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# What to do when forecasting seems out of fashion?

A study on a fast growing fashion company

Master thesis within International Logistics and  
Supply Chain Management

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# **Master Thesis in International Logistics and Supply Chain Management**

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## **Abstract**

### **Problem**

The Fashion Company (TFC) is a Swedish fast growing Fashion Company with suppliers and customers all over the world. Until now, TFC has kept up a reputation of a reliable distribution process to customers in which delivery dates are continuously met. Traditionally, the company has relied upon an early forecast as a part of their planning process. Inaccuracy in that forecast leads to implications for the ordering process towards suppliers, which so far luckily have been manageable. However, the forecast seems to follow a trend of more and more inaccuracy for each season. If this trend continues, TFC are reluctantly aware of that the problem will affect their ability to fulfill customer delivery promises and damage their reputation.

### **Purpose**

The purpose of the paper is to investigate the forecasting process and problems and also the underlying conditions affecting this process.

### **Method**

A qualitative method was chosen on the basis of the purpose. To get a deeper understanding of TFC and its supply chain and to identify the main problem area, a pilot study was used prior to the main study. Mainly personal semi-structured interviews have been conducted. Email conversations have been a complementary to the personal interviews. The respondents from TFC were four people from the logistic department and one from sales department.

### **Conclusion**

TFC's current forecasting practice can be improved. However, as the nature of fashion products in themselves are very hard to predict TFC's main problem will not be solved by continuously depending on accurate forecasting.

Instead dependency on forecasting should be decreased by focusing on cutting lead times or reaching more flexible terms with suppliers.

By both improving forecasting accuracy, in accordance with recommendations proposed in this study, and at the same time re-considering and upgrading the role of lead times and flexibility as factors in the supplier selection process, TFC can minimize their experienced problem.

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# 1 Introduction

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*This chapter provides the reader with an introduction to the subject of interest. The background leads to a problem discussion which in turn leads to the formulation of the purpose.*

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## 1.1 Background

*“If we continue our logistics like today, we may as well choose to go out of business” (TFC, 2006)*

Companies nowadays have a hard time competing in an industry if they work in isolation. Before, competition was between firms at the same level in the production process (Lumus & Vokurka, 1999). This situation has changed into a supply chain competition perspective, which stretches from first supplier to end customer. As a response, firms must engage in supply chain networks as a way of reaching competitive advantage (Dam Jespersen & Skjøtt-Larsen, 2005).

“Globalization” is the term that has been used widely the past decades to describe the world we are living in. It involves many aspects of changes such as structural changes in trade, economics, products and technology and the emergence of international and global organizations (Yaw & Smith, 2001). The term has attained a lot of focus and practical application during the latest decades. It can be explained in terms of product/market breadth and the geographic scope of business and seems to be connected with something positive. However, with globalization follows difficulties not found in traditional Supply Chain Management such as; substantial geographic distances, added forecasting difficulties, matters of national economic policies and infrastructure inadequacies (Pollin, Troutt & Acar, 2005).

Fashion markets, by their nature, demand highly responsive logistics support. Therefore, the trend towards global sourcing as a way to reduce costs should be seen as a paradox. Instead of shortened supply chains, physical flows are covering thousands of miles before reaching the end consumer (Christopher & Peck, 1997). Traditionally the industry is characterized by strong supplier power, long lead times and complex and inflexible supply chains. Due to supplier power, flow of goods was relatively easy to control and predict. Today, end consumer power has strengthened which has led to an increasing need for adaptability and integration within supply chains. It is now important to minimize lead times to become less vulnerable to volatile trends decided by unpredictable moods of end customers (Barnes & Lea Greenwood, 2006). As consumers today uses fashion and clothing as a way of expressing themselves and exercise freedom to choose independently, trends have become more difficult to predict, at the same time as there are more niche segments to cover (Agin, 2004). For the mass market, dependence on celebrities as trend originators have become more important than ever, meaning that trends can emerge overnight due to celebrity exposure in media. Fast-fashion giants H&M and Zara have successfully, thanks to technology and globalization, been able to turn their industry into a faster-paced business. These companies possess resources to rapidly react to changes in end consumer demand within a couple of weeks (Agin, 2004).

But for smaller actors in the industry their individual power may not be enough to control the supply chain in general and upstream in particular, where fabric suppliers and factories traditionally are to blame for long lead times. At the same time they must find a way of coping with volatile end consumer demand, to avoid exceeding stock or stock-outs due to

miscalculations in forecasts calculated several months in advance of the season. According to Halley and Guilhon (1997) small actors both can and must focus on improving their logistics to reach overall better performance. When adding the dimension of a fast growing company, the problem gets even more critical. Even though fast growth in general is regarded as something desirable, growth figures in the region of 30% is not manageable. This kind of excessive growth leads to a risk that the company may not be able to fill customer orders and meet rising demand for products (Bradford, 1997).

However, yet very few researchers have considered logistics development in small firms (Halley & Guilhon, 1997). Therefore, this subject can be seen as both interesting as well as necessary to study.

## **1.2 Problem discussion**

The Fashion Company (TFC) is a fast growing Swedish Fashion Company. The company has had annual growth of sales since the start of the company in the early 1990s. In 2006 the company's annual report showed a turnover in the region of 35 million euro. Today the company is active in some 13 different countries and has suppliers in Europe and Asia. TFC has during the latest years entered several new markets and are targeting that their substantial growth will continue. TFC is aware of that it will mean growing pressure on their logistics. The company relies on a strong brand image and reputation and their customers expect a high service level. Promised delivery dates must be met.

Until now, the company has relied on small ad-hoc changes when improving their logistic and supply chain activities. It has worked well, but during the last year TFC's logistics department felt that their current way of working resulted in more problems than acceptable, for example in terms of incorrect forecasts, capacity problems at the warehouses and insufficient information management handling. Logistic performance has high priority at TFC and they are open for external help to identify where and how to take action in order to stay ahead of problems before they grow too big to manage.

During the pilot study (chapter 2.3), a number of issues were identified that could be of interest to investigate further. One of these was expressed as a forecasting difficulty during the sell-in period. This period starts approximately six months prior to a season (a "season" is the period when the collection of clothes is available to end customers in stores). The sell-in period lasts for about ten weeks during which TFC's sales people and agents present the upcoming collection to customers and collect orders. These orders are then used by TFC to book fabrics from suppliers and production capacity from manufacturers. However, due to external factors such as production time, fabric availability and other lead times, an initial order must be placed almost immediately after (or sometimes before) the sell-in period has started. In other words, TFC must place an order before they know how much they will need. After the initial order, there is room for a limited degree of adjustment (depending on for example type of fabric, supplier or manufacturer) until the order is final. Thus, it is of big importance that the initial order is as accurate as possible, to avoid buying too much or too little. The last year TFC experienced a bigger than acceptable inaccuracy in the forecast from which the initial order was generated. After a lot of effort and understanding suppliers, the situation was solved that time, but in the future TFC is afraid that the problems can grow bigger than what is manageable. Therefore, they are eager to find a solution as soon as possible. With the predicted growth in mind, the company

expects to double its revenue over the next four years, TFC cannot afford to lose customers due to poor logistic performance.

This problem discussion leads us to the following research questions:

- Is the current forecasting method causing TFC's main problem and, if so, can it be solved by an alternative forecasting method, why or why not?
- What underlying conditions could TFC take action against to decrease the dependence on accurate forecasting in the planning process?

*To answer these questions, it is necessary to examine the following supporting questions:*

- How is forecasting made and used during the planning process?
- What factors should be taken into consideration concerning forecasting within the fashion industry and what does it imply for alternative forecasting methods available?
- What underlying conditions are the planning process dependent upon and how are they related to the problems experienced?

### **1.3 Purpose**

To investigate the forecasting process and its problems and also the underlying conditions affecting this process.

### **1.4 Delimitations**

The initial pilot study pointed out different problems for TFC. Several areas were identified, which could be part of the study. However, due to the time limit for this research delimitation was a necessary step to do. When adding delimitation to this research, a specific problem could be analyzed deeper rather than touching several issues on the surface.

#### **Information system**

Naturally, information technology holds a central role in the area of forecasting in terms of generating reports and analyzing data patterns. Therefore, it could also have been regarded as an important aspect to consider in this paper within the area of information management. However, TFC is currently in the middle of a process to implement a new version of their information system. The new system will include many changes related to these issues and all are not yet decided upon. Therefore, analyses and studies made on the system currently in place would have had limited usefulness as soon as the new system is implemented. Based on these arguments, this study will not address the information management perspective other than in general terms.

#### **Capacity problem**

During the pilot study it became evident that TFC felt that they had grown out of their current warehouse. This question has high priority within TFC and is currently investigated by external consultants as well.

A decision had to be made about how extensive studies that could be made at the warehouses. Due to the time limitation of this study it was decided that no closer look was possible, neither in Stockholm nor in Gothenburg. However, the warehouse will not be left unmentioned in the thesis, but the only information source concerning this topic will come from the TFC headquarter.

## 1.5 Definitions

In this part some central definitions are presented and described in what way they should be interpreted.

The terms sell-in season/period, planning and sales processes will be used extensively in the paper and are at the same time closely connected. To avoid misinterpretation the following paragraphs aim to clarify these key concepts.

### **Sell-in season or sell-in period**

This is to be considered as a period in time rather than a process. The period starts about six months before a collection will be available to end customers in stores. During the period, TFC sales people books meetings with customers (stores). During the meetings they show the collection and collect orders. The period lasts about ten weeks.

### **Sales process**

The sales process consists of the sales related activities that occur during the sell-in season. In short, TFC's sales people book customer meetings during which they show the upcoming collection and then collect customer orders.

### **Planning process**

Forecasting is a part of the planning process, where sales data from the sales process is used as input. The planning process aims to provide reports such as what quantities to order from suppliers and when orders must be placed to meet promised delivery dates.

## 1.6 The structure of the Thesis

A theoretical background, a problem discussion leading to the purpose and an introduction to TFC is given in *chapter 1*, the present chapter.

*Chapter 2* presents the methodological considerations that have been taken for this study. The methodology is chosen based on the characteristics of the problem and the objective of the study. The chapter presents the authors' approach to the research as well as a theoretical view of the method. Finally, the chapter describes practically how the research has been conducted.

The theoretical framework, used as a theoretical base for the analysis is presented in *Chapter 3*. It contains both fashion industry specific theory as well as general Supply Chain Management references. The chapter also presents literature that has been important in the data collection preparing phase.

The empirical findings are presented in *Chapter 4*. The beginning of the chapter presents a background of the company, which is followed by findings from the pilot study. The rest of the chapter focuses on empirical findings within the problem area specified in *Chapter 1*.

The analysis is found in *Chapter 5*. In the chapter, empirical findings from *Chapter 4* are discussed and analyzed by applying theories from *Chapter 3*. The objective with the analysis is to identify matches and mismatches between theory and empirical findings and, with awareness of the unique setting and position of the firm as well as the environment it operates within, the analysis eventually leads to conclusions in *Chapter 6*. Finally, the thesis ends with *Chapter 7* which includes criticism of the study and proposals for further research.

## 2 Methodology

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*This chapter aims to give the reader an understanding of how the research has been conducted. Initially, a discussion is held to give the reader an understanding for what motives that have influenced the author's methodological choices. This is followed by a description of how the research has been conducted.*

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### 2.1 Research perspectives

In this research a single company and its environment was studied. From these findings, relevant theories were applied. This is, according to Andersen (1998), an inductive approach. Andersen (1998) states that induction is when we from a single happening close ourselves to a principle or general law. The author states that the researcher should start from an empirical part and in the end conclude general knowledge about theory. Deduction is the opposite of induction in which the researcher approach the problem in a proved way. This approach is used when the researcher would like to prove a thesis. In our research we do not have a thesis to prove and therefore the deductive approach would have had limited applicability.

### 2.2 Choice of method

According to Lekwall and Wallbin (2001) there are two types of research methods, qualitative approach and quantitative approach. Both methods generate empirical data but with different attributes and in different ways.

There is a clear difference between the two approaches where, according to Patel and Davidsson (2003), the quantitative approach is preferred when a large selection is used and where statistical result is a base for the analysis. The qualitative approach is used when the researchers are seeking for deeper answers to questions.

Andersen (1998) and Holme and Solvang (1997) agree on this and adds that a qualitative approach generates deeper knowledge from respondents than the quantitative approach.

This study has investigated work and activities at TFC in their natural setting. The research is therefore context bound to TFC, meaning that the researchers must be aware of the setting and situation for TFC throughout the work. These initial starting points motivate a qualitative approach for the study. According to Holloway (1997) the qualitative approach consists of seven main elements:

- Researches focus on everyday life of people in natural settings
- The data have primacy; the theoretical framework is not predetermined but derives directly from the data.
- Qualitative research is context-bound.
- Qualitative researches focus on the views of the people involved in the research and their perceptions, meanings and interpretations.
- Qualitative researches describe in detail: they analyze and interpret; they use 'thick description'.

- The relationship between the researcher and the researched is close and based on a position of equality as human beings.
- Data collection and data analysis generally proceed together and interact.

### 2.3 Pilot study

According to Shkedi (2005), every research project is built up on previous knowledge. This knowledge can be based on personal knowledge or on available and relevant literature. However, sometimes the gap between the current knowledge and what we seek to learn is too big. There might be general points of interest and a blurred picture of where the researchers want to go, but due to uncertainty, and lack of knowledge, it becomes difficult to articulate good research questions and focus the study. The above described situation applied to this study. TFC wanted an investigation to be made within their current logistics activities. Ideally, the outcome should be new knowledge about some issues that could be addressed in the future. However, what direction the study should take is were not clear, therefore the study needed to overcome the gap, described by Shkedi (2005).

In such situations a pilot study can be an important tool to direct the researchers when defining problem questions and planning the project. This pilot study will then be the link between general knowledge which is possible to grasp in the initial stage, to the type of knowledge that we seek to know. This tool aims to clarify the focus and shine light on issues that the study could address. The phase helps in focusing the study and might as well direct the study to new elements of relevant literature. The outcome of the pilot study can also be used to formulate a proposal about what the direction the study will take, which can be presented to the assignor of the study, prior to continuation (Shkedi, 2005). Based on this discussion, the research question and purpose have been formulated after the realization of a pilot study.

When conducting a pilot study, the data collection phase should be similar to the data-collection procedure for the entire study. This has been applied in this study and the data collection procedures will be discussed more in depth in chapter 2.6. However, in accordance with Shkedi's (2005) recommendations, the analyze phase of the pilot study is a bit simpler than when analyzing the entire study. In general it means that the purpose of the pilot study is limited to the above described objectives. Therefore it is accepted to use reflective analysis, based on general impressions and thoughts. In this process the researchers gets a larger picture of the potential of the full study. Later, it is also acceptable to use the information from the pilot study in the larger study, if the researcher thinks it's applicable (Shkedi, 2005).

In this study, an initial mapping step has been conducted which will be labelled as the pilot study. The objective of this study has been to formulate and specify purpose as well as research problem, but the information collected has also been used in the larger study. When examining the empirical data from the pilot study, the simpler, reflective, approach to analysis has been used to select among possible issues to focus on for the larger study. Here the researchers evaluated freely between potential researches directions. Special weight was given to opinions from TFC about what issues they felt were of most interest to study. The data that later was used in the larger study has been object to more extensive examination. Shkedi's (2005) description of this course of action is that data will initially be gathered for the purpose of a pilot study, but then re-analyzed in accordance with the analysis procedure for the whole research.

## **2.4 Literature studies**

The information collected from the printed material has mainly been retrieved from Jönköping University Library. Except for printed books about Supply Chain Management in general, we have used articles from scientific journals available from the Library's databases for literature and research related to the fashion industry. Among the most used databases are ABI/Inform and Emerald. The authors have taken an active choice to use these databases extensively to ensure that the frame of reference consisted of up-to-date theories.

The literature study is divided in three parts:

### **2.4.1 Pre-literature study**

Before this research, we had limited knowledge about logistical challenges in the fashion industry. Therefore we used the above mentioned databases ABI/Inform and Emerald Fulltext to retrieve information about the subject as a way of creating understanding. Among the search words used and combined were "fashion industry", "clothing industry", "fashion companies", "forecasting" and as article key words/subjects we had "supply chain management" and "logistics". The search engine Google has been used very carefully as it does not guarantee trustworthy search results. We have also used TFCs website to retrieve information about the company. Through the pre-literature study we gained a deeper understanding of the subject matter and were an important key to be able to understand the industry and its complexity.

### **2.4.2 Methodological literature**

The literature for the methodology has been collected through printed books from Jönköping University Library.

### **2.4.3 Deeper literature study**

This study continues from the pre-literature study. Here the theory takes a deeper approach where different fields within supply chain management has been studied but with a clear focus on areas of relevance for the purpose of the thesis. The fashion industry has been investigated with a focus on the supply chain management and forecasting issues. This study has been sourced from both printed material and scientific journals. Former thesis studies were also investigated. The result of this study has formed the frame of reference and is presented in Chapter 3.

## **2.5 Selection**

According to Lekwall and Wahlbin (2001), it is of big importance to interview correct persons in order to retrieve data that will help to fulfil the purpose of the thesis. Merriam (1994) discusses problems in seeking the right persons and recommends that a first contact could be with a key person of the company. This person can in turn point out the right persons to interview further.

In order to get the right information we turned to the distribution director in our first contact with TFC. After an initial email conversation a first meeting was scheduled. The objectives for the meeting were to obtain trust for each other, discuss possible approaches to

the study and to initiate the pilot study. For the purpose of the pilot study, motivated in chapter (2.3), the distribution director was the main respondent. As the pilot study included reviewing logistic flows and a supply chain overview, the respondent needed to have good knowledge about all parts of TFC's supply chain.

Before the second phase of interviews, the distribution director was given focus areas in advance to make the process of selecting respondents easier. Merriam (1994) stresses the importance of sending information in advance as a way of strengthen validity. The preparation should include what kind of questions the interviewing persons intend to ask. The contact person's effort in choosing the right respondents is facilitated by this procedure. The first step in the second phase of interviews was to complete the pilot study and to agree upon the background and problem discussion to focus on in the paper. As the bases for the main study became clear, the focus shifted towards the specific problem. Three respondents were interviewed during the second phase. The distribution director was one of them, as responsible for the demand planning and sales process in general as well as the forecasting in particular. In addition to that, two persons from the logistics department at TFC were also used as respondents.

The early interviews followed a tunnel approach which in the first part started with general information about TFC and its supply chain, eventually leading to experienced problems. Interviews in the second phase had a deeper focus with the aim to get more knowledge about the specified problem.

