. If a product is deemed to have too large attributed costs (No) compared to the gains from the next disposition alternative, the product will be scrapped.

Even if this framework is based on the case study conducted at Solar, it could be considered as a general model that is applicable for other companies in a similar business segment as well. This is because most of the disposition alternatives included in the framework can be seen as accessible for a majority of other companies. By discerning the available and currently unused disposition alternatives, the authors believe to have covered the basic layout of what can be constituted as viable decision framework for the product obsolescence process, both at Solar as well as in other business segments. The framework will further an understanding both within the company, and also for external parties to reflect on their disposition process. The benefit of using this framework is essentially that it will lead to a better structure

within the product obsolescence process, both in terms of visibility, value creation and cost management. This is partially due to the fact that the division of responsibility and product ownership between the different disposition alternatives will be made clearer, and that each department involved will know when they are required to take action. In this way, the problem of items with no further actions taken will also be mitigated. The proposed framework also includes additional benefits for Solar since it consists of two potentially new disposition alternatives. If these are put into practice it could provide new ways of disposing obsolete items.

The fundamental proposal is also to assign the scrapping alternative a more central role within the process. The mandate and the monetary limit currently assigned to the MPD should be increased, which would reduce the time period until action is taken. Furthermore, as mentioned the scrapping alternative should always be assigned as the last option in the process so that the obsolete item will be completely removed from the inventory. Finally, this option should also include the external disposition alternative of selling valuable raw material as stated by the MPM.

6. Conclusion

This chapter presents the answers to the research questions and the most prominent conclusions drawn from the empirical findings and analysis. A case study approach was used to focus on the product obsolescence process at a large supplier of electronics and HWS products. The study highlights that the process is complex, closely linked with cross-functional collaboration and dependent on a wide variety of factors.

The first research question addressed the following:

“What characterizes the product obsolescence process at an electronics wholesaler and what are the main features?”

The process can be broken down into two major attributes, characteristics of the process and the complexity within. First of, the process is characterized by the fact that there is a variety of different disposition alternatives, each with different benefits and drawbacks that are attributed to each process. In order to establish a suitable disposition alternative for each item, the initial analysis phase is crucial in determining suitable options. One of the primary findings involves the difficulty to determine the right disposition alternative for each particular item. In the case study, the company demonstrated that the first priority involved returning items to suppliers. However, after this initial step, the follow up procedures were lacking and could lead to items not been processed. Hence, the choice of disposition alternative was something that was not cemented in guidelines but rather handled on a case-by-case basis. This can be attributed to the second attribute, which is the complexity within the obsolescence process. It became evident that the process involves a number of actors both internally and externally. This in relation to the immense quantity of items and suppliers creates a situation where proper guidelines are both, difficult to formulate but also crucial for a functional process. What can be stated is that the product obsolescence process can be considered to be a rather invisible function where actions have limited direct impact, which also furthers the fact that many within the company do not prioritize it.

The second research question addressed the following:

“What are the most common challenges for an electronics wholesaler when dealing with product obsolescence?”

The primary challenges with obsolete items that was identified in the case study can be related to guidelines, cross-functionality and product ownership. In regards to the first mentioned, it has become evident during the thesis that there is a need for clear guidelines in order for the process to function well. In the case of Solar, there exist guidelines but these are not necessarily always followed in detail and in some instances issues are handled on a case-by-case basis. Furthermore, a lot of work duties seem to be based on personal experience and knowledge, which in some cases can be appropriate but it also makes the process dependent on the individual.

Challenges related to cross-functionality were also identified, especially in regards to communication between departments. As the obsolescence process involves many departments and actors internally and externally a challenge is to facilitate a clear and transparent involvement between departments. As of now, the different departments can have conflicting goals in regards to KPIs and other measurements which might hinder their collaboration with regards to obsolete items.

Challenges within the process related to product ownership were also acknowledged. It was clear that actions tended to be delayed when returns to suppliers were rejected. The lack of a clear framework and guidelines as previously discussed is a major contributor to the problem. It is evident that the question of product ownership throughout the product obsolescence process can be considered to be vaguely defined, which creates a situation where no further actions are taken on items. The problem is exaggerated further by the fact that many different departments needs to be involved through the process and the division of responsibility between the departments is not always clear. Furthermore, conflicting strategic directives was given from a higher-level, which sometimes created further confusion among the actors involved.

The third research question addressed the following:

“How should product obsolescence be handled when it occurs and what factors need to be taken into account?”