Following this second phase of interviews, data was collected and summarized. As there still were question areas the researchers wished to handle deeper, the distribution director was contacted again and a third interview phase was conducted. This time only the distribution director was consulted. However, during this stage of the study the researchers had e-mail contact with another two persons, within sales and logistics department respectively, not previously interviewed, who had knowledge about areas that the distribution director felt he/she could not answer for.

## **2.6 Data collection**

To get a deep understanding in TFC and its current logistic chain and also be able to identify areas of improvements, data was collected through interviews which are an appropriate tool to use according to Lekwall and Wahlbin (2001). The information retrieved during these interviews is primary data and will be presented in the empirical part of the study. Later in the paper, collected data will be used together with relevant theories in the analysis part. Primary data is of high relevance to the study (Eriksson & Wiedersheim-Paul, 2006) and involves interviews with focus groups or individuals while secondary data is collected from company archives and business journals (Sekaran, 2003). In this study both primary and secondary data has been used. Secondary data was collected from databases and will be presented in the frame of reference.

There are three different types of interviews according to Andersson (2001); Group, personal- and telephone interviews. Personal interviews were best fitted for this thesis. When doing a telephone interview, there are drawbacks such as unable of seeing the respondents' acts in both handling and speaking. This drawback could have the impact of missing out on the respondents' intentions and explanations (Eriksson & Wiedersheim-Paul, 1999). Group interviews do not fit for this study because the respondents were not able to attend all at the same time and place. Group interviews could also leave with incomplete answers

since some respondents have the ability to dominate more than others. This would lead to a reduced amount of data collected (Andersson, 2001). According to Eriksson and Wiedersheim-Paul (1999), personal interviews make it possible to trace intentions and explanations in an easier way compared to telephone interviews. It is also possible to keep the conversation within the field of study and it allows unlimited questions (Lekvall & Wahlbin, 2001). Further, personal interviews give the research a higher trustworthiness (Eriksson & Wiedersheim-Paul, 1999). Based on these arguments personal interviews were chosen.

## **2.7 Interview structure**

The purposes of the interviews were to retrieve information that has not been documented before. There are three different types of interview structures, according to Lekvall and Wahlbin (2001). The first type is structured interviews which are based on a questionnaire in order to retrieve a structure of the interview. The interviewers follow the questionnaire with no exceptions and the respondent answers the asked questions. According to Andersson (2001) this type is fitted for a quantitative research method and is restraining the respondent to give complete answers. The structured interview makes it possible to compare and evaluate the respondent's answers but is not fitted for this paper and the qualitative approach.

The second types of interview structures are the unstructured interviews which are, according to Arksey and Knight (1999), fitted for qualitative research. The interview is open and general questions are used to get a discussion in the subject matter (Lekvall & Wahlbin, 2001). This interview approach allows the respondent to give complete answers and the result of the interview is a deeper information gathering for the researcher. This type also gives the researcher the opportunity for follow-up questions (Svensson & Starrin, 1996). The drawback with this approach is the risk of fading away from the studied area.

The third type is semi-structured interviews which are to be seen as a middle-way between structured and unstructured interviews. The base for this approach is open questions but the difference between the unstructured and semi-structured is that semi-structured interviews use a framework to keep the interview within the research field (Jacobsen, 1993).

Before the interviews, focus areas were made (presented in chapter 3.8). The focus areas were open questions where the respondent could give complete answers and follow-up questions and new additional questions were asked. It was of importance to keep the interview within the specified problem because of the delimitations (presented in chapter 1.5) and therefore the semi-structured interview approach was used.

## **2.8 Design of interview guide with focus areas**

After the initial meeting with the distribution director, the discussions lead the authors to the first problem; to map the supply chain to identify areas of improvements. This problem was investigated in the second meeting and before the interview focus areas (Appendix 1 and 2) were produced.

The focus areas were formed as questions and divided in different areas, in order to get an easy overview and to upkeep a structure during the interview. Although this did not stop the respondent from talking freely, instead it gave the researchers and respondents a hint of when the discussion went in the wrong direction and away from the purpose.

The focus areas were sent in advance to the respondent. The respondent had the opportunity to prepare in advance and if there were some areas that the respondent could not answer in a satisfying way, other people within the company were noticed and made short appearances during the meetings to answer specific questions. This method is supported by Svensson and Starrin (1996).

If there were questions that the respondent was unable to answer, they were answered afterwards through email. Before the focus areas were produced, the authors gathered information through printed books and scientific journals within the field to be able to construct relevant questions.

## **2.9 Method for analysis**

In a quantitative research method, statistical measurements are used as a method for analysis. In a qualitative approach, interviews and interpreting analysis by the collected material are used as the method for analysis (Patel & Davidsson, 2003). Smith (2003) states that the analysis should be based on a process of structuring and interpreting empirical findings. The biggest difference between a quantitative approach and a qualitative approach is how the analysis of the collected data is done. When using a quantitative approach, the analysis starts when all data is collected in difference to the qualitative approach where the analysis is done continuously with the data collection (Patel & Davidsson, 2003).

When analyzing the pilot study, a reflective approach was used in which the authors drew conclusions continuously in order to specify the boundaries of the research problem area. This approach is motivated in chapter 2.3. Further, findings resulting from the pilot study have also been included as a part of the main study, which is also an approach supported by Shkedi (2005) and motivated in the same chapter. For the main study, a more extensive analysis method was used. The analysis chapter was structured after the problem questions in order to make sure that all areas were covered. In each step, relevant literature from the frame of reference was applied, according to the recommendations from Smith (2003).

## **2.10 Limitations of research method**

A generalisation of the studied problem is limited because of the choice of a qualitative method. By doing a quantitative study, generalisation about problems could have been made. If the research had been conducted towards several small and medium sized fashion companies, it has been more likely that a generalisation could have been drawn. Our choice of a qualitative method is therefore limited to generalize the studied problem to make conclusions about the problem area with primary data from several small and medium sized fashion firms. This paper could have used a qualitative approach after the quantitative study was made. The suggested solutions could then have been applied to those companies that had the same problem.

## **2.11 Validity and Reliability**

Validity and reliability are two important concepts to remember in order to strengthen the quality of a study. They should be carefully treated and discussed in a paper (Smith, 2003). A question whether validity and reliability really is useful in qualitative research has been raised but Silverman (1997) argues for the importance of these two concepts also in such study.

Validity stands for, according to Lundahl and Skärvad (1999), that the paper does not include any systematic errors in the empirical part and this argument is also supported by Merriam (1994). There are two types of validity, internal and external. Internal validity arises if the collected data agrees with the intended collection of data. External validity is achieved if the empirical findings agree with reality (Lundahl & Skärvad, 1999). According to Smith (2003), a theoretical understanding in the subject matter is generating a high validity.

Reliability is the correctness of the chosen research method. This means that if the empirical part is done one more time under the same condition, an identical result should appear (Smith, 2003). Reliability is best fitted for a quantitative approach because it is hard to standardize the interviews in a qualitative study (Mason, 2002). Nevertheless Mason (2002) states that although reliability have limited applicability, it is of importance to the study. One way to increase the reliability in a study is to give the respondent possibility to read the paper and confirm the correctness of the information (Maxwell, 1996). Merriam (1994) argues for the importance of using a tape recorder to avoid misinterpretations and to give the researchers a possibility to listen to the interview several times.

Different steps were taken to increase the validity and reliability of this paper:

- Preparation before meetings with focus areas made it possible for the respondents to prepare in advance. This increased the ability to obtain a fit between the actual data collection and the intended data collection
- The questions prepared in advance of the first interview were based on the theoretical study and by that procedure we ensured that the discussion was kept within the boundaries of the study.
- The results of the empirical part were transformed into text and sent to respondents in order to verify gathered information. The respondents got the chance to check for mistakes and to observe if there were any differences from the reality. If so, it gave the respondents the chance to correct inaccurate information.
- Interviews were taped in order to give the researchers possibility to re-listen to interviews again and secure the collected data. During the interviews, the knowledge that conversations were recorded gave the interviewers more time to listen to respondents answers and reflect about follow-up questions, instead of taking notes.
- Respondents were chosen by a key person within the processes studied, to ensure that people with relevant knowledge was interviewed. It is the researchers' belief that validity is not weakened due to the fact that the key person had an important role in selecting respondents. The reason for this is that the problem studied was prioritized and important by the focal firm and the key person in particular. This person was actively seeking for a solution on the problem studied and the researchers never felt it necessary to questioning his/her interest in making important information visible.

These steps have been a help of keeping a high validity and reliability throughout the study.

## **2.12 Summary of the method chapter**

The study uses an inductive approach and applies relevant theories to the empirical findings (Andersen, 1998). As a research method, a qualitative approach is used for this study

as a way of getting deeper into the problem. A quantitative approach has limited applicability due to the purpose of studying one single company in this thesis (Patel & Davidsson, 2003).

The problem studied in the paper is a result of a pilot study done in the beginning in order of getting new knowledge in the subject matter (Shkedi, 2005). The literature studies were divided in three parts; pre-literature studies, literature for the method and deeper literature studies. The pre-literature study consisted of scientific journals and was mainly collected from ABI/Inform and Emerald databases. Printed books from Jönköping University library was the source for the methodology applied. The deeper literature study was a continuation of the pre-literature study. The interviews were concluded with different people with knowledge of the studied problem (Lekwall & Wahlbin, 2001). The distribution director for TFC was the main contact person. The choices of interview type fell on personal interviews in order to strengthen the validity of the study (Lekwall & Wahlbin (2001); Lundahl & Skärvad, (1999). In order to securing the validity, focus areas were sent via email to respondents in advance of interviews. The interview followed the focus areas, which means that semi-structured interviews were used (Jacobsen, 1993), as a way of keeping the conversation close to the subject. Interpreting analysis of collected data has been the method for the analysis part.

## 3 Frame of reference

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*This chapter includes the underlying theoretical framework for the thesis. The fashion industry will be in focus in most chapters. Furthermore issues such as forecasting and...*

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### 3.1 The fashion industry

In this section we present the fashion industry in general as well as in terms of characteristics of relevance for an in depth Supply Chain analysis, based on earlier research. The chapter is based on secondary data.

Fashion is a broad term that can mean any market or product where there is an element of style that is likely to be short-lived. Christopher, Lawson and Peck (2004) define the industry with the following characteristics:

- **Short life-cycles;** the product is designed to catch the mood for the moment and saleable period is likely to be short and seasonal, measured in months or weeks.
- **High volatility;** demand is rarely stable or linear and might be influenced by several erratic factors such as weather, films and celebrities.
- **Low predictability;** due to high factors of uncertainty and volatility it is extremely difficult to forecast with accuracy, no matter if it is total demand for a period, week-by-week or item-by-item.
- **High impulse purchase decisions;** buying stimulation and decision are made at the point of purchase. This means that the buyer needs to be confronted with the product to stimulate buying; therefore there is a need for “availability” in stores.

#### 3.1.1 Segments in the fashion industry

The fashion industry has been targeted by Enterprise Resource Planning (ERP) system provider Lawson. When customizing their ERP system Movex to make it as supportive as possible for fashion companies, Lawson has made a categorization of segments in the industry. This segmentation is of interest to present, as it will identify the position of the firm studied in this thesis.

Figure 1 visualizes the main functions in the industry; manufacturing, design and retail. Segments are distinguished depending on what functions they are active within.

The **high fashion** segment has an active role in all functions of the industry. Even though manufacturing might not be undertaken in-house, it is strictly monitored and controlled to ensure quality. High fashion firms often have their customers in the high-end market and make quality clothes at a relatively expensive price (Zackrisson, 2005).

The **design, source and retail** (DSR) segment produces more mainstream products than the high-fashion firm, to a wider market. The segment is very price-sensitive and most, if not all, of the manufacturing process is outsourced. Design is carried out in-house and products are sold in own stores or in stores who have a franchise agreement with the branding company (Zackrisson, 2005).

**Design, source and distribute** firms are similar to DSR but they do not sell their products in own stores, or at retailers as a part of a franchise agreement in the firm's name (Zackrisson, 2005).

The roles of the **manufacturer** and the **retailer** are more obvious. A manufacturer can be both the fabric supplier and the factory that sews the garment. The role covers the process of weaving or knitting, cutting and sewing (Zackrisson, 2005).

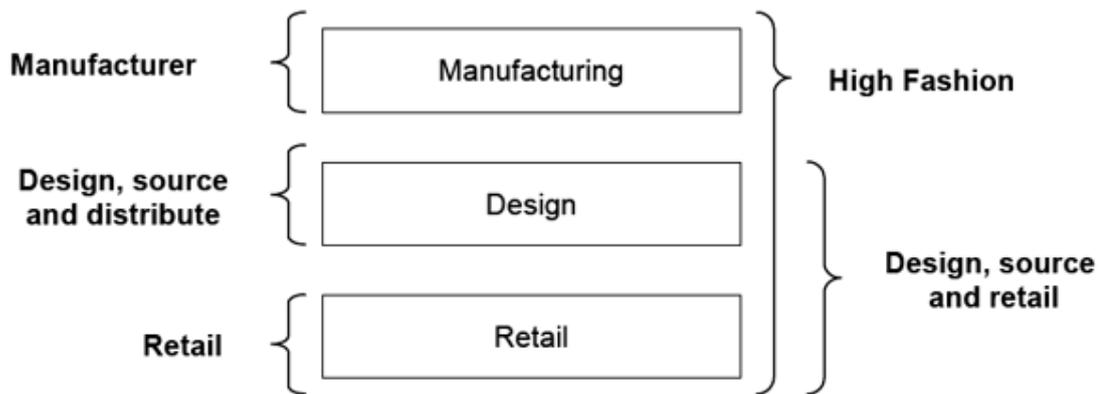


Figure 1 Fashion segments by Intentia (Zackrisson, 2005)

### 3.1.2 Fashion calendar and cycles

Traditionally fashion buying is driven by a calendar of two seasons per year (Barnes & Lea-Greenwood, 2006). Also Tyler, Heeley and Bhamra (2006) have identified this pattern, arguing that the Spring/Summer and Autumn/Winter seasonal ranges are still dominating practice of apparel retailers. The initial stage of developing a seasonal range occurs twelve months before the range appears in the shops. In the beginning of this process, designers and marketing personnel are visiting trade shows as a part of a design influencing cycle. In the traditional approach, presented by Barnes and Lea-Greenwood (2006) planning and forecasting is made up upon earlier sales data. However, the demand pattern of fashion customers has changed and sellers instead need to catch trends that are short-lived. Consumers expect quick reaction to emerging trends, which can be born over one night and which are impossible to predict one year in advance. Thus, according to Tyler et al. (2006) the timing of the trade shows are an important factor influencing the season cycles. As fabric suppliers must be able to show their respective textiles at these fairs, their production cycle must start several months in advance. This is because of the technological complexity in creating new textiles. To understand this Tyler et al. (2006) highlights the fact that the time for developing new type of textile fibres can take up to five years, new variants of already developed fibres up to two years, and new fabrics between six and twelve months. Development of new fabrics is scheduled so that it can be showcased during trade fairs at which the textile companies for the first time can start collecting revenue from the lengthy production development work carried out. Timing of the trade fairs effectively sets the timetable for the fashion industry (Tyler et al., 2006). Following the fairs, fabric suppliers are collecting order and production is almost always made to order. An observation made by Tyler et al. (2006) is that due to the fabric supplier strategy and lead times in terms of development and production, little or no opportunity is given to end consumer

demand to affect volumes produced. Only 10 percent of the textile is bought during the retail season and 60 percent already earlier than six months in advance of the season.

Fast turnaround with responsive design is today a crucial element in the fashion industry (Barnes & Lea-Greenwood, 2006). Intense competition has driven up the number of seasons during a year. Shorter business-cycles for collections, frequent changes of merchandise in stores, leads to big challenges for fashion logistics management as there is less time for making profit on each collection and higher cost of obsolescence (Christopher et. al., 2004). Tyler et al. (2006) are expressing the same trend in another way. They argue that even though the number of seasons have not increased, there are today more phases occurring within seasons (3-5 mentioned) which lasts on average from eight to twelve weeks. This can be named as a trend towards mid-season purchasing which are having far-reaching effects on buyer-supplier relationships.

### **3.1.3 Fashion supplier selection and global sourcing**

According to Doyle, Moore and Morgan (2006) there is a growing pressure on supplier selection, evaluation and management as fashion supply chains in later years have faced a trend towards global sourcing and time contraction. Christopher and Peck (1997) call this phenomenon a paradox, where supply chains are rather extended than shortened due to global sourcing. The burden of handling the effects of the paradox will then, according to Doyle et al. (2006), be on the supplier selection process. Evaluating and managing supplier relationships are so important that they can be regarded as a key to company success.

To be able to combine the advantages of global sourcing and at the same time stay responsive and agile, Doyle et al. (2006) discusses the necessity of balancing global and local sourcing as a best route. For products with high demand and volatility suppliers nearby should be used. This rule is however largely generalised, in addition there are other factors to consider. Long-term relationships are among them and have a large impact on the geographic distribution of suppliers. Offshore suppliers have by tradition been used due to cost-management motives. But there are many hidden risks connected with this selection, such as increased complexity management and selection as well as unstable exchange rates, import licenses and inflexibility (Doyle et al., 2006).

The supplier selection process is responsible for finding the balance between optimal cost structure and a maximisation of benefits while minimizing risks. The problem lies in estimating the benefits in terms of agility and flexibility at a local supplier against cost benefits at an offshore supplier (Doyle et al., 2006).

No matter if the supplier selection turns against a local or global supplier several authors, according to Doyle et al. (2006), argue that agility and speed must be important criteria in the selection process. As most companies in the industry outsource their manufacturing process it is important to establish inter-communication between supply chain members to facilitate time compressed and agile supply chains. The relationships should be characterized by mutual trust and end user focus. Stock-holding in all steps of the chain should be based on demand requirements. Effective communication can result in fewer decision changes later in the process. At the same time, when rapid demand changes must be communicated, the relationships should be designed in a way so that this process is integrated (Doyle et al., 2006).

In more specific terms, the above adds pressure on many parts of supply chain management, in particular in the need for a great level of synchronization in order to manufacture

smaller and later volumes. According to Doyle et al. (2006) this can be seen as a shift towards postponement, where point of purchase is to be deferred as close as possible to the point of purchase by the consumer.

Finally, closer relationships between suppliers and buyers will most likely result in faster stock turnaround and greater flexibility. But the burden of the problem still lies on the supplier selection process, where the selection criteria consist of many factors. Traditionally, key areas include price, quality and capacity, but it becomes more complex when flexibility and service becomes key issues. The shift can be seen as a move from quantitative criteria towards qualitative, wherein the buyer's selection process is likely to be based upon criteria compromises (Doyle et al., 2006).

### **3.1.4 The fundamental problem**

According to Christopher et al. (2004) there is a fundamental problem, not just in fashion industries, which often results in revenue losses on the final market. The problem can be explained as the time it takes to source materials, convert them into products and move them into the market place is longer than the time the customer is prepared to wait. This gap in time is termed as the lead-time gap. Traditionally the gap has been filled with forecast based inventory as an attempt to ensure that products are available when customers demand it.

The authors (Christopher et al., 2004) have identified several direct costs related to the lead time gap. The costs results from forced mark-downs (unwanted/unsold goods at the end of the season which have to be removed to make way for new goods), stock-outs and carrying inventory costs that occur in each step of the fashion supply chain. The earlier in the chain (fabric suppliers) the lower is the cost of a forecasting error. The cost related to forced mark-down is significantly high at the retailer (10% of total retail sales).

As a response to this problem, Christopher et al. (2004) have focused around the term "The agile supply chain". Explained in short, an agile supply chain is driven by demand instead of forecasts. The chain should be characterized in four key dimensions: (1) Market sensitiveness, (2) Virtual integration, (3) Network base and (4) Process alignment.

#### **Market sensitive**

The objective of market sensitiveness is to be able to be as close as possible to the market and by that be able to quickly adapt to trends. In the fashion industry it can be done by a variety of means. Analyzing point-of-sales data daily to identify replenishment requirements is one method. But also activities several months in advance of a season, when fashion companies are trying to capture indications and ideas about coming trends, can be seen as a way of aiming towards market sensitiveness.

#### **Virtual integration**

The degree of virtual integration means to what extent supply chain partners are integrated in terms of information sharing. Christopher et al. (2004) argues that information sharing about end consumer demand is vital in the agile supply chain. It is important that all actors, fabric suppliers as well as manufacturers and retailers work with the same set of numbers. Previously few retailers in any industry would be willing to share this kind of data. Now however, more and more companies have started to understand what benefits that can be achieved in terms of higher on-the-shelf availability at the same time as inven-

tory can be reduced. CMI (Co-Managed Inventory) is an extension of information sharing, where the supplier takes responsibility of inventory control.

### **Network base**

The way the agile company works with its suppliers is distinguishing. Both Zara and Benetton are examples of successful fashion companies which have a wide supplier base and where the relationships are characterized by long term agreements. Flexibility and customer responsiveness are key aims in the relationships. In both of the above mentioned examples, the companies have chosen to work with specialist manufacturers for specialized production tasks, where economies of scale would not be an option if carried out in-house. In both these cases the manufacturers have dedicated their whole production process to Zara or Benetton. Christopher et al. (2004) do not state whether it is possible to realize the network base dimension with totally independent suppliers.

As agility and flexibility in a way is easier to achieve with relatively few involved actors, the nature of the fashion industry with many suppliers may seem to contradict the idea of creating an ideal network. However, as different seasons come with different types of collections, not all suppliers are always involved in every season. The focal firm (in this study TFC) should work as a coordinator, deciding about what suppliers to use each season based on the requirements of the collections. During each season the focal firm should try to work closely with a small group of suppliers, selected from the bigger group of actors the company has worked with in the past.

### **Process alignment**

By process alignment is meant the ability to create connections between supply chain members that are seamless or boundary less. There should be an attempt of minimizing buffers between the different stages in the chain and transactions should be kept paperless. In an agile network, process alignment is critical and can be enabled by web-software, letting different actors to be connected without needing to have the same computer system. With integrated computer systems, businesses in different geographical locations, can act as if they are part of the same company.

In the fashion industry, there can often be many actors involved in the process starting from design and ending with physical movement of the product to the retailer. Christopher et al. (2004) argues that coordinating and integrating the flow of information and material is critical if quick response to changing fashion is to be achieved. By creating virtually integrated teams across the network of suppliers and distributors a high degree of synchronization should be possible to reach, which would lead to a cut in lead times.

### **3.1.5 Earlier studies and other industry examples**

It is almost impossible to review logistics and supply chain management within the fashion industry, without mentioning Swedish Hennes & Mauritz and Spanish Zara, both regarded as industry leaders and pioneers when it comes to logistics within the fashion industry. The two companies have differences in their logistic strategy, which the authors of this study find interesting to point out.

### **3.1.5.1 Hennes & Mauritz**

The Swedish fashion firm Hennes & Mauritz (H&M) has over 50 000 employees and operates in 24 countries. The first store opened in 1947 and in 2005 the number of stores are close to 1200 with a turnover of 71 885M SEK (Hennes & Mauritz, 2006).

H&Ms products are being produced by some 700 independent factories all over the world. These are selected based on criteria such as lead time, quality and price, but also all factories must accept a lengthy code of conduct (Hennes & Mauritz, 2006). Depending on the type of product the lead time might be long, around six months for basic products, or short, 2-3 weeks for high-fashion items (Tungate, 2005). Thus, depending on whether the product is a base product or a fashion product it is possible to balance the criteria of low cost per item versus acceptable lead time. However, there is always a desire of postponing the order decision, the later an order can be placed the better accuracy and the better will the rate of flexibility be in terms of ability to re-fill successful products to stores (Hennes & Mauritz, 2006).

At H&M, 3200 people work with logistics. Except for transportation, the company controls the whole chain, acting as importer, wholesaler and retailer. Stock management at all levels is computerized (Tungate, 2006).

### **3.1.5.2 Zara**

In 1975, Spanish fashion firm Zara opened their first store and during the coming ten-year period the network of stores got spread out over several major Spanish cities (Inditex, 2006b). Today, the company is present in 63 countries and has some 1000 stores (Inditex, 2006a). In 1986-1987, Zara laid the foundation of their logistics system, which was designed to cope with their expected high growth. During this period Zara also secured the control of a number of manufacturing companies who devoted their whole production to the Zara chain (Inditex, 2006b). Today, more than 50 percent of Zara's clothes, particularly high-fashion items, are made in Zara's own factories in Spain. Twice a week, new clothes are leaving the 480 000 square metre logistics centre to stores all over the world. The logistics centre is the heart of the organisation and everything is computerized (Tungate, 2006).

Orders are placed by local store managers, who have a vital role in the Zara organisation. They are responsible for monitoring tastes and preferences of the customer base represented in their store. All stores are connected with the central computer system. Sales data are analyzed immediately and at Zara headquarter it is possible to tell within a day or two whether a product is successful (Tungate, 2006).

### **3.1.5.3 Hugo Boss**

An article published in Supply Chain Europe (Anonymous, 2005) focuses on the German high-end fashion house, Hugo Boss. The article gives information about how the company handles the complexity that follows due to offshore sourcing, many suppliers and lead time pressures.

*"We think of ourselves as being embedded in a network of supply chain partners with warehousing operators, logistics service providers, forwarders and manufacturers.../...We have to manage that network to get the shortest lead-times and the best costs." – Andreas Arni, Supply Chain Director Hugo Boss Industries (Anonymous, 2005, pp. 36)*

Hugo Boss has two main seasons, summer and winter, which means that there are distinct peaks in the supply chain. Prior to a season the pressure on warehouses is very high. As many other fashion companies, the company has most of their production in Eastern Europe and the Far East, while their warehouses are found in Central Europe, their biggest market. The direct shipping from manufacturers to warehouses is being carried out by either truck (80%) or air freight (17%). Sea freight is very seldom used. The reason for this is the lead time extension caused by sea freight. Even though it is cheaper, the lead time is extended by 3-4 weeks when transporting by boat. Short lead time is a key issue at Hugo Boss; the longer it takes for goods to reach the point of sale, the greater the risk that the initial forecasts will be inaccurate. In the end it means that you can lose more than you save, if choosing the cheaper sea freight alternative. Hugo Boss also uses special containers where clothes can hang up during transport (Anonymous, 2005).

#### **3.1.5.4 Sara Lee Knit Products**

An article by Bonner (1996), presents a forecasting problem and its solution at Sara Lee Knit Products (SLKP) which makes underwear and active wear. The company sells basic, seasonal and short life-cycle products and was experiencing a forecasting problem for especially short life-cycle products where no previous sales data were available. The company deals with a large number of different products which became overwhelming even though their current forecasting technique was intended to take a season perspective into account. The high volume of items seemed to result in lost information and as a reaction SLKP decided to invest in Quick Response.

In the process of change it was concluded that short life-cycle products with high seasonal demand required constantly updated information about sales and a traditional way of forecasting was not effective (Bonner, 1996).

The first thing SLKP did was to implement a new information system. The system was able to update itself continuously and this resulted in that sales trends could be spotted in a more satisfactory way than before. The information system worked with data-mining and pattern recognition with graphs that showed the patterns with respect to different regions, events and weather conditions. Existing forecasting techniques were still used as a base for the new tools. The most useful addition was the ability to take trends in different regions and countries to account when forecasting (Bonner, 1996).

As a conclusion, the problem was solved thanks to successfully implemented software tools that could analyze patterns on a disaggregated level (regions and countries) when forecasting (Bonner, 1996).

#### **3.1.6 Supplier selection in the clothing industry**

In a recent research, TFC were among the respondents (source hidden due to anonymity).

TFC pointed out the importance of successful long-term relationships, when selecting what factories to be used for production. Other factors mentioned in the research were product quality, delivery accuracy, flexibility, ability to realize sketches into products and finally price. Flexibility is regarded as the combination of short lead times and whether the factory will accept small as well as large quantities. Further, TFC points out the importance of that the factory understands TFC's business and potential problems. A manufacturer who is involved and takes an active interest in the relationship is considered as an asset. In

general, TFC feels they have very good relationships with the manufacturers, when problems occur it is often due to delayed or poor quality fabrics from fabric suppliers.

## **3.2 Forecasting in general**

As already presented, a central issue within the fashion industry is the one of forecasting. Due to long lead times and pressure from suppliers and supplier's suppliers to book fabrics and fix production quantities, companies must predict demand for individual products in advance. Therefore literature within this field will be presented.

According to Helms, Ettkin and Chapman (2000) the forecasting function is one area that must receive priority when companies are seeking to review functions and change processes in order to save costs and gain benefits in supply chain management initiatives. The force that drives activities in the supply chain is without doubt end customer demand. Each of the links in the chain operates in reaction to actual or anticipated demand from the consumer. Accuracy and efficiency levels in terms of how demand is communicated up and down the chain are directly connected to inventory and service levels. Forecasting and demand planning are therefore a key factor in the successful implementation of a supply chain management strategy (Helms et al., 2000).

### **3.2.1 Basic principles of forecasting**

An article by Herbig, P., Milewicz, J., Golden, J. E. & Smith III, H. C. (1994) presents the following eight basic principles of forecasting:

#### **Forecast accuracy**

Since forecasts almost always are wrong, the question to answer is: How much error is acceptable for the forecasts used in the business? This acceptable error varies from company to company and depends on factors such as reaction time, size of company and cost of error to a company.

#### **Forecasting time horizon**

Forecasting accuracy decreases as the time horizon increases. Related to competitors, the more time you have to react to predicted events, the more you can benefit from these events. Changes in environment, technology, strategy, buyer behaviour, impact the long-term forecasts. As many of these changes cannot be predicted, their effects on business cannot be predicted either.

#### **Technological change**

Increasing rate of increasing technological change decreases forecasting accuracy. In high-technological industries, forecasts are almost impossible as technological change is rapid.

#### **Barriers to entry**

With low barriers to entry the actual industry, forecasts are more likely to be inaccurate. Patterns and relationships can be drastically changed following entrance of new competitors.

#### **Dissemination of information**

If distribution of information is fast, then the value of forecasting will be less since this information is relatively easy to capture. Therefore, these forecasts are more or less available to everyone and the value of correctness is to be considered as a relatively weak competitive advantage.

### **Elasticity of demand**

With high elasticity of demand follows low accuracy in forecasts. Necessities (low elasticity of demand) are easier to forecast than non-necessities (vacationing).

### **Consumer versus industrial products**

Forecasts for consumer products are more likely to be accurate than those for industrial products, which are sold to a few large customers. For industrial products, each customer stands for relatively high share of total sales, meaning that the loss of losing an industrial customer means a substantial loss in sales. In industries where the customers are consumers, each customer stands for a smaller share of the total sale, meaning that losing a customer will not substantially affect total sales.

### **Aggregate versus disaggregate**

Forecasting for families or groups of products is likely to lead to more accurate results, as the data pattern of aggregated data will not change as quickly as that of individual units. In the end, overestimating one product group can cancel out underestimation of other groups.

## **3.2.2 Forecasting and firm size**

A research conducted by Herbig et al (1994) investigated differences in forecasting behaviour between firms of different size. The research separated small from larger companies based on number of employees (Small: 1-100, Medium/Large > 101) and revenue (Small: < \$50M, Medium/Large > \$50M). Among their results were:

- The larger the company, the more people are involved in the forecasting process (and the smaller the firm, the more executives involved in forecasting).
- The larger the firm, the more objective forecasting process (less personal subjectivity)
- The larger the firm, the higher importance is given to the forecasting and the more often does the company use complex quantitative techniques, while smaller firms instead are more likely to use less complex and more qualitative techniques when forecasting.

## **3.3 Forecasting in the fashion industry**

Demand planning (or forecasting) is a process of planning the future demand for products or services. The demand planning process is relying on multiple inputs from sales, marketing, brand, and product management organizations as well as statistical analysis.

As already discussed by Christopher et al. (2004) traditional ways of responding to consumer demand in the fashion industry is forecast-based, with the resultant risk of overstocked or under-stocked situations, customer dissatisfaction and ultimately reduced prof-

its. The fashion companies are today flooded with Point-of-sale information about consumers' buying patterns (Fisher, Hammond, Obermeyer & Raman, 1994), still many retailers are having a hard time making supply meet demand. Department store markdowns have actually increased from 8% of store sales in 1971 to 33% in 1995 (Fisher, Raman & Sheen McClelland. 2000). The dramatic increase in demand uncertainty is a recent phenomenon and most fashion companies still plan their production and sourcing as if forecasts were reliable. The accuracy of a demand forecast is a fundamental success factor since a majority of merchandise is bought with long lead-time on the basis of the buyer's plan (Mattila, King & Ojala, 2002). The long lead times and the quest for low manufacturing costs causes fashion companies to make decisions on what, where and how much to manufacture close to a year in advance of the actual selling. Further, most production has to be committed before any actual demand information is available (Fisher & Raman 1996).

The forecast is based on historical data in combination with believes about the future. It includes a projection of expected demand given a set of environmental conditions (Brannon, 2006). Since the selling season of fashion products is short and the products are constantly changing it is often the case that no historical information is available for a certain product. The data is then used to analyze trends and to be transferred and compared to a product with similar attributes and conditions, though making the forecast uncertain. The increasing number of Stock Keeping Units (SKUs) makes forecasting activities difficult to administrate and overview, and though a quite accurate forecast can be made at an aggregated level it is difficult to predict how the demand will be divided on each of the numerous SKUs (Fisher et al., 1994). Still many retailers forecast the future demand strictly relying on the gut feel and the taste of a few individuals and involve almost no use of sales data (Fisher et al., 2000).

The inaccuracy of the forecast, termed the forecast error, is a combination of volume error and assortment error (Mattila et al, 2002) and result in either too little or too much inventory. The cost of obsolete inventory is easy to calculate but the typical company lacks information about the actual costs involved in a situation of stock out, since lost sales are very hard to measure (Fisher et al., 1994).

### **3.3.1 Forecasting methods**

Brannon (2006) argues for different ways of collecting point-of-sales data. There are different techniques for sales forecasting and managers with forecasting responsibility tend to have limited background in statistical sales forecasting. Further, Brannon (2006) argues for three broad categories which these techniques fall under:

#### **Time-Series Techniques**

The forecasting is based on previous sales of the last 36 months. The prediction is for the next 12 month. This quantitative technique use recorded sales in regular time intervals to foresee upcoming value (Brannon, 2006).

#### **Correlation or Regression Techniques**

Advertising campaigns and sales promotions usually increase the sales. This technique use correlation or regression calculations to study the change relationship between different variables. The result shows how a change in one variable affects another. Then it is possible to predict the increase of sales due to a promotion (Brannon, 2006).

## **Qualitative Techniques**

Neither Correlation nor Regression techniques can account for changes in demand or other relationships that affects the sales volume, which the company does not affect. Time-Series Techniques cannot predict changes in demand. In such situations there are qualitative techniques which use expertise inside and outside a company to regulate the forecasts and deal with these problems (Brannon, 2006).

This method is specially fitted when forecasts are fine-tuned out of forecasts deduced from quantitative techniques, when forecasting for new goods when data is not available, when forecasting is made in a long range or at a corporate level.

Brannon (2006) present different subjective approaches of the adjustment process:

### **In-House expert**

The In-House Expert approach is used when adjustments of forecasts derived from quantitative techniques comes down to one employee. This person is skilful and has a wide knowledge together with the right information resources. The expert is valuable to the company but there are drawbacks with the dependence on this person. A loss of the expert could be critical to the company and the replacement problem arises (Brannon, 2006).

### **Executive Committee**

A different way of dealing with the adjustments is to involve groups of people outside the expert. This group could consist of for example functional managers. The group holds meetings that take off from quantitative data and come up with needed adjustments together (Brannon, 2006).

### **Polling Experts**

Instead of meetings, used in the Executive Committee approach, a polling process can be used when deciding adjustments. This approach is especially fitted for new products with non-existing previous sales data. The method is also called the Delphi method. The result of the method is to use a best guess approach. Adjustment suggestions are collected from all involved polling experts and finally the consensus is generated out of the answers. Attendants are unaware of the identity of other respondents. This is supposed to remove bias resulting from group dynamics (Brannon, 2006).

### **Time series statistical forecasting**

According to Crum and Palmatier (2003), the time series technique is the most common statistical forecasting method used to support demand planning in the statistical analysis process. Historical demand data is sequenced by time (days, weeks, months, etc.) and the future demand is then projected by the same time sequence based on historical demand. Mathematical algorithms are used to determine patterns and trends of past demand and extrapolate to a projection of future demand. Advantages of time series statistical forecasting are that it is based on historical demand data and is therefore not affected by human judgment. It is also suitable and effective when a large number of end items are to be forecasted, as is the case of the fashion industry. Time series forecasting is more reliable in predicting variations in demand when the demand patterns are repeatable and future demand will have a similar behavior, and if there are enough historical data available, about 24 to 36 historical data periods. Even though a forecast is unreliable with major forecast errors it can still be used as a starting point to which other input is needed that explains

past peaks and dips in demand, validates the total trend and understands the effects that planned product, marketing, and sales activities will have on future demand. Changes caused by external factors, like competitors actions and the global economy, must not be disregarded (Crum & Palmatier, 2003).

Rather than believing that history will repeat itself, it is better to analyze and question the demand history to understand why it turned out the way it did and what is different for the period that will be forecasted. The answers to these questions tell you how much you can rely on the statistical forecast and what adjustments that have to be made when developing the demand plan (Crum & Palmatier, 2003).

Time series statistical forecasting is a necessity for companies in the fashion industry that have hundreds or thousands of end items, or Stock Keeping Units (SKUs). It is essential that demand plans are developed for all products; otherwise unplanned demand will compete against planned demand for resources. A planning strategy is needed when the number of end items is large and a common solution is to develop an aggregate, or family, plan by product type or category. By making the plan at an aggregated level it is possible to delay decisions on item level and specifying the product mix, maybe until raw materials have to be bought or production starts depending on the product. The closer in time to the actual sale that these decisions can be made, the more up to date input information will be available to support the decisions. The demand plans at item level have to be monitored on a daily and weekly basis, to catch up on signals in time to make adjustments (Crum & Palmatier, 2003).

The time series statistical forecast provides a backward looking historical view of demand that then has to be adjusted manually, according to the believes about the future and the anticipated demand. Input about anticipated future demand is based on different people's beliefs and interpretations of signals that might indicate what the future demand will look like. This input can easily be affected by bias that comes from an overly optimistic or pessimistic mind-set and the inability for people to realizing the actual facts. Bias can also appear as an effect of, for example, reward systems where targets are easily set low to make them highly attainable (Crum & Palmatier, 2003).

The numbers in the demand plan are the result of assumptions made about demand creation efforts, customer buying behavior and the state of the economy and other business drivers (Crum & Palmatier, 2003). It is important to document the assumptions that were made when creating the demand plan to make it possible to go back later on and analyze what might have caused any forecasting errors. It is not the numbers in the demand plans that are wrong; it is the assumptions on which the demand plan was created that are incorrect. In order to improve the demand plan accuracy, and actually learn from the mistakes, the assumptions have to be documented, questioned and updated (Crum & Palmatier, 2003).

### 3.3.2 Analyzing forecasts

Brannon (2006) discusses ways of group data for the forecasting analysis:

- **Sales Volume** Conclude on how much contribution a product group makes to the total revenue.
- **Sales Volume by Geographical areas** Use geographical areas to break down the sales data and compare estimated sales with actual sales in each area

- **Sales Volume by Time period** Comparing differentiations in sales against a time scale and discover seasonal effects.
- **Sales Volume by Sales Channel** Comparing sales channels to present the most profitable one in order of decide the degree of reliance for each channel.

### 3.3.3 Dependency on forecasts

Tyler et al. (2006) have addressed the issue of fashion companies that tries to reach better forecasting performance. The authors conclude that the predominant way of forecasting is to rely on individuals with tacit knowledge of buyer's preferences, or In-House experts to use the term defined by Brannon (2006). The only tacit data available to base predictions upon are previous sales data on similar products. Inevitably the forecasting decisions at this stage, prior to a season and before the product is placed before the customer, can not be seen as anything else but guesswork. Its success rate is notoriously low. Christopher et al (2004) expresses is somewhat strongly by concluding that it is now gradually being accepted, both by those who work within the industry and by those who study it, that the demand for fashion products cannot be forecasted.

Christopher et al. (2004) therefore means that it is very important for fashion companies to decrease their dependence on forecasts and instead focus on lead-time reduction, making the forecasting horizon shorter, leading to lower risk of errors. The forecasting horizon is the duration of the activities of design, make and ship the clothes or accessories. Long term success lies in the ability to respond quickly, or at least quicker than competitors, to trends and changes in demand (Barnes & Lea-Greenwood, 2006). There are in particular three important lead-times to manage; *Time-to-market*, *Time-to-serve*, *Time-to-react* (Christopher et. al., 2004).

- *Time-to-market*; the time it takes to transform market trends and opportunities and transform them into products available on the market? Long time to market means that the company will loose sales opportunities that will not be repeated and when the product finally reaches the market, demand is likely to start falling.
- *Time-to-serve*; the time it takes to deliver a product according to a customer's order. Traditionally within this industry time-to-serve can be up to eight to twelve months. It does not correspond to the time it takes to make or ship the product. Instead, the problem often lies in the fact that the order-fulfilment process is made of separate activities that are structured in a cost-minimizing way to create economic batch quantities at each step. Global sourcing leads to time-lengthening activities of administration, consolidating shipping loads and extensive documentation. To summarize, low cost of manufacturing and shipping is prioritized higher than the total supply chain cost, foreseeing issues such as cost of lost sales, inventory carrying costs and forced mark-downs. Tyler et al. (2006) especially address the fact that there is not only a transportation time for finished products to take into account, but also the time it takes to transport fabrics from its suppliers to the factories. This limits responsiveness.
- *Time-to-react*: The time for adjustment of the business output to meet demand. Ideally a company would want to meet customer requirements at the moment he or she needs them. The two major barriers for time-to-react are time-to-market, and time-to-serve. The challenge is to see real demand, day-by-day, and adjust supply chain production upon that information instead of forecasts. By isolating consumer buying information

for upstream supply chain members, their production will be depend on forecasts based on judgment and guesswork. Inventories and order-batching at several steps in the chain will hide end consumer demand from upstream members.

### **3.3.4 Alternative approaches to decrease dependency on forecasts**

The costs related to forecast errors can indeed be immense to a company but they can be reduced by the use of new approaches that have been developed, such as accurate response methods or the Quick response strategy, together with improved supply systems.

#### **3.3.4.1 Accurate Response Approach**

“The basic idea with the accurate response approach is to determine what can and cannot be accurately forecasted, and decisions regarding the most unpredictable items should be postponed until more market information is available” (Mattila, King & Ojala 2002, p. 342). The products should be classified depending on how easy they are to forecast, which usually means distinguishing the basic products from products with high fashion content. Different forecasting and sourcing techniques are then used on the products that are easy to forecast and the unpredictable ones. The group of products with predictable demand can be sourced well in advance, allowing long lead times which results in low costs. The focus for the more unpredictable products with a more uncertain demand should be on short lead-time to be able to replenish throughout the season (Mattila, King & Ojala 2002).

#### **3.3.4.2 Quick Response**

Lately there has been a shift from the traditional forecast based approach to a demand driven; quick response (QR) strategy has started in the fashion industry (Christopher et al., 2004).

Quick response can be defined as

*“...a consumer driven business strategy of cooperative planning by supply chain partners...using IT and flexible manufacturing to eliminate inefficiencies from the entire supply chain”* (McMichael, Mackay & Altman, 2000, p. 613)

Quick response has been the retail industries’ correlation of just in time manufacturing because the aim is to improve the movement and management of inventory in the supply chain (McMichael et al., 2000).

Quick response was introduced for three purposes:

1. Reduce stock holding throughout the supply chain
2. Reduce inaccurate forecasting risk by moving the decision of what type and number of pieces to order closer to the consumer purchase.
3. Lower the price on garments due to a more efficient supply chain.

It is common that the fashion companies manufacture as much as possible of the finished inventory required before the season starts and then deliver half to two-thirds of the necessary products before the beginning of the season (Christopher et al., 2004). The problem is that when the first buying plan is made, very little information about the demand in the coming season is available. The strategy is based on a mixture of upfront buying and re-

plenishment during the selling season. This means that a small quantity is sourced in advance and shipped before the season (Mattila et al., 2002).

When QR evolved in USA between fashion retailers and suppliers the subject was to be able to compete with off-shore manufactures. Approximately 25 billion dollars was at that time lost every year due to inefficient supply chains. The loss was a result by long lead times from fabric supplier to end customer. The causes were two-sided (McMichael et al., 2000):

**Overload:** An overload of inventories in the supply chain resulted in leftover goods and markdowns

**Stock-out:** Increased sales make the forecast inaccurate and stock-outs.

Fabric supplier, factories and retailers generate long term relationships based on trust and co-operation to achieve reduced lead-times. In quick response, production is based on real customer demand instead of forecasting. This calls for information sharing between the retailer and suppliers such as sales data, schedules and deliveries (McMichael et al, 2000).

The fashion world struggles with cycle times from design to a finished garment on about one year. This includes fabric fairs, fashion shows, trade fairs, distribution and design and layout time for the retailer. Orders are being placed around six months in advance before the release (McMichael et al, 2000).

The most common way is two main seasons for the retailers. Placing orders are based on forecasts from previous sales including type of garment, colour and volume. Merchandisers and buyers have problems with the correctness of the forecasts due to the planning that is pushed so far in advance. To struggle with this problem, retailers use a combination of fabric suppliers and manufacturers in different geographical areas to have the ability to choose from low-cost with long lead times and higher costs with shorter lead times. These two strategies are increasing the total price for the garments but it lowers the chance of stock-outs and overload of goods (McMichael et al., 2000).

Speed to market has become important (Christopher et al., 2004) and the QR strategy involves all parts in the supply chain. Abernahty et al. (1999) argues that this strategy have emerged from the nature of the changing condition and competition between retailers and not from quick response implementation. This time-to-market focus has resulted in different operational and supply decision than the decisions in a traditional supply chain (Birtwistle, Siddiqui & Fiorito, 2003).

### **3.3.4.3 Assortment planning**

Assortment planning is a forecasting and ordering technique. It is used in the fashion and apparel industry and aims to take factors such as different buying behaviors between stores into account when making the assortment plan. A fundamental description of assortment planning can be seen as determining the breadth and range of products and stocking levels for items at specific stores for a particular retailer. Product mixes are based on certain consumer habits, traits and buying behaviors, but also demographic and geographic profiles (Baker, 2005).

### **3.4 Summary of the frame of reference**

The theory chapter uses a funnel method which begins with a general presentation of the fashion industry. Christopher et al. (2004) defines the industry with several characteristics and main segments in the fashion industry are presented by Zackrisson (2005). Tyler et al. (2006) explain the fashion calendar and its cycles which are followed by areas covering supplier selection and global sourcing. The fashion industry chapter ends with a presentation of what Christopher et al. (2004) defines as the fundamental problem facing the fashion industry. The fundamental problem is closely connected to the occurrence of a lead time gap between the time it takes to source, produce and distribute products to the market place and the time the customer expects to wait.

The frame of reference continues with sections presenting forecasting, initially in general terms and then its application within fashion industry in particular. Different alternative forecasting methods and dependencies on forecasting is discussed.

The frame of reference also covers earlier studies and other industry examples from H&M, Zara, Hugo Boss and Sarah Knee Lit.

## 4 Empirical findings

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*This chapter holds the empirical findings of this thesis which consist of the materials gathered from the interview sessions at TFC or within the frame of the data collection procedure explained in chapter 2.5-2.7, if nothing else is stated.*

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### 4.1 TFC Company presentation

This chapter aims to give the reader a brief introduction to the case company of the thesis.

The Fashion Company (TFC) was founded in Stockholm in the early 1990s. The founder wanted to create sophisticated and simple clothes to contemporary fashion. Starting from the very first collection of woman clothing, the company has grown into a label with a distinct profile and brand that communicates of style, simplicity and quality with both men and women lines.

TFC's revenue has almost doubled between 2002 and 2006.

### 4.2 Pilot study findings

TFC is a fashion company whose strategy aims to create a strong brand image. This, in turn, leads to several obligations in terms of delivered customer value. With respect to logistics, the crucial element is that delivery promises towards customers (stores) must be met. Until now, TFC has kept up a reputation of continuously meeting delivery dates and it is a high priority to continue on that track. As soon as their logistics starts to fall behind, it would damage their reputation. In the long-term, TFC is afraid that such damage could be severe and difficult to repair.

At the time for the first interview, TFC mentioned that they expect to double their revenue in the coming four year period. To be able to reach that target they must ensure that distribution to customers works without major disruptions.

#### 4.2.1 Product categories

Products in each collection are either considered as base products, contemporary products or high-fashion products. The characteristics of each category are explained below.

##### **Base products**

Base products stand for about 40% of total sales. When products are designed for the base collection, items are supposed to have a lifecycle of at least two years. The base collection has not been treated as a separate part of TFC's collection categories for very long. Before, similar clothes to those that today are belonging to the base collection, were found in the contemporary product category.

By categorizing base products, TFC tries to benefit from economies of scale. As these products traditionally has less volatile demand there is a lower risk when ordering larger quantities. Since the introduction of the base product category, TFC has observed that customers seem aware of that the company has a higher stock availability of these products. As a response, customers tend to order smaller quantities during the sell-in season as

they know they can re-fill their stores during the season from TFC's stock. This is something that TFC considers as problematic when they forecast during the sell-in season.

### Contemporary products

Contemporary products are fashion products and each item is generally only sold during one season. They stand for about 60% of TFCs total sales each season.

### High fashion collection

The high-fashion collection is very small in quantity, but bigger in terms of image. TFC is not cost-sensitive when designing, constructing and purchasing raw material and production for the high-fashion collection.

Concerns regarding the high-fashion collection will not be discussed in this paper.

## 4.2.2 Information system

TFC is in a process of changing their existing information system. A new version of the existing information system is supposed to be finally implemented in April 2007 but the system should be up and running in January 2006. The system used is Filemaker and TFC use consultants for the implementation process. The old information system has had several drawbacks in terms of communication ability and information availability. The need for improvement has therefore been considered as major. The new system will be tailor-made for TFC who has been able to dictate what they need.

## 4.2.3 TFC Supply Chain Overview

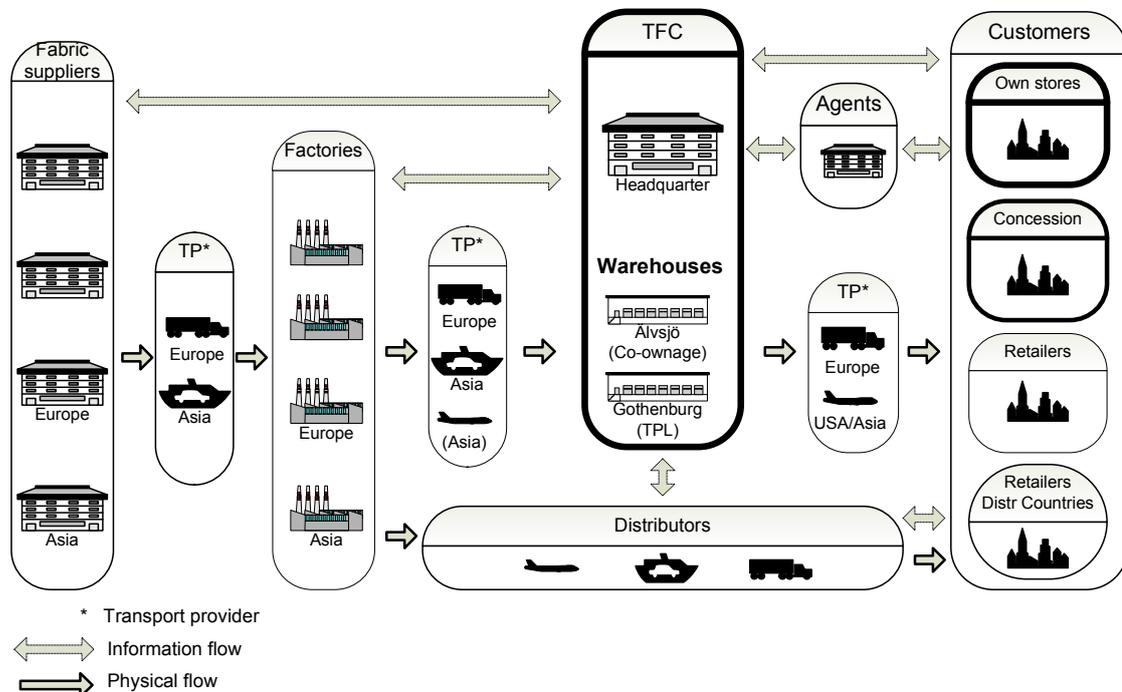


Figure 2 TFC Supply Chain Overview

The above picture aims to give the reader an introducing overview of the TFC supply chain. It visualizes the most important actors of, and their position in, the chain as well as the main flows. The supply chain stretches from the fabric supplier's to the stores where TFC's clothes reaches the end consumer. In this picture, end consumers have been excluded, mainly due to visualization constraints. But also, as will be apparent, in the logistical perspective the stores are the actual customers from TFC's perspective.

The information flows visualized are those between TFC and fabric suppliers, factories, agents, distributors and customers as well as between agents and customers. The focus will be on the flows and activities between TFC and agents, distributors and customers with respect to the sell-in process. However, these activities are highly dependent on conditions imposed by other processes in the chain. Therefore, other relevant processes will also be presented with an aim to provide understanding for in what way they influence activities during the sell-in period and in the planning process.

The following sub-chapters will explain all of the actors and flows in a more detailed way.

#### 4.2.3.1 Fabric suppliers

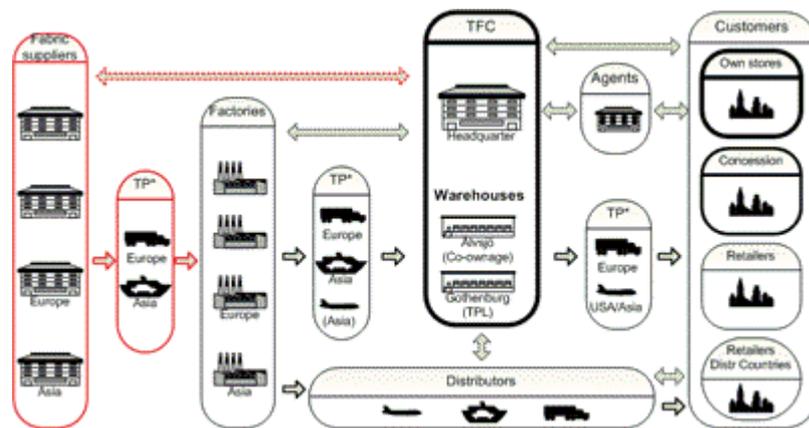


Figure 3 Fabric suppliers' position in the supply chain

TFC uses between 40 and 60 fabric suppliers. Most of them are located in Asia, Portugal, France and Italy. Italy is the major fabric supplier country and supplies together with France woven fabrics. Asia supply most yarn and Portuguese suppliers are used for tricot.

The geographical perspective is not static because sometimes TFC uses an Italian fabric supplier for an Asian knit production. Fabrics have to be transported from the fabric supplier to the factory. This transportation cost is mostly hidden in the total cost for the fabric and not treated as a separate cost. The production time for fabric varies from supplier to supplier between 60 to 120 days.

#### 4.2.3.2 Factories

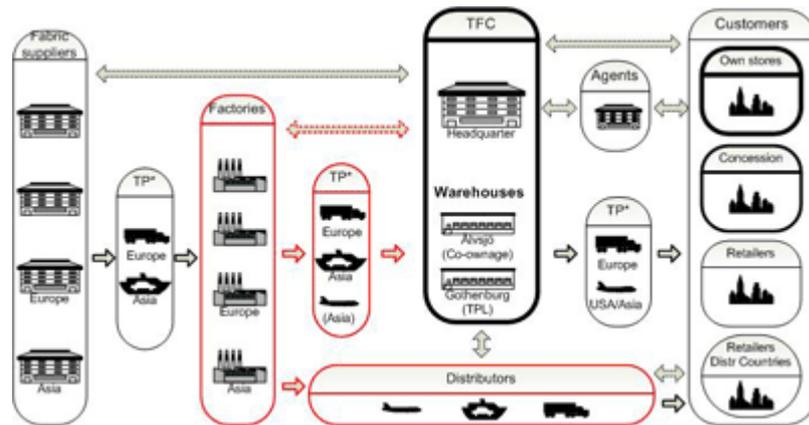


Figure 4 Factories' position in the supply chain

TFC today uses factories in Portugal, Italy, Estonia, Latvia, Turkey and Asia (Hong Kong). Long term relationships are valued highly. In difference with fabric suppliers, it is more likely that TFC can use the same factories season after season. Relationships with factories are therefore in general stronger than those with fabric suppliers. Table 2 shows what type of products that are being produced in different countries.

Production in countries	
Country	Type of final product
Portugal	Tricot, Suits, Outdoor garment
Italy	Jeans, Shoes, Bags
Estonia, Latvia	Shirts, Skirts, Dresses
Asia (Hong Kong etc)	Knitted garment, Tricot, Weaved garment
Turkey	Outdoor garment, leather/suede

Table 1 Production in different countries

Final products are either directly transported to TFC's warehouses in Sweden but if the products are produced in Asia and designated to a country where TFC cooperates with a distributor, the distributor generally takes care of the transport to their respective market. Some exceptions apply and the transportation issue will be handled more in detail in chapter 4.4.3.

#### 4.2.3.3 Distributors

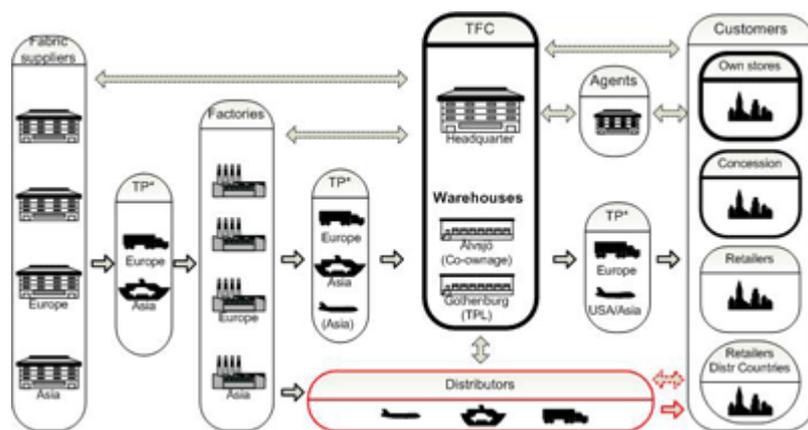


Figure 5 Distributor's position in the supply chain

In USA, Canada and Australia TFC cooperates with a distributor.

From TFC's perspective, these countries act as single stores/customers. TFC has no communication with stores or retailers on these markets. As already stated, distributors in each country take responsibility for their respective market with respect to transportation to stores and central warehousing.

Products that are produced in Asia and assigned for markets where a distributor operates, never take the route via Sweden. Instead, items are delivered by the factory to a transit warehouse in Hong Kong, where distributors then take over the responsibility for the products.

However, during the sell-in period distributors are part of the sales process on the same conditions as all other countries.

In countries where agents work as distributors, re-fill orders are very rare.

#### 4.2.3.4 Customers

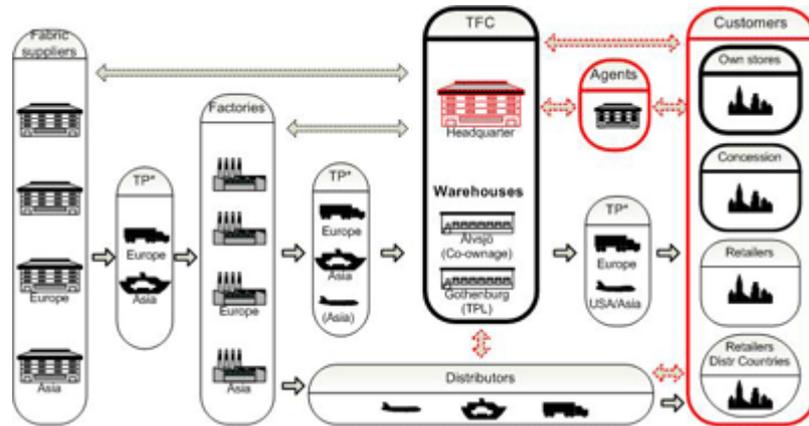


Figure 6 Customers' position in the supply chain

Customers, from TFC's perspective, are stores that sell their clothes. It is possible to categorize the customers in four different categories. These are: own stores, agreement stores, concession stores and independent retailers. The company is today actively operating on the following markets: Sweden, Norway, Denmark, Iceland, Finland, the Netherlands, Belgium, Germany, Ireland, Austria, Canada, USA, United Kingdom, Switzerland, Australia, Spain and France.

In total, TFC's garments are sold in some 650 stores.

#### Own stores

TFC's own stores work both as a marketing channel and sales channel. End customer walking in a TFC store will most likely find a bigger representation of the full collection of the season than in any other retailer. Depending on the number of TFC stores in the actual city, TFC can put a profile on each store, where the most apparent distinction is separate man and woman stores. But it can also be by having different colours in different stores, as a complement to the traditional black/grey/white style.

When entering new markets with estimated big potential, TFC holds a high belief in their own stores as a marketing channel. Since retailers in a country where TFC is a new actor, may not be prepared to order very many parts of their collections in the beginning, TFC's own stores, placed in attractive locations in bigger cities, can expose a bigger part of the collection to the market and by that, hopefully, create a demand for their clothes.

TFC's own stores are directly connected to the central computer system and TFC headquarter can monitor sales information and stock levels instantly.

Stores can see central stock availability and place orders directly in the computer system.

Sales data can be accessed live, but is often analyzed monthly. Then TFC headquarter can monitor that the stores have enough products and identify if stores have too little stock of certain products.

#### Agreement stores

The agreement stores appears as a TFC store, and in many respects works as one, for example ordering during the sell-in season is made at the TFC headquarter. However, their computer system is not integrated and TFC can not monitor sales instantly and orders from stores can not be placed directly in the central computer system. Instead re-fill orders are carried out the same way as for concession stores and retailers, by phone or e-mail. During the rest of this paper, agreement stores are considered to be included when mentioning own stores, unless nothing else is stated.

### Concession stores

Concession stores are partly owned by TFC and partly by an independent retailer or company. Therefore the relationship can be considered as stronger than towards independent customers, but there is for example no integration of the information system. Re-fill orders during the season are placed over phone or e-mail. Today there are a total of six concession stores, five of them in Sweden and one in Norway.

### Retail stores

The retail stores are independent stores who acts as retailers and sells TFC clothes. They vary in size but all of them are assessed prior to acceptance as a retailer. For TFC, image and style is an important variable and therefore retailers must meet some criteria that concerns whether or not the retailer can represent the TFC brand. Customers in the retail store category can be anything from large department stores to hand-picked specialty shops in major cities.

As already stated, retailers in countries where a distributor operates are not visible to TFC. Ordering on their behalf is done by the distributor.

## 4.2.4 Season cycle overview

TFCs business is built upon the season cycles, thus it is important to describe these cycles.

In a simple way these cycles can be described as easy as the annual year is divided into spring and fall and each of these two seasons consists of three collections; pre-collection, main collection and in-season collection (see table 1).

Collection cycles (Case example Fall)		
Collection	Design & Construction	Planning & Sales
<b>Pre-collection</b>  In stores: June 07	<b>Mid June – Mid October 06</b>  16 Jun: Design kick-off 1 Sept: Deadline handover to construction	<b>Mid October 06 - January 07</b>  17-19 Oct: Tollgate with prototypes 1 Dec: Sell-in starts 12 Jan: Production instructions to factories
<b>Main collection</b>  In stores: July-Sep 07	<b>Mid June – Late November 06</b>  16 Jun: Design kick-off Sep-Oct: Sequential work between design & construction, deadline divided depending on type of fabric.	<b>Mid October 06 – February 07</b>  17-19 Oct: 1 <sup>st</sup> tollgate with sales 14-16 Nov: 2 <sup>nd</sup> tollgate with sales 10-12 Jan: Sell-in starts, deadline for orders to TFC stores and largest customers. 28 Feb: Production instructions to factories.
<b>In-season</b>  In stores:	<b>Mid February – Mid April 07</b>  Feb/Mar: Initial in-season meeting	<b>April – July 07</b>  Apr: Forecasting demand and place order at

Oct 07	Mar: Design sketches handed over to construction. Apr: Final sketches from construction	factories. Jun: Sell-in starts
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Table 2 Collection categories example Fall-collection

The **main collection** is always the biggest, in terms of number of unique items, and has a sales period of three months, meaning that TFC delivers the collection to their customers during three months (Fall: July-Sep, Spring: Jan-Mar). It is up to the customers to decide whether they want to keep the collection in stores for a longer time.

The **pre-collection**, as stated, is smaller than the main collection and appears in stores about one month in advance (Fall: June, Spring: Dec). However, the style and base values of the collection is similar to the main one their respective design process is in the beginning sequenced. The pre-collection’s objective is to be a foretaste of what will come in the main collection.

The pre- and main collection represents between 85 and 89% of TFCs total orders to factories during a season. Orders placed during the sell-in period (explanation in Chapter 4.3.1) is some 63%, of total sales, while the rest (~25%) are re-fill orders placed during the season. Refill orders are placed in stock to be able to meet demand of customer re-fill orders.

The **in-season** collection has a shorter time-cycle than the other two collections. This collection is not in focus in this paper and will therefore not be discussed or taken into consideration in any part of the paper except for this paragraph, unless anything else is stated. In short, the process of creating the in-season collection is rapid compared to the other two collections. The time period from design until final order date towards factories takes no more than two months. Orders to factories are placed before the sell-in period and are based on speculation made by the distribution director. The speculation, or forecast, is partly based on what type of products that sold well in the main collection during the sell-in period that closed a couple of weeks earlier. The in-season collection stands for some 11-15% of total orders to factories during a season.

#### 4.2.4.1 Design and construction

These processes will be described very briefly due to their relatively limited involvement with the logistic activities (compared to planning, sales and transportation).

The design team takes the first steps of each season, deciding about style and values that are to influence the new collection structure. Last say is always given to the founder of the company. As style and values are decided over, the design and construction team is together involved in the process of transforming ideas to final production instructions. In short, the design team comes up with the ideas, sketches them down and hands them over to the construction team who is responsible to investigate whether the ideas are possible to realize, with respect to for example fabric demands, and produce detailed production instructions including fabric specifications.

#### 4.2.4.2 Planning and Sales

With the collection structure in place, the planning and sales process faces the task to plan the season, block fabrics and capacity at suppliers and estimate sales budget.

In the planning process, the different items in each collection are to be given customer delivery dates. This applies in particular to the main collection, where deliveries are spread out over three months. This decision is based on several factors (in addition to if the item's nature makes it natural to place it early or late in the season):

- What type of fabric is needed for the item? What is the production time for this fabric? What previous experiences do TFC has with the supplier, are they punctual?
- Where will the item be produced and by whom? What is the production and transport time?

If any of the above factors implies longer lead times, then the delivery date can be placed later in the season.

Another important activity in the planning process is forecasting. Forecasting is heavily dependent upon sales data from the sales process (see next paragraph). However, some initial forecasting is made before the sell-in season starts. This process is central in the paper and will therefore be examined more thoroughly in chapter 4.3.1.

The sales process is also named the sell-in season and has a length of approximately ten weeks. It starts about six months prior to when the first items in the collection is supposed to be delivered to stores (see table 1). During the sell-in season, sales people hold meetings with potential customers (stores) and sell items from the collection. Also this process has a central role in this paper and will be described thoroughly in chapter 4.3.2.

#### **4.2.4.3 Delivery period to customers**

The last period in the season cycle occurs when the collection starts being delivered to customers. The main collection is being delivered during three months and the pre-collection starts being delivered one month earlier. The most crucial aspect for TFC is to deliver on time. So far, TFC feels they have a strong reputation in terms of reliable deliveries and they also offer their customers the option to reject late deliveries without penalty.

During this period customers are welcome to lay re-fill orders to the central warehouse. If the product is in stock it ships immediately. The central stock level for separate items depends upon an estimation made in the planning process about how much re-fill orders TFC expects to receive from stores during the season. This buffer is decided upon by the distribution director and can be decided based on different factors. If a product sold very well during the sell-in season this indication can be seen from two angles. Either that end consumer demand will be high which means that re-fill orders will be plenty, or that customers may have over-estimated end consumer demand and may not be in need of additional deliveries during the season.

### **4.3 Planning and sales process**

Selling of the two collections (pre and main) starts approximately six months prior to the arrival in stores. As it is a process of selling in the collection to the customers it is named "sell-in season".

The planning process is closely connected to, and heavily dependent upon, the sales process as planning is made based upon input on actual sales from the sales process.

Some key dates for the sales and planning process are presented in table 3.

Schedule during the sell-in season (Case example Fall collection 07)	
Date	Activity
12 January (Monday)	Kick-off (Sales)
17 January (Wednesday)	Own stores and largest customer Point-Of-Sales data collection (Sales). Forecasting based on POS-data and subjective judgment by distribution director (Planning).  Block fabrics and production capacity based on forecast.
28 February	Deadline for sales in Scandinavian countries.
3 March	Sales deadline and final order to fabric and factories with information about the amount of pieces and colours, not to which country. Deadline for final orders to countries where import licenses are needed.
30 March	Inform factories about how products should be divided country wise (including pre-pack instructions).

Table 3 Schedule for the sell-in season

#### 4.3.1 Sales process (the sell-in season)

The sell-in season starts with a kick-off meeting involving sales people from TFC, their agents and distributors. The meeting aims to present the collection's design, theme and inspiration. Sales people are also being given product samples to be used during customer meetings. During the week after the kick-off meeting, sales people have already booked their schedule with meetings at their respective biggest customers. During these meetings customer orders are collected. At the same time, the distribution director starts deciding about how much to order to TFCs own stores in each country.

The thought behind this strategy is that the relatively large size of each order placed during the early days in the sell-in season will form a good base to forecast total sales during the sell-in season. Historically, initial orders placed during these first days will at the end of the sell-in period account for some 40% of total sales.

During the rest of the sell-in season, sales people continue to meet up with customers and sell the collection. Sales data from Sweden, Norway and Denmark are reported directly into TFCs computer system, while agents in the other countries are uploading their orders on a weekly basis.

Traditionally the order distribution during the sell-in period is not stable. When selling the fall collection (January-March), many customers wait until after the Copenhagen International Fashion Fair to place their orders. Other variations apply in different countries. In France for example, customers tend to place their orders later than in other markets, especially during the sell-in season for the spring collection (July-September). In the North American market (USA and Canada) an important fashion fair takes place after the sell-in season and TFC is aware of that the distributor in these countries ideally would like to collect orders during this fair. However, this is not possible as today's lead time conditions force TFC to place their final order earlier.

### **4.3.2 Planning process and forecasting**

Forecasting is part of the planning process and dependent on sales data from the sales process. However, depending on several circumstances it might be necessary to estimate sales for certain items also before the sell-in season has started. A common reason can be when an item is dependent upon fabric from a supplier who has long lead times or that the supplier works by first-come-first-serve. In such cases TFC can choose to reduce risk by blocking fabric in advance, to ensure that the supplier will allocate capacity for TFC. If TFC waits too long with blocking fabric or placing an order there is a risk of delay of the fabric order.

About two to three days after the sell-in period has started, the first forecast is made based upon incoming orders from the selling process. This forecast will then be based on the orders collected from the largest customers in each market. Further, the distribution director has decided orders to TFC's own stores.

From that information, the distribution director looks at each individual product, divided in colour but not in size, and estimates the total sales for each product. The estimation is not only based on sales data. The distribution director is also taking his/her subjective predictions about what items that will be popular. This means that an item that has not initially sold very well may be forecasted a little bit higher than the initial demand pattern would indicate. The forecast is finally placed as an initial order to factories to give an indication about how much production capacity TFC would need, and to fabric suppliers about how much fabric TFC wants to order.

TFC's current forecasting method does not divide the forecast based on what country orders come from or what kind of customers orders are designated for. However, they are aware of that different types of customers do have different buying behaviour. For example high-fashion retailers in bigger cities may buy more of the contemporary collection while retailers in shopping malls may buy more base products.

After the initial planning activity, the forecast is adjusted every two weeks based on sales data that is available for the moment. As more and more sales data becomes available, it is often necessary to adjust orders to suppliers. If it is early in the sell-in season it is more likely that suppliers will accept bigger changes. How big changes that are acceptable depend on each supplier.

#### **4.3.2.1 Problems experienced in the forecasting process**

It is often a bigger problem to change bookings made towards fabric suppliers than changing estimated production capacity at manufacturers. For example, if TFC would like to order a larger quantity the fabric supplier might accept that parts of the additional order will be handled together with the initial quantity, while the rest might be placed as a new order and handled later. This could lead to a delay in the supply chain. Also, manufacturers are not always positive towards receiving fabrics in separate deliveries if it forces them to start the production process several times. Ideally they want to receive one shipment of fabric and produce the whole quantity of final products in one sequence.

Also if TFC has to adjust down an order, the fabric supplier might argue that they already have dedicated a certain amount of fabric to TFC and that TFC's desired change is too big to accept. Then, TFC might have to buy more fabrics than their forecasted need.

As TFC is growing, they feel inaccurate forecasts have caused more and more problems. During the last two seasons they had to adjust a lot of orders to suppliers many times. Thanks to strong mutual relationships with flexible and patient suppliers, most situations were solved, but with the predicted growth in mind TFC feels they must do something otherwise the problem will become too big to handle.

TFC has made some small changes for products that are designated to countries that require import licenses. For example as factories in Asia, prior to shipment, have to specify which country the goods are sold to, the distributor in USA and Canada have to place their final orders about three weeks before the sell-in season is closing. For the distributor, it means he has to speculate how much he will sell during the final weeks of the season. If the forecasted demand will be over estimated the distributor will have to keep garments in stock and carry the cost. From TFCs perspective, it means that the risk of forecasting inaccuracy is transferred over to the distributor. Also, the process of preparing necessary documents for import licenses can be handled earlier and will not risk delaying delivery of products.

## 4.4 Conditions affecting the planning process

Lead times in TFCs supply chain varies from product to product and depends upon many different factors. The most common are

- Type of fabric
- Production time at the fabric supplier
- Production time at the manufacturer
- Transportation lead-times from fabric supplier to manufacturer and from manufacturer to TFCs warehouse
- Handling, preparation and distribution at/from TFCs warehouse

Except for lead times, also the suppliers and factories degree of flexibility is an important condition for the planning process.

### 4.4.1 Fabric type and fabric supplier production time

As TFC is positioned in the affordable to upper price range, fabric quality is very important. As the design and construction team have specified desired fabric specifications, TFC purchasers gather information about available fabric types from fabric fairs. Quality tests are then being done on fabric samples, retrieved from suppliers. Depending on what type of collection category the fabric is to be used for, the quality demands differ.

- **Base collection** - Very high quality fabrics to facilitate durable products that can be used for many years and should be able to withstand several washes.
- **Contemporary collection** - High quality fabrics, but more in terms of exclusive fabrics than in duration.
- **High fashion** - More expensive fabrics that only could be used for high fashion clothes. For these items, TFC orders smaller and more expensive quantities than

what would be acceptable for the two other collections. TFC would like to work more with those fabrics but they are too expensive.

TFC grades fabric quality on a five grade scale. No matter what collection category the fabric is to be used in, TFC never works with anything that has a grade below three. Further, the purchasing department must consider costs when choosing suppliers. Each product has a specified budget, including how much the fabric is allowed to cost. Recently also code of conduct has been added as a supplier assessment criterion. Code of conduct concerns issues like environmental questions and child labour abuse.

As soon as the type of fabric is decided upon and the quality tests have been made, it is necessary to select a supplier.

TFC always try to work with suppliers who have short lead times, but sometimes TFC feels that they have to accept longer lead times, as there are no other alternatives. In many cases when the supplier has long lead times and therefore demands an early order date, TFC is suspecting it is an argument to fill the supplier's order book as early as possible. TFC is always interested in long term relationships with suppliers that have proved to be reliable and with whom TFC feels the relationship is working. It is often easier to negotiate with a supplier who is relatively small, or where TFC is a big customer. However, some of fabric suppliers in question are very big companies, where TFC is not considered as a relatively important customer. This condition affects the relationship.

The fabric supplier selection is a complex process, starting from a need to find a supplier who can provide a certain type of fabric, fitting the specifications decided upon by the design and construction team. Further, the cost issue is to be considered as well as the quality issue. Finally the ideal supplier can deliver with short lead times and it is also very desirable if the supplier can be flexible with adjusting orders as late as possible. A flexible supplier is definitely helping the planning process as it decreases the dependency of an accurate initial forecast.

There are many differences to take into account depending on which supplier is used. For example, suppliers in Asia tend to demand more administrative routines both in terms of import documents and licenses but also concerning other paperwork.

#### **4.4.2 Manufacturing time**

When working towards factories, the purchase department state criteria that the factories must meet. The most obvious criteria are that the clothes must be sewn with such a quality that TFC's end consumer expects. But as important as this are the criteria of lead time (production time) and flexibility, in terms of being able to adjust to changing conditions, i.e. changing orders during the sell-in season. As when selecting fabric suppliers, code of conduct is an increasingly important variable.

Currently, TFC feels they have good relationships with their manufacturing suppliers.

#### **4.4.3 Transportation lead times**

##### **4.4.3.1 From fabric suppliers to factories**

TFC does not take an active role in organizing the transportation from the fabric supplier to the factory. When booking fabric, the fabric supplier agrees to meet a date when TFC

wants the fabric to be available at the factory where the garment is to be sewn. As already mentioned, when selecting fabric supplier and factory for an item, little or no consideration is taken to their relative geographical location. Thus, in practice it means that often the fabric supplier for an item that is sewn in Asia can be located in Europe. This means that the transportation lead time for this step can vary from a couple of days up to 30.

#### **4.4.3.2 From factories to TFC/Customer**

Depending on whether the supplier and/or end customer is located inside the EU/EES-area, goods can either be directly sent to end customer or via warehouse in Sweden. Unless anything else is stated, the below routines applies for original order deliveries, which means the fulfilment of orders that were placed during the sell-in period.

From suppliers in Asia most goods are sent by boat, which takes about 35 days. But when time pressure is high also flight transports are used, which occurs quite often. As soon as a supplier has handed over goods to the transport provider that TFC cooperates with, the provider notifies the company that goods are on their way to be shipped and TFC can take necessary actions to prepare import licenses etc. To avoid unnecessary customs and freight costs as well as time savings for goods that are aimed for markets outside EU/EES these are shipped directly from Asia. The batch size for shipments to third party countries (outside EU/EES) is calculated up to six months ahead of delivery, as soon as the original orders from the sales season are collected. This applies for i.e. USA, Canada, Australia and Norway. These goods are stored at the provider's warehouses in Hong Kong, Shanghai and Beijing. Then the buyer (USA/Canada and Australia) collects the goods from the warehouse. To Norway, shipments are being sent directly to TFCs Norwegian subsidiary who takes care of customs clearance, and later also distribution to stores in the country. In Switzerland, TFC do not have a subsidiary or agent that takes care of customs clearance. Therefore, orders addressed to Switzerland are being shipped together with the Swedish shipment. However, the goods are not cleared at customs in Sweden. Instead they are put on a transit warehouse where TFC's partner First Cargo repacks the goods and prepare for separate deliveries to each customer (20 different) in Switzerland. The reason for this is that there is no agent or distributor, in Switzerland, that are willing to take care of customs clearance and distribution of the batched delivery in the country.

Goods sent from a supplier inside the EU/EES-area are sent by truck. The transportation is taken care of by another contracted provider and the usual delivery time is one week. All goods from suppliers within this region is sent to Sweden, and then distributed to end customers from the warehouses in Gothenburg and Älvsjö. The warehouse in Gothenburg takes care of hanging garment and goods that are to be sent to USA/Canada, Australia and Switzerland. The main reason for using the warehouse in Gothenburg is because of the provider's high knowledge and competence of taking care of hanging garment. The reason for transporting hanging goods is to avoid wrinkles. For some products, for example dresses and suits, clothes can not be delivered to the customer if they are wrinkled. Then TFC has to bring the wrinkled garments to a third party provider in Malmö who straightens out the wrinkles. This service is very expensive.

#### **4.4.4 Preparation and handling at TFCs warehouses**

Trucks from European factories are unloading in Gothenburg first and then bring the remaining goods to the warehouse in Älvsjö. Still discussing original orders, we are now about one month ahead of the point in time where the goods are to be delivered to the

customers/stores. During this month, the warehouses are preparing deliveries and documents as well as packing according to customer orders. To minimize the time and work load for this process, all of TFCs suppliers are instructed to pre-pack the goods at their site, especially for larger customers. It means that incoming deliveries to the warehouse comes already packed and prepared for final delivery to stores. Then the warehouses in Sweden do not have to re-pack the goods.

Even though the process of handling and distribution has been drastically helped by an increasing usage of pre-packing at the warehouse, it does not increase capacity in terms of storing items at the warehouses. The problem is most critical during the month prior to delivery, as all collections have a fixed delivery date meaning that all customers are to receive the clothes at the same time. As each season so far has meant growing sales, the warehouse has faced a growing number of items every season. During the last season (fall 2006), the warehouse in Älvsjö was working on full capacity. To solve the capacity problems at the warehouse are among the top priorities for the TFC logistics department. They have briefly discussed solution alternatives such as extend the warehouse in Älvsjö or change to another warehouse. But then they must decide where to place the new warehouse.

#### 4.4.5 Lead time examples

Lead time examples, spring collection									
Del Month	Product	Prod Supplier (name)	Del. from Production to TFC.	Prod time at Factory	Fabr. latest at Prod.	Transport time (Fabr-Prod)	Latest fabric delivery	Prod time Fabric	Latest day for fabric order
December									
	A	Loo	061208	35	061103	21	061013	100	<b>060705</b>
	B	Moo	061208	35	061103	21	061013	120	<b>060615</b>
February									
	C	Roo	070105	42	061124	21	061103	105	<b>060721</b>
	D	Soo	070105	42	061124	21	061103	60	<b>060904</b>
March									
	E	Soo	070202	35	061229	28	061201	87	<b>060905</b>
	F	Loo	070202	35	061229	28	061201	60	<b>061002</b>

Table 4 Lead time examples, planning schedule

Table 4 gives an example of how a planning schedule can look like at TFC. Each product is being given a month during which customers are promised delivery. Starting from that month, TFC counts backwards, adding lead times in each step together which finally results in the date when fabric must be ordered.

Even though data in this table are figured, they represent a realistic scenario. Production time at factories is often between 30 and 45 days, depending on quantity. The transport time between the fabric supplier and the production facility can vary and is affected by the geographical distance between the two. The most varying lead time is the production time

for fabric. Some fabric implies longer production time due to its specific nature but in some cases, as already mentioned, the actual fabric supplier may demand an early order date just to keep their order book full as early as possible.

In the above table the longest lead time example is for product B with 176 days from fabric order date to delivery date from supplier. This could be compared with product D's lead time of 123 days. In this example, TFC struggle with long fabric production lead times for December deliveries. For the planning process it means that the final order of fabric might have to be placed even in advance of the sell-in process has started. The order for these products will then be heavily dependent upon an accurate forecast.

## 5 Analysis

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*In this chapter the empirical results (Chapter 4) will be examined from the perspective of the frame of reference presented in Chapter 3. The structure of the analysis has been designed so that the provided discussion answers the paper's research questions in a logical way.*

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### 5.1 TFC in the Fashion industry

This chapter will introduce the analysis and TFC will be positioned in the fashion industry. Characteristics of the company will be compared with the way the frame of reference are describing fashion firms in general. This is being done to ensure validity in the analysis. By finding connecting points between fashion firms, as described in the frame of reference, and TFC it is being ensured that the frame of reference is applicable and relevant, thus validity is strengthened.

#### 5.1.1 Identifying TFCs segment

TFC is a fashion company who designs and distributes clothes and some apparel (footwear). The company does not undertake any manufacturing of either final products or supplies (fabrics, buttons, leather etc). Most of TFCs products are sold in stores that TFC does not control, even though the strength and type of relationship varies from agreement stores, independent retailers and in some cases (distributing countries) TFC does not have any connection with stores that sell their products. When applying the Intertia segmentation of the fashion industry, presented by Zackrisson (2005), TFC can be categorized in a combination of two (possibly three) segments. These are, in order of relevance:

**Design, Source and Distribute (DSD):** The biggest part of TFCs business fits into this description. TFC designs and sources their products and then distributes them to its customers (stores).

**Design, Source and Retail (DSR):** As TFC also operates with own stores, today some 17 (23 agreement stores included) stores, a part of TFCs business qualifies the company in to the Retail segment.

However as TFC in some countries works with an independent distributor, who in some cases collects products directly from the manufacturer, TFC can also be found in the **Design and Source (DS)** segment. This term is not expressed in Intertia's segmentation, but we feel its existence is apparent in this case.

Even though we have shown that TFCs business structure segments the company in to a combination of the above described segments, we will from now on consider TFC as belonging to the DSD-segment. This can be supported by questioning whether TFC can be seen as a DSR-company, as TFCs own stores in fact operates under a separate company structure which is a subsidiary to TFC. From that perspective, TFC maintains its position as a DSD-company with the retail function outsourced.

### **5.1.2 The nature of TFCs products**

Further, Christopher et al. (2004) builds their arguments on an industry where the products are short-lived and an element of style is added to the product. Already in the background of this paper (Chapter 1.6) it was concluded that TFC aims to create sophisticated and simple clothes who communicate style, simplicity and quality. With this in mind it is evident that TFC and its products fit into the generalisation made by Christopher et al. (2004). Therefore the characteristics short-life cycles, high volatility in demand, low predictability in forecasts and high impulse purchase decisions should apply. However, an issue we feel relevant to address is whether TFCs intentions to create simple and sophisticated clothes would lead to longer life cycles than in the general case. In particular this should apply to the base products where TFC has expressed that they try to create clothes with time-less designs that, if unsold one season (summer/winter), should still be modern and possible to sell again next season. As the base products accounts for some 40 percent of total sales this observation should not be ignored. On the other hand, for contemporary and high-fashion products, the primary data does not contain any indication that contradicts the characteristics found by Christopher et al. (2004).

### **5.1.3 Season cycle application at TFC**

When looking at the season cycle several researchers within the field, among them Barnes and Lea Greenwood (2006), states that traditional fashion companies are working with two main collections. However, the trend towards more demanding customers and shorter life-cycle of trends has forced the industry to have more than two collections, supported by both Barnes and Greenwood and Christopher et al. (2004). At a first glance, TFC would fit in to the traditional description having two main seasons, namely Spring and Fall. However, when looking closer at the season cycle, each season consists of three collections. In the longest spanning main collection, deliveries of clothes to stores are spread out over the season. This means that end consumers will be faced new clothes in at least ten of the twelve months in a year (October and May are separating Spring and Fall and no deliveries to customers are made during these months). From that perspective, which is ours, TFC should be seen as a fashion firm who follows the trend identified by researchers in general. The traditional two season division, Spring and Fall, should be seen as a result of the conditions set by the textile and fabric industry, presented by Tyler et al (2006), who concluded that timing of the fabric fairs effectively set the timetable for fashion firms' seasons.

### **5.1.4 TFC as a fast-growing company**

TFC is generally considered as a fast growing company and the latest annual report showed revenue growth figures close to 40%. In the problem discussion to this paper, Bradford (1997), argued that even though fast growth generally is considered as something positive, growth in the regions of 30% is not manageable and can especially lead to problems in customer order fulfilment. As TFCs growth is well above the figure mentioned by Bradford (1997) the company's argued fast growth should be considered as concluded. Further, we also find a very interesting connection between the order fulfilment issue raised by Bradford (1997) and TFCs worries about not being able to meet promised delivery dates.

## 5.2 Forecasting process and practices

The problem discussion consists of two main research questions. To answer these research questions, three supporting questions were identified which will be answered in this chapter.

### 5.2.1 TFCs current forecasting practices

This chapter will answer the question how TFCs forecasts are made and used during the planning process. The chapter is divided into sub sections based on different elements of a forecasting process according to the frame of reference.

As presented in the empirical part of the paper, TFCs forecasting process works in parallel with its sales process. The forecasting process starts with an estimation of total sales already within a couple of days after the sell-in period (sales process) has started. This estimation, or initial forecast, uses Point-Of-Sales (POS) data provided from the sales process. During the initial couple of days in the sales process, TFC sales people have had meetings with their biggest customers in each country and TFC themselves have decided how much to order to their own stores. Historically, this initial point-of-sales input will end up represent for about 40% of the final order that is placed. It is though important to handle this 40% figure with care and suspicion. If it was reliable and continuously stable around 40% from season to season, basic mathematics should be enough to predict total sales (100%). However, the complexity of the problem does not stop here. Even if the 40% figure would be reliable, it is not useful for TFC in an aggregated form since planning and forecasting must be made on product level. This issue is addressed by Fisher et al (1994) who also conclude that even though a quite accurate forecast can be made on an aggregate level (also supported by Herbig et al (1994)), the challenge lies in dividing it in to each of the numerous SKUs. Surely, this theoretical support is taking us closer to the research problem investigated in this paper and experienced by TFC.

When looking at the forecasting method applied at TFC, our empirical findings show that TFC uses a qualitative method to interpret a combination of point-of-sales data, historical sales figures and tacit knowledge of trends. In this paper, the qualitative method has been presented by Brannon (2006) and is said to be especially fitted when forecasts are to be fine-tuned out of quantitative estimations. The fine-tuning is mentioned as the adjustment process in the sense that adjustment is the qualitative addition to the quantitative result. Still supported by Brannon (2006) qualitative technique can include using expertise both from inside the company as well as outside. In TFC, only in-house expertise is used, or in fact an in-house expert as basically all forecasting is done by one single person. This makes it easy to categorize what subjective approach of the adjustment process that applies at TFC. According to Brannon (2006) the In-House expert approach applies when the final adjustment of the forecast comes down to one employee. This person is skilful and has a wide knowledge together with the right information resources. The expert is valuable to the company and the dependency on the person is high. This dependency should be considered as a drawback. The finding that TFC is using one single person for all forecasts is not surprising, with respect to what Herbig et al. (1994) found in their research when investigating forecasting practises in firms of different size. They found that the smaller the company, the larger personal subjectivity influences the forecasting process as fewer persons are involved. At the same time, the research (Herbig et al., 1994) also concluded that the larger the company the higher importance is given to the forecasting process. This

conclusion can also be seen as valid when observing rapidly growing TFC who has identified inaccurate forecasts as a problem that needs to be solved.

The In-House expert at TFC is creating a forecast based on the POS-data. The forecast should answer to the question; “If we continue to sell each product at the same pace as the initial ordering pattern indicate, how much will the total sales be?”. Based on this information we can draw a conclusion about what quantitative input that is used for the forecast. TFC is using historical demand data to predict future demand with a belief that demand patterns will repeat themselves. This is, according to Crum and Palmatier (2003) as well as Brannon (2006), an application of a time series statistical forecasting approach. The approach is suitable and effective when dealing with a large number of end items and is not affected by human judgment. However, the approach is heavily dependent upon that demand patterns are repeatable and that future demand will have a similar behaviour.

Considering what has been found in the empirical chapter, as well as the problem discussion provided early in the paper, it is relevant to question whether the TFCs demand patterns are repeatable and expectations about future demand can be predicted to have a similar behaviour as the initial POS-input. The company has admitted that their forecast accuracy has declined more and more for each season and since the forecast is based on the above described method. Therefore, we believe, it is not far-fetched to conclude that the conditions for the time series statistical forecasting approach are not met in the case of TFC. At the same time, this is not the same as saying that the initial forecast is not useful. Crum and Palmatier (2003) argue that the forecast, even if it has major accuracy errors, can be used as a starting point. So rather than relying on that the history will repeat itself, forecasts should be analyzed and monitored to understand to what degree the forecast is accurate and what makes it inaccurate.

During the sell-in season, TFC is continuously monitoring sales data and compare them to the initial forecast and make adjustments. Updated sales data are received at least once a week from sales agents worldwide. Changes in demand patterns are then transferred into the forecast every two weeks. If the new forecast implies changes in total sales at the end of the period, TFC contacts its suppliers and try to change the final order. Whether a change in order quantity is accepted depends on how big the change is, at what time the enquiry is made and how flexible the supplier is. A big change in quantity at a later stage in the sales season is more difficult to make and it is more likely that the change will be accepted if TFCs relationship with the supplier (and/or factory) is strong and the supplier is flexible. The planning process in which sales are monitored, translated into product level forecasts and resulting in adjusted orders will eventually lead to final orders towards the suppliers at the end of the sell-in season. The point in time of the final order is what Crum and Palmatier (2003), in this case, define as the actual sale. All orders have then been placed by customers and final demand (not to be mistaken for actual end consumer demand during the sales season in stores, which is a completely different type of demand than the one studied in this paper) is visible for TFC.

This point in time, the actual sale, is important in the forecasting process. Crum and Palmatier (2003) argue that the closer in time to the actual sale item level decisions can be made, the more information will be available to support the decisions. Also Mattila et al. (2002) and Doyle et al. (2006) are supporting this statement in the sense that the fashion company’s point of purchase decision should be moved as close as possible to the point of purchase by the customer. In TFCs case, the point of purchase is not static. In an ideal scenario, TFCs planning and forecasting process leads to a point-of-purchase decision occurring in the end of the sales season when all customer orders are collected and the final

order is made. But, this scenario relies on that the final order lies within the acceptable range of adjustment with respect to the initial order placed in the beginning of the sell-in season. The initial order placed can be seen as a dedication of a large share of production before information about real demand is visible, as discussed by Fisher and Raman's (1996).

As a conclusion to this topic, with respect to the question to be answered in this chapter, TFCs current forecasting practice strives for placing the point-of-purchase towards suppliers at the same time, or at least as close as possible to, the point-of-purchase by the customer. However, it is heavily dependent upon the forecast based order placed in the beginning of the season. The combination of qualitative and quantitative methods practiced by TFC is in accordance with recommendations presented by for example Brannon (2006), Crum and Palmatier (2003) and Tyler et al. (2006). The latter, as well as Fisher et al (2004), however means that even if an aggregated forecast can be quite accurate, the process of disaggregating into individual SKUs will make the forecast uncertain and unreliable.

## **5.2.2 Investigation of alternative forecasting methods**

What factors should be taken into consideration concerning forecasting within the fashion industry and what does it imply for alternative forecasting methods available?

In the preceding chapter we concluded that TFC is currently practicing a qualitative forecasting method upon underlying quantitative input. The qualitative approach used is influenced by an In-House expert who makes predictions upon time series statistical forecasting adding on his/her tacit knowledge. The initial forecast is subject to adjustment during the sell-in period, but as booking of fabrics and ordering of production capacity is based on the initial forecast it is of importance that it is accurate. The initial forecast is based on POS-input from TFCs biggest customers and their own stores. Forecasts are only useful on a disaggregated level, and are therefore divided on SKUs.

When analyzing whether TFC is likely to benefit from alternative forecasting methods the paragraph above resulting from the preceding chapter will, together with relevant theories presented in the frame of reference, form the main base for discussion.

### **5.2.2.1 Alternative Qualitative forecasting approaches**

The qualitative forecasting method in use at TFC is supported by several researchers within the field, for example Brannon (2006) and Tyler et al. (2006). Therefore, we feel no need to question this choice. However, the theory presents different approaches when using a qualitative method which are of relevance to discuss as alternatives.

TFCs current practise has been identified as the In-House expert approach, termed by Brannon (2006). Another approach, also defined by Brannon (2006) is using the concept of "polling experts". It is mentioned to be especially fitted for new products with lack of existing previous data. As TFC for each season are working with new collections this criteria can be considered as applicable. In the polling experts approach, several people make adjustment suggestions and then the consensus of the group will be the measure used to place the first order. By involving more people in the process, also the dependency on one key person is decreased. To make it useful in practice, these polling experts must be able to provide some tacit knowledge to the process not currently used. Currently, TFC is aware of that different countries have different buying patterns. What is popular in one country may be unpopular in another. The current forecasting method is showing difficulties to

handle this. A polling expert approach variant could let sales agents from different countries provide predictions about their respective market demand. Today, sales agents do not provide anything else than made orders, which is subject to quantitative analysis. We believe that it is likely that local sales agents can add value by adding a qualitative layer on that input, based on their knowledge about their own market. Useful information can be extracted from thoughts such as “Even though this shirt has not sold that well just yet I believe it has big potential considering earlier buying behaviour at stores I will visit next week/month”. If a local sales agent expects their respective market will end up selling more or less of a certain product, compared to the forecast done at TFC, then this information can result in an adjusted forecast.

#### **5.2.2.2 Demand patterns derived from type of distribution channel**

Brannon (2006) has identified sales volume by sales channel as a way of group the data for analysis, in order to decide the degree of reliance for each channel. However, in order to make this analysis, forecasting must have been made divided by sales channels in the first place. Otherwise there is nothing to compare. Even though TFC is aware of that different type of customers stand for different type of buying behaviours, this information is not used in the current forecasting method. Whether or not this can be useful is difficult question. As a starting point this should be considered as a disaggregated forecasting method, in which several customer types are handled individually. Examples of such segments could be high fashion stores in larger cities, shopping mall retailers, smaller city retailers etc. However, according to for example Herbig et al. (1994), forecasts in aggregate forms are always more accurate than disaggregated ones. In an aggregated form, overestimating one customer category can cancel out underestimating another. If a forecast method at TFC is to take different buying behaviours into account, the first step must be to divide customers into categories. Today TFC has already divided their customers in ABC-categories depending on their relative size as a customer to TFC. To use this categorization when forecasting may however not be very wise, as the initial forecast is made up on basically only A-customers and will then not tell anything about demand patterns for B and C-customers. Therefore, the main forecasting problem, which is from TFCs perspective identified as inaccuracy in the initial forecast, will not be solved. Therefore, if a categorisation which aims to separate different buying behaviours depending on customer type is to be useful, these categories should ideally be represented in the initial POS-data.

Further, when a categorization has been made its usefulness can only be assessed by looking at historical sales data to see if the categorization in fact shows different buying behaviour between the segments. This is the step that Brannon (2006) terms analyzing sales volume by channel as a way of grouping data. By doing that it should be possible to estimate the degree of reliance in predictions for each sales channel.

Taking buying behaviour into the forecasting process is also discussed by Baker (2005) in the context of assortment planning. However, in assortment planning it is taken for granted that the fashion company in fact decides about orders placed to retailers. In other words, at TFC this method can only be applied for the part of TFCs sales that is taking place at their own stores. With respect to what is studied in this paper, the main problem is not related to assortment planning in own stores or forecasts concerning them, therefore the application of assortment planning techniques is not what we are looking for in this study.

As a conclusion to the question whether including buying behaviour based on customer categories could result in better forecasting accuracy it is not possible to prove in this

study. First a categorisation must be made that, based on historical sales, shows that there are differences in buying behaviour between the segments. After that has been concluded, disaggregated forecasts can be made in which POS-input are divided into each segment so that sales progress can be monitored. Depending on how many customers in each segment that have placed their orders, an estimation of what will come from the remaining customers in the same segment could be extracted.

### **5.2.2.3 Demand patterns divided country by country**

Another question raised by TFC is whether or not it could be useful to divide the forecast country wise. Customers in different countries have different buying behaviour due to different fashion cycles. Today, this factor is overlooked. It means that if a few countries are overrepresented in the initial forecast, their respective fashion cycles will effectively influence the final order.

To support this statement we will use an example. Early in the sell-in season, each of TFCs sales agents collects orders from their respective biggest customers and TFC decides what to order to TFC stores in each country. These initial orders are included when TFC makes their first initial forecast which is used to decide about initial order quantities to suppliers, which effectively will limit the final order. However at the end of the sell-in season, it is likely that the initial orders share of each country's total sales will be varying. If a market with a relatively big share of TFCs total sales only managed to contribute with 20% of its sales to the initial forecast, the demand patterns from that market will be distorted. France is an example of a country where retailers prefer to order late in the sell-in season. This means that buying behaviours of French customers will not be visible to TFC until late in the season. On the other hand, in countries where TFC has several own stores, a greater portion of their total sales will be visible early and influence the total forecast. This forecast will be inaccurate due to relatively strong influence from fashion trends in countries that are overrepresented with early orders.

By dividing the forecasts and monitor sales country wise it is more likely that TFC would be able to become aware of what products that are selling well in different countries. At the same time TFC would be able to monitor how many customers in each market that have placed their orders yet and from that be able to predict total sales for each country. By combining information about buying behaviour in each country and predictions about total sales country wise, estimations about how many SKUs that will be sold in each country can be added together and form a forecast.

Even though this is a way of disaggregating data, which would mean higher uncertainty in forecasts (Herbig et. al., 1994), we believe that it can result in better forecasting accuracy.

### **5.2.2.4 Are orders designated to TFCs own stores an indication of future demand?**

Finally, we would like to bring up an issue which may not found support in the frame of reference. However we have found it relevant to question how TFC is handling and interpreting the initial POS-data as a tool for predicting total sales at the end of the sell-in period.

It has already been presented several times in this paper that the initial POS-data will in the end account for some 40% of total sales. These orders include both own stores as well as the biggest customers in each country where TFC has an agent or distributor. Ordering to own stores are made by one person at TFC, the same person who also later is responsible

for the forecasts. This means that a large part of the initial orders are in fact influenced by TFCs own predictions about future demand. However, is this information really useful when trying to forecast demand patterns from TFCs customers? When looking at time series statistical forecasts based on both own store orders and biggest customer orders we argue that the result will be biased. On the one hand, the pattern will pull towards TFCs predictions about future demand (own store orders), on the other hand towards a pattern resulting from external customer orders. We argue that the only interesting pattern to extract is the one possible to withdraw based on orders not placed by TFC (own stores). Therefore, when making predictions about incoming orders these should not take own store orders into account as they do not represent customer demand, but only a predicted customer demand. When the forecast based on external customer orders is made, own store orders should simply be added and result in an estimation of the final order.

The validity of this conclusion is not as simple as black or white. One should take into account that TFCs image and reputation can be considered as strong enough to dictate trends. If TFC sales people actively promote to external customers what products that will be over represented in their own stores, it can be a driver for demand. However, this variable will be hard to handle in a quantitative way unless it can be analyzed based on several seasons. Therefore, our conclusion stands; own store orders should not be included in any statistical analysis in the forecasting process as these do not represent an indication about customer demand.

### **5.2.3 Underlying conditions for the planning and forecasting process**

What underlying conditions could TFC take action against to decrease the dependence on accurate forecasting in the planning process?

TFC has expressed that they are highly dependent on an accurate initial forecast as soon as possible in the sell-in season. This dependency is based on several conditions, some of which that are more responsive to change than others. This chapter will discuss these alternatives.

Each step in TFCs sourcing and production process (fabric production, transportation, product manufacturing) takes a certain amount of time. The lead time for each step depends on the supplier chosen for each product and its geographical location. Thus, lead times for different products will vary and TFC must keep track on when they need to order each product to ensure final delivery to customers as promised. This is being done by counting backwards, starting from the date when TFC need to have the products at their warehouse to have enough time to prepare final deliveries to customers (visualized and explained in 4.4.5). This results in latest final order dates for each product. As the sourcing process start at fabric suppliers, the latest order date towards fabric suppliers becomes the first date of importance in the planning process. At this point in time, TFC ideally should be aware of the final demand for the actual product the fabric is needed for.

Forecasting is the underlying base for the initial order which effectively limits the final order as concluded in chapter 5.2.1. From the perspective presented by Christopher et al. (2004) it leads to a conclusion that TFC is facing the fundamental problem of the fashion industry. The final order becomes forecast based which results in revenue losses on the final market. With TFCs growth in mind, the revenue loss could occur if the dependence

on accurate forecasts increases. Then, if the forecast is inaccurate, the final delivery might end up being delayed. Considering TFC's reputation of delivering goods in time, this problem could hurt their reputation and in the long run getting less and less orders from their customers. Until today, TFC has not had big problems with this but they see the problem coming and they have to get a fit between the corporate growth strategy and the logistic strategy.

We believe that TFC is struggling with a lead-time gap, explained by Christopher et al. (2004) greater than acceptable. TFC has, as the authors' state is the traditionally way, filled the gap with a mix of forecast based ordering and forecast based inventory to ensure customers demand on delivery date. Christopher et al. (2004) explains the problem as "*the time it takes to source materials, convert them into products and move them into the market place is longer than the time the customer is prepared to wait*". The period from when TFC has to place the initial order to the point in time when their customers will receive the products is in this case the time to source materials, convert them into products and move them into the market place. On the other end; the time the customer is prepared to wait is the period from when each individual customer, both those placing orders early and late in the season, to when they are promised to retrieve deliveries.

With the help of a pair of examples visualized below (figure 7), the lead time gap can be explained further. The figure visualizes a simulated time period from the beginning of a sell-in season to the promised delivery dates. The dates chosen in the figure involve selling in and planning a fall collection. The reader should be aware of that the figure is simplified in several ways. Dates of importance vary from season to season. Further, in the figure the initial order can be mistaken for a definite non-adjustable order, which is not always the case in TFC's situation. However, as a tool for visualizing the initial order forecast problem it clearly shows the lead time gap, defined by Christopher et al. (2004) and even though orders are adjusted continuously during the sell-in season, they are still limited by the initial order.

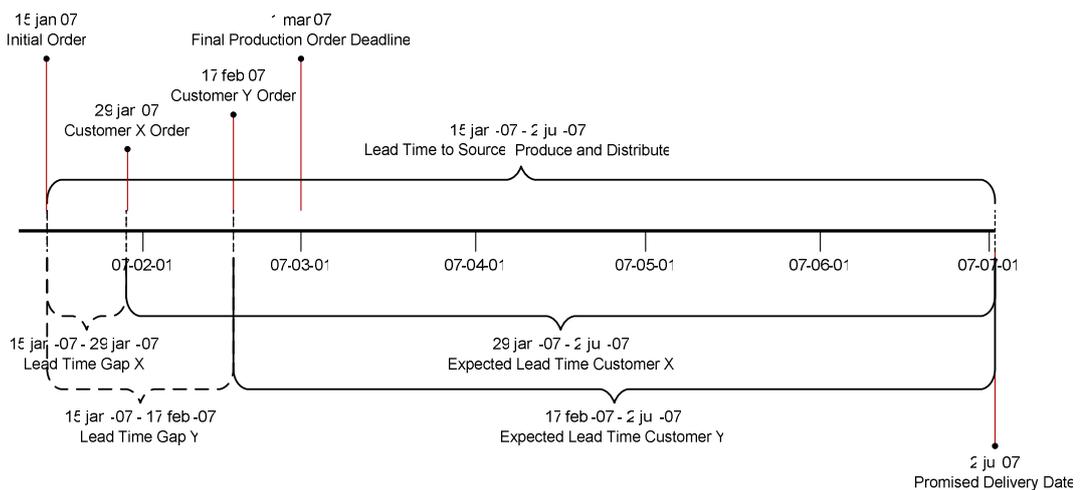


Figure 7 Example of lead time gaps

The time line in figure 7 starts with the initial order, placed in the very beginning of the sell-in season (which lasts until 07-03-01). To be able to source materials (textiles), produce (sew clothes) and distribute (handling and sending out from warehouses) the order to sup-

pliers must be placed at this date. A considerable amount of customer (store) orders are visible at this time, but traditionally a majority of customer orders will be placed in the coming weeks. Among these are the ones coming from Customer X and Customer Y. These two customers will eventually place their respective orders within the frame of the sell-in period and by doing so they are promised by TFC that their order will arrive at a certain delivery date (July 2<sup>nd</sup>). The lead time gap becomes apparent when comparing the length from when the initial order is placed to the final delivery date, with the length from when Customer X and Y's orders are placed to the very same date of delivery. In other words, the time it takes to source materials, convert them into products and move them to the market place compared to how long the customer expects to wait.

Christopher et al. (2004) list four responses to this fundamental problem, defined as striving for the agile supply chain. The concept is driven by demand instead of forecasts.

### **Market sensitive**

TFC is trying to forecast total demand by analyzing early available POS-data which results in an initial booking. This can be seen as TFC's way of being as close as possible to the market. By basing the forecast on actual orders they try to react and adapt to trends and by that reach market sensitiveness. In chapters 5.2.1 and especially 5.2.2 TFC's current forecasting practices, when analyzing point-of-sales data, have been addressed and should therefore be considered as our recommendations with respect to this issue.

Christopher et al. (2004) also mentions attending fashion fairs as a mean of capturing upcoming trends. The empirical findings show no disregard of this recommendation by TFC as it is an important part of the company's design and process.

Still, the objective is to be able to take the final order decision as late as possible in the sell-in season, which then represents the final customer demand. By virtually integrate supply chain members, visibility of demand information can postpone the final order as suppliers will continuously be aware of current demand and forecasted final order. The postpone-ment issue has in this paper been presented by Doyle et al. (2006) as a way of making fewer decisions later in the process.

### **Virtual integration**

Keeping a high degree of integration between actors in the chain is vital in the agile supply chain. TFC argue that they hold frequent contacts with suppliers to continuously update their initial order during the sell-in period. Every two weeks, point-of-sales data is analyzed and forecasts adjusted. If the new forecasts are indicating considerable changes in the final order, suppliers are contacted.

It is our belief that improvements in this matter can be made with relatively small adjustments. Christopher et al. (2004) argues that it is important that supply chain members works with the same set of numbers. Information about demand should be visible as far as possible without delays or boundaries. Today, point-of-sales data from sales agents outside Scandinavia is only transferred in average once per week, and only analyzed every two weeks. This delay in information sharing is unnecessary and we believe it can be rectified. With TFCs new information system in place, support for automatic daily updates of sales figures also from sales agents outside Scandinavia could be implemented. It would give TFC continuous access to updated sales data and it would be possible to identify changes in demand patterns faster than before. This will lead to a possibility to contact suppliers

earlier when initial forecasts seem to be wrong. As a change in the initial order is more likely to be accepted early in the sell-in season, this way of further virtually integrate suppliers should be possible to do at TFC.

Even though further virtual integration actions would be desirable, the extent of them and the possibility of implementing them would need a deeper study in itself. The same applies if we are to assess whether alternative approaches to decrease dependency on forecasts is an option for TFC, discussed in the frame of reference by Mattila et al (2002) and McMichael et al (2000). Linkages between TFC and its suppliers need to be investigated further. However, what we do know is that relationships towards factories are relatively strong, with more or less the same actors used from season to season. Some of these may be open for closer integration based on long term improvement, while others are not. Such integration issues are also dependent upon the possibility of process alignment, which now will be discussed.

### **Process alignment**

Process alignment focuses on the way of sharing information and information system in order to interact with actors in the chain despite the geographical differences. TFC's supplier network covers mainly Asia, Southern and Eastern Europe. The new information system in place at TFC will increase internal system capability including communication with warehouses but it will not change the way TFC communicates externally. In the future, this could be a task to solve for TFC but, due to the same reasons as described in the previous paragraph, it is difficult to analyze possibilities in integrate suppliers information systems. However, it can be concluded that process alignment towards suppliers is not in place today. Information sharing is done manually, over mail or phone.

According to Christopher et al. (2004) creating virtually integrated teams across the network of suppliers and distributors would lead to a high degree of synchronization, which would lead to a cut in lead times.

Still, the objective is to be able to take the final order decision as late as possible in the sell-in season, which then represents the final customer demand. By virtually integrate supply chain members, visibility of demand information can postpone the final order as suppliers will continuously be aware of current demand and forecasted final order. The postponement issue has in this paper been presented by Doyle et al. (2006) as a way of making fewer decisions later in the process.

### **Network base**

Agile companies are distinguished by the way they work with their supplier base. It is recommended to work with a small set of suppliers, selected from a wide base of actors, for each season (Christopher et al., 2004).

Every season, TFC is changing some of the fabric suppliers due to for example new garments which consist of another kind of fabrics. The network base is indeed shifting. The manufacturing base is relatively small and changes are few from season to season, due to an objective of working with long term agreements. This is a strategy which is wise and valid according to theory (for example Christopher et al., 2004).

The fabric supplier base is more flexible and varying than its manufacturing supplier base. According to TFC, there are more difficulties in adjusting orders towards fabric suppliers. Also lead times are often longer and more varying at fabric suppliers. The relatively low

dependence on individual fabric suppliers and the adjustment problems with these could indicate a fabric supplier selection change possibility.

The reason for the relatively bigger problem when cooperating with fabric suppliers can be explained by Christopher et al.'s (2004) finding that the cost for forecasting errors is lower earlier in the chain. The fabric suppliers are not traditionally those who take the risk in this supply chain and therefore are their relatively low degree of flexibility not surprising. The challenge for TFC lies in finding flexible suppliers that can deliver the type of fabric they need.

In addition to these four responses we would like to further discuss two relevant areas which impose problems to TFC, namely the fabric suppliers and the global sourcing strategy which results in long lead times.

### **Fabric supplier selection**

TFC strives for strong and long-term relationships with its suppliers which are flexible. Common problems are usually due to poor fabric quality or delayed deliveries from fabric suppliers. These actors are the first step in TFCs supply chain and it is therefore of big importance that these relationships works out well. The problem will otherwise follow the supply chain and finally reach end customers. As the product is labelled with TFC's name, it is natural that TFC will be the actor who suffers most.

Today TFC has several criteria when selecting fabric suppliers. Traditionally price, quality and capacity are the key areas in supplier selection (Doyle et al., 2006). TFC also include lead time and flexibility in their criteria which is moving TFCs selection process from quantitative to a more qualitative approach.

In the empirical part, we explained the reasoning behind TFCs criteria for supplier selection with focus on costs and flexibility. Several fabric suppliers are graded lower than three on TFCs scale and are therefore not applicable. TFC aims for short lead times but sometimes there are no other alternatives to use rather than long lead time suppliers. However, we would like to be critical to this argument. The grading criteria are to a great extent qualitative. Even though factors such as lead times and flexibility might be expressed as very important as will probably quality and cost be. However, when a decision is to be made quality, cost and lead time are tangible factors while flexibility is more intangible. The tangible factor of quality is not and, with respect to TFC's brand and image, should not be down prioritized. Neither should the lead time factor, as it is in focus in almost all theories presented in Chapter 3. Without doubt, the factor of cost seems to stand alone as a force fighting against the flexibility factor in TFC's situation. The empirical findings state that when selecting a fabric supplier, the cost must be in accordance with budget constraints. We would like to question how TFC is measuring the value of choosing a flexible, but more expensive supplier. This paper has shown and will further do that TFC is suffering from a problem highly related to inflexible suppliers.

### **Global sourcing and time contraction**

We have a geographical perspective to take into consideration and the supplier selection is the key to handling this paradox, according to Doyle et al. (2006) and supported by Christopher et al. (1997). TFC has fabric suppliers in different countries and sometimes they use fabrics from one country and ship it to another country for manufacturing. This includes an extra transportation cost as well as time. In accordance with the discussion ending the

paragraph above, the critical part may not always be the cost but instead the lead time for transportation. How is the value for a cut in lead time measured in TFC? By cutting transportation lead time, production will be able to start closer to the season which leads to higher flexibility in terms of changing the initial order. We believe TFC is suffering from long lead times and inflexible suppliers due to a constant seek for low manufacturing costs, explained by Fisher and Raman (1996).

### **5.3 How can TFC decrease the dependency on forecasts?**

In this sub chapter our analysis will be summarized by answering the two main research questions.

Throughout this paper we have approached the problem studied as two-sided. On the one hand we have the forecast accuracy, which TFC has identified as problematic and will be separately handled in Chapter 5.3.1. TFC's observation is not surprising as several researchers within the field have pointed out a difficulty in forecasting fashion clothing (for example Tyler et al., 2006). Christopher et al. (2004) are among the most critical to the issue and has harshly stated that fashion products cannot be forecasted at all. But also by applying Herbig et al.'s (1994) eight basic principles of forecasting makes it evident that the characteristics of the products and the industry are not suited for forecasting. That being said, we do not undermine the importance of forecasting as a planning tool and mainly to understand why forecasts went wrong, in accordance with Tyler et al. (2006). But it is important to be aware of that forecasts in the fashion industry are unlikely to be accurate, no matter what technique and tools that are used and therefore the dependency on forecasts should be kept as low as possible.

On the other hand we have examined underlying conditions that influences the role of the initial forecast. What underlying conditions make TFC dependent upon an accurate initial forecast? Figure 8 visualizes this dependency. TFC has experienced that their initial forecast comes with an inaccuracy that, when the final order is to be made, have resulted in final order quantities that lies above or below the acceptable range of adjustments suppliers are willing to accept. This range is effectively limited by the initial order quantity and thus the dependency on the initial forecast is high.

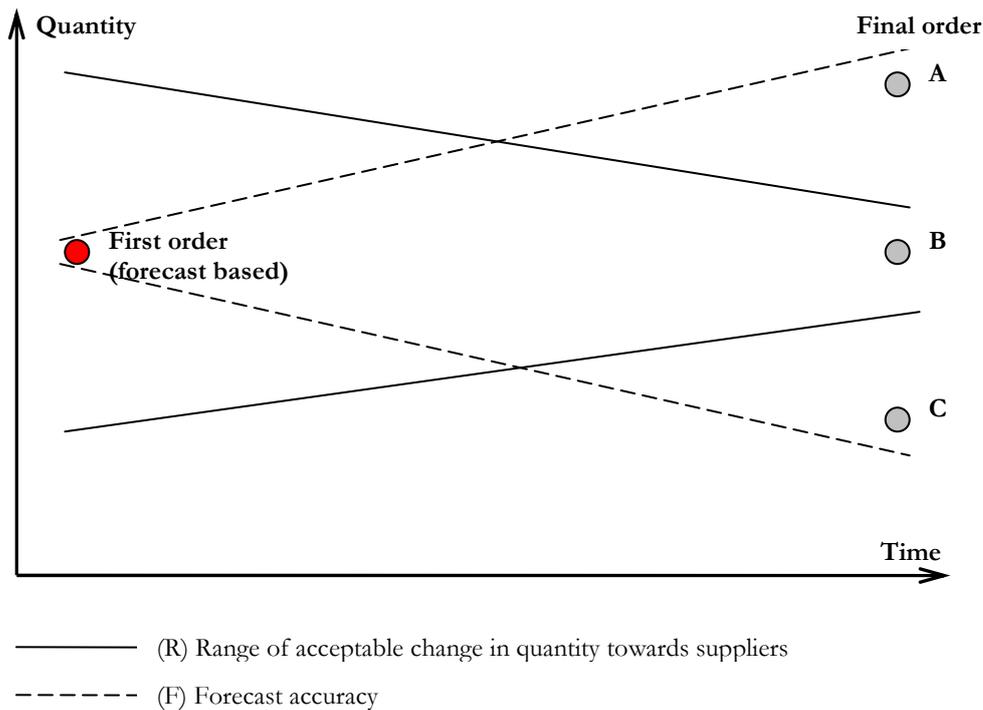


Figure 8 Graph visualizing the correlation between forecast inaccuracy and supplier inflexibility

With figure 8 we would like to summarize and visualize what can be concluded about TFCs situation. In the beginning of the sell-in period, TFC still can benefit from relatively high flexibility regarding adjustments in orders towards suppliers. As the time goes on, the empirical findings have shown that flexibility at suppliers decreases and there is less room for adjustments. The opposite happens with forecasting accuracy, which instead declines as the time horizon increases, supported by Herbig et al. (1994). Therefore as shown in figure 8 a possible scenario can lead to, and is in fact leading to, final order quantities in the region of A, B or C. Neither quantity A or C will be accepted by suppliers, as it is outside their range of acceptable change. In situation A, TFC can only order a smaller quantity than demanded from customers. An additional order will possibly be placed to cover up for the missing quantity, but then the lead time to source, produce and distribute to the market place might be longer than the time the customer is prepared to wait (promised delivery date). From TFC's perspective this is a worst case scenario which actually is not far from reality considering the findings in this research, as inability to meet customer demand will damage their reputation and lead to disappointed customers. The chain reaction that will follow from such a scenario can include many other potential damages. Without mentioning them all, or any we choose to use TFC's own word to describe it: "If we continue our logistics like today, we might as well go out of business".

As we already have argued, it becomes apparent that the problem is two-sided. Either efforts should be concentrated on narrowing TFC's forecast range (make forecasts more accurate) or suppliers used must offer more flexible terms or shorter lead times. The ideal situation would the lead to a situation visualized in figure 9, where forecast accuracy and/or supplier flexibility is increased or lead time shortened. If any, or combination of these, factors can be affected so that all potential quantity scenarios within the frame of expected forecast accuracy can be accepted by suppliers, this unique problem can be seen as solved.

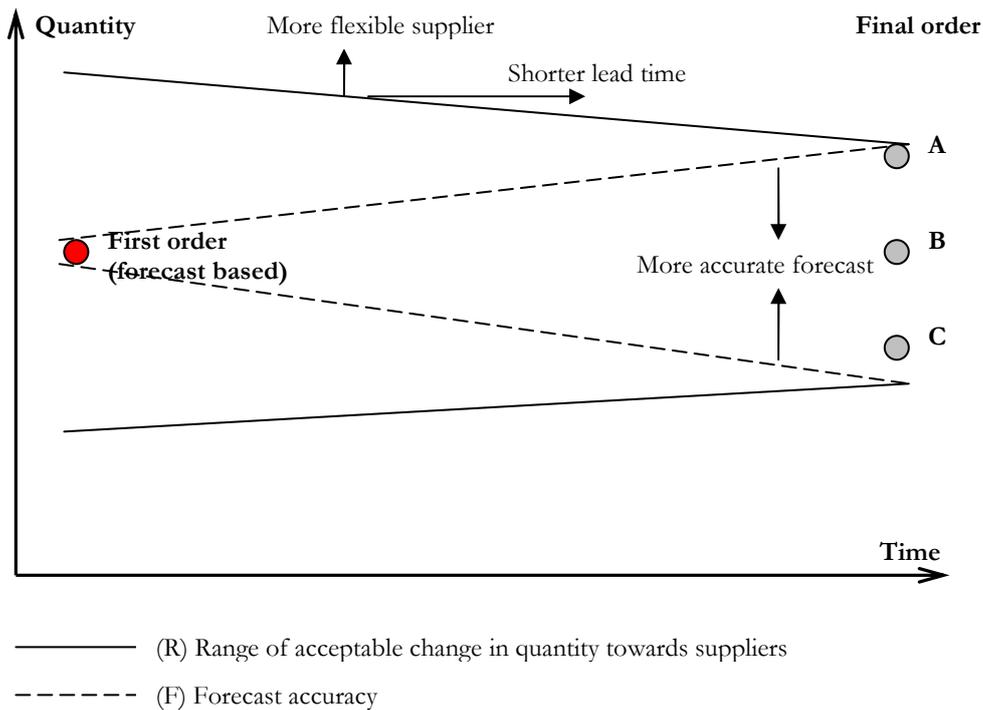


Figure 9 Graph visualizing a desired correlation between forecast inaccuracy and supplier inflexibility

The possibilities in changing any of the two above described factors will be handled in chapter 5.3.1 and 5.3.2 respectively.

### 5.3.1 Forecasting changes are unlikely to result in solving the main problem.

TFC has expressed a desire for finding a forecasting technique or method, other than the one in place today, which results in more accurate forecasts. In this chapter we will give our answer to whether we believe it is possible and, if so, how.

The current forecasting method and possible alternative methods have already been analyzed in chapter 5.2. Based on this discussion we can conclude that there are in fact several possible adjustments that TFC could benefit from when forecasting. The most important are:

- We believe it is likely that TFC can benefit from dividing their forecast based on individual countries. By doing that TFC can take into account demand patterns per country with respect to how many customers that have placed their order in each region.
- Disaggregating the forecast on different distribution channels is a more complex step, as the customer base is more varying than the country base. While it is likely that trends can influence buying patterns on a country level, it lays another challenge connected to if distribution channels are to be useful in the same way as a valid categorization must be made. Today, TFC has divided their customers in ABC-categories. Whether or not this can be used to monitor demand patterns in each respective category is hard to tell. However, as TFC's initial order is based upon sales towards the biggest customers (A), it is unlikely that knowledge about

demand patterns from B and C-customers can be made visible at that stage. In the end, TFC's orders towards suppliers are divided by country and not by distribution channel.

- We strongly recommend that TFC considers using additional qualitative input to their forecasting process, other than from the distribution director. This person can not possess knowledge about all markets TFC operates in at the same time. Sales people from the respective countries should be able to give hints about demand in their respective country other than what is visible from quantitative sales figures.
- Sales data should be reported back more frequent than today and figures should be analyzed more frequent than every two weeks to avoid delaying important indications of changes in buying patterns compared to the initial forecast.
- Included in the initial forecast TFC uses POS data from own stores. These orders are only a predicted demand by TFC and do not give an indication of customer demand. Make a forecast based on forecasted demand is not an optimal way for TFC. Our suggestion is to separate the biggest customer POS data from the own store orders to identify separate patterns in the customer base.

With the above described points, we believe TFC's current forecasting practices have the potential to be improved and create more accurate forecasts. However, several times throughout the analysis, the frame of reference has raised a warning sign in depending too much upon forecasts within the fashion industry. Fashion products cannot be forecasted accurately (Christopher et al., 2004). Therefore we do not believe that improved forecasting practices will solve TFC's main problem.

### **5.3.2 Underlying conditions that can be changed to decrease dependency on forecasts**

With the forecasting issue argued as the first one of the two sided problem discussed (visualized in figure 8 and 9), the second part has throughout this paper been termed as underlying conditions for the planning process. Eventually, the term has been given a high emphasis on flexibility and in this chapter we would conclude how flexibility can be increased. By that, the underlying conditions for the planning process will be changed as the dependency on an initial accurate forecast will be reduced.

In difference with the issue of changing forecasting practices which mostly calls for an internal change, the underlying conditions involve external actors. These conditions are set by the suppliers chosen in terms of their flexibility and lead time. The matter has been discussed and analyzed in chapter 5.2.3, where Christopher et al.'s (2004) theories have been applied to conclude that TFC is struggling to handle a lead time gap. Further Christopher et al.'s (2004) responses to the lead time gap problem have been applied on TFC. Most of these responses are dealing with relationship issues between the focal firm (TFC) and its suppliers. As this study is conducted towards TFC alone we find it most relevant to point out what actions that can be taken at TFC to change in accordance with the proposed responses. So far, chapter 5.2.3 and later also 5.3 (and figure 8 and 9) have concluded that lead time and flexibility are two extremely important underlying conditions influencing the dependency on the early forecast. Only by affecting these variables, forecast inaccuracy can

efficiently be handled (Christopher et al., 2004). With this in mind, we would like to look once again on the industry examples presented in the frame of reference.

Fashion giant Hennes & Mauritz seems to have an outsourcing strategy similar to TFC, with independent fabric and manufacturing suppliers all over the world. However, due to H&M's relative size they are in a position to dictate terms and demand short lead times. Further, their price position in the fashion industry is different to TFC's which means H&M can alter the quality issue in the selection process, which is not an option for TFC. In the case of Zarah, the company controls a majority of their manufacturing network in own facilities in Spain. Their size gives economies of scale benefits and the positioning of the facilities in Europe gives closeness to their market, which means shorter lead times. In terms of price positioning, the like of Hugo Boss can be seen as a brand closer to TFC than H&M and Zarah. Their strategy includes keeping off-shore suppliers but instead cutting transportation lead times by avoiding sea freight at all, even though the increase in actual cost is significant. Finally, the example of Sarah Lee Knit might not concern the issue of cutting lead times as much as the other examples. Instead it should be seen as an evidence of the potential in adding information system support to the forecasting process when approaching the problem.

If TFC is to change any of the underlying conditions (supplier flexibility and/or lead times), chapter 5.2.3 have already directed the attraction to Christopher et al.'s (2004) responses to the fundamental problem. In addition to these four responses, the issues of fabric supplier selection as well as the global sourcing have attracted our attention. As concluding remarks from this discussion we would like to recommend TFC to:

- The degree of market sensitiveness seems to be highly prioritized at TFC, who aims to stay as close as possible to the market by attending trade fairs. Further, textile and production orders are placed as late as possible after the sell-in season has closed and is based on POS data. However, an initial forecast is effectively limiting the final order and its inaccuracy is in fact the motive for this research and implies a failure in reaching the market sensitiveness target as described by Christopher et al. (2004).
- In terms of process alignment and virtual integration the dependency on suppliers are higher. These steps can TFC not take alone and since capabilities at suppliers have not been examined in this study, conclusions about possible actions are difficult to take. On the customer side however, some issues have been identified. With support from theory (Christopher et al., 2004) we recommend TFC to collect sales information from agents on a more regular basis than once per week. This information should also be monitored and analyzed more frequent than every two weeks. By doing that, TFC would be able to update their forecasts more frequent and in case of forecast inaccuracy, be able to contact suppliers earlier to change the initial order.
- TFC's network base consists of a relatively static number of manufacturing suppliers but a more varying set of textile suppliers. In both cases, TFC is striving for long term mutual relationships but due to changing textile demand from season to season, the fabric supplier base is more shifting. When analyzing this matter, we have nothing to argue against considering the network base. As recommended by

Christopher et al. (2004), TFC works with a relatively few set of suppliers that is changing from season to season and selected from a wider supplier base.

- Most lead time problems can be traced back to the fabric suppliers. With respect to theories presented by Doyle et al. (2006), we would like to recommend TFC to reconsider whether their current selection process are in fact valuing factors such as lead time and flexibility high enough. One example is the extensive use of suppliers in Asia, which implies long lead times, and costly administrative routines. Doyle et al. (2006) stresses the danger of relying too much on cost-management issues and forgetting about hidden risks in such selection. There is a high necessity in balancing global and local sourcing. A solution for TFC