The conclusion of this thesis is that in order for product obsolescence to be handled, there needs to be set guidelines and processes. The most important step in the product obsolescence process is the primary analysis of the obsolete items. Where and how they originated along with determined disposition alternatives are key factors for the evaluation of the process. This can be achieved by using the proposed disposition alternative framework developed in this thesis. By assigning the disposition alternatives to the departments by their involvement, a clear ownership structure will be formed. It will also establish clearer mandates for each department in order for actions to be taken on items. Furthermore, the cost for each disposition alternative and the valuation of the product will constitute significant factors when it comes to the handling of obsolete products through the framework.

In order for this framework to be successfully implemented a need for better cross-functional communication is required. However, the authors believe that that a need will only occur during the implementation and creation of guidelines stage. After that the mandates created will allow departments to act more independently, which will reduce the resource utilization.

6.1 Recommendations for future research

The authors perceive that the theoretical background covering product obsolescence from a wholesaler perspective is rather limited. Current theory tends to be based upon return logistics in B2C or B2B markets, where only one of the disposition alternatives used in this case is covered. However, in the case studied in this thesis, there is another point of reference. The company studied is located in the middle of the supply chain, which creates a new perspective in regards to the disposition alternatives presented.

Future studies could also investigate the product obsolescence process from a quantitative perspective, instead of using a qualitative approach, which was done in this study. The primary benefit would be the possibility to calculate exact cost involved in each disposition alternative involved. These values can thereafter be incorporated into the proposed framework, which would make the model complete. However, it would be difficult to generalize the results using a quantitative approach, since the values and findings would be to company-specific.

It would be interesting with studies that focus on the product obsolescence process through different perspectives. A suggestion would be to investigate multiple wholesalers, or look at the problem from an aggregate industry level. Future studies could also be to investigate the problem from the point of view of other actors in the supply chain, preferably suppliers, in order to distinguish differences.

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8. Appendix

8.1 Interview questionnaire

8.1.1 Maria Gustafsson, Head of material planning, Supply Chain: 30th March 2016

- What is your title and job description?
- In your opinion, what is the root cause of the problem with obsolete products?
- How would you rank the different consequences of obsolete products? For instance, Write-down value, storage costs, administrative costs etc.
- Why and how do obsolete products occur? What different characteristics do they have, Eg. Supplier stop sales, lacking in sales etc.
- Would you describe the problem as a lack of processes, resources, communication or some constellation of the three as a cause to the problem?
- What are the goals right now? How does your dream scenario look like?
- Has there been a previous attempt to work with these questions? If yes, how did it go?
- Is there any other department that works with obsolete and write-down material? Can you see any challenges with this?
- Who has the burden of responsibility when it comes to obsolete products?
- What steps or processes will a obsolete material pass through?
 - Which is/are the most occurring process/es?
 - Which is the best?
 - Is there any process of disposition that as of now is not used, but could be seen as interesting?
 - Scrapping, when and why? Is there any sustainability processes involved?
- Do you feel that there are too few processes today to regulate you daily operations in regard to obsolete products?
- What costs can be related to obsolete products?
- What other factors can affect obsolete products?

8.1.2 Therese Mård, analytics group, subgroup to Material Planning 31st March 2016

- What is your title and job description?
- What are your responsibilities?
- How much of your working time do you spend dealing with obsolete items?
- In your opinion, how are the responsibilities when it comes to handling of obsolete items structured? How would you prefer it to be structured?
- What are the problem areas that you can identify that is related to obsolete items?
 - Internal problems, for example processes, working files (spreadsheets etc), cross-functional communication?
 - External problems, for example suppliers, returns agreements etc
- Would you describe the problem as a lack of processes, resources, communication or some constellation of the three as a cause to the problem?
- Has there been a previous attempt to work with these questions? If yes, how did it go?
- Do other departments work with obsolete items as well?
 - If so, is there any collaboration?
- How does your dream scenario look like?
- How many returns are processed each month?
 - Internally
 - Externally
- How many of the processed returns are rejected by suppliers?
 - If you receive a “No” what is the next step? Do you contact other departments or managers?
- Is the return process similar for all suppliers or are there any differences?

8.1.3 Jonas Sjödal, Manager in the Product Management Department: automation & industry, 1st April 2016

- What is your title and job description?
- What are your responsibilities?
- How much of your working time do you spend dealing with obsolete items?
- Would you prefer a situation where the material planning/logistics department bare the responsibility of obsolete items?
- What are your work duties when it comes to obsolete items? Are there any set processes or guidelines for the marketing department?
- What are the problem areas that you can identify that is related to obsolete items?
 - Internal problems, for example processes, working files (spreadsheets etc), cross-functional communication?
 - External problems, for example suppliers, returns agreements etc
- How does the marketplace (marknadstorget) function?
 - What are the positive and negative aspects of it?
 - What kinds of items are suitable? Campaign, obsolete or new items?
 - Are there any specific guidelines in regards to price, discounts and the time that the items are visible?
- What is assortment fitness and how does it work? Does it have any connection to material planning/logistics routines such as write-down and 0-8 item pickings?
- How do you perceive the cooperation between the different departments involved with obsolete items?
 - What are the positive and negative aspects of it?
- What kind of criterias do you base scrapping decision on and what are your work duties related to this?
- Do you currently perform any target sales and how does that work in practice?
- Do you currently perform any special return deals with any of your suppliers?

8.1.4 Tommy Vouri, Sourcing department: 1st April 2016

- What is your title and job description?
- What are your responsibilities?
- How much of your working time do you spend dealing with obsolete items?
- Do you have any contact with other departments regarding obsolete items?
- What are your work duties when it comes to obsolete items? Are there any set processes or guidelines for the sourcing department?
- How do you perceive the cooperation between the different departments involved with obsolete items?
 - What are the positive and negative aspects of it?
- Is there any set process for how you negotiate return deals?
- Would you say that the returns agreement is a significant part of the general supplier contract?
- Are there any problem areas when it comes to returns agreement in supplier contracts? For example bargain power or standardization?
- Is it ever the case that some suppliers are not used to handle returns?
- What is your opinion on scrap agreements with suppliers and when do you think it is suitable?

8.1.5 Anneli Johansson, Product Management Department: 4th April 2016

- What is your title and job description?
- What are your responsibilities?
- How much of your working time do you spend dealing with obsolete items?
- Would you prefer a situation where the material planning/logistics department bare the responsibility of obsolete items?
- What are your work duties when it comes to obsolete items? Are there any set processes or guidelines for the marketing department?
- What are the problem areas that you can identify that is related to obsolete items?
 - Internal problems, for example processes, working files (spreadsheets etc), cross-functional communication?
 - External problems, for example suppliers, returns agreements etc
- How does the marketplace (marknadstorget) function?
 - What are the positive and negative aspects of it?
 - What kind of items are suitable? Campaign, obsolete or new items?
 - Are there any specific guidelines in regards to price, discounts and the time that the items are visible?
- Do you currently perform any target sales and how does that work in practice?
- What is assortment fitness and how does it work? Does it have any connection to material planning/logistics routines such as write-down and 0-8 item pickings?
- How do you perceive the cooperation between the different departments involved with obsolete items?
 - What are the positive and negative aspects of it?
- What kind of criterias do you base scrapping decision on and what are your work duties related to this?
- Do you currently perform any special return deals with any of your suppliers?

8.1.6 Tommy Larsson, Warehouse support staff: 12th April 2016

- What is your title and job description?
- What are your responsibilities?
- What are your work duties related to obsolete items? How is the division of responsibilities structured and what kind of mandates do you have?
- Do you have any workfiles for identifying obsolete items? What kind of data/statistics are these based on?
- What types of challenges do you perceive with obsolete items from a central warehouse perspective? What kind of problems do they create?
- How would you rank the different consequences of obsolete products? For instance, Write-down value, storage costs, administrative costs etc.
- What costs can be attributed to obsolete products?
- What are your opinions regarding the cooperation between the central warehouse and headquarters?
- What happens after a decision to scrap a specific product is taken? Who is in charge of these decisions and are there any directives that need to be followed?
- Could you identify any challenges when it comes to returns to suppliers?

8.1.7 Carsten Sørensen, Warehouse manager: 20th April 2016

- What is your title and job description?
- What are your responsibilities?
- What are your work duties related to obsolete items?
- Do you have any workfiles for identifying obsolete items? What kind of data/statistics are these based on?
- What types of challenges do you perceive with obsolete items from a central warehouse perspective? What kind of problems do they create?
- How would you rank the different consequences of obsolete products? For instance, Write-down value, storage costs, administrative costs etc.
- What costs can be attributed to obsolete products?
- What are your opinions regarding the cooperation between the central warehouse and headquarters?
- What happens after a decision to scrap a specific product is taken? Who is in charge of these decisions and are there any directives that need to be followed?
- Could you identify any challenges when it comes to returns to suppliers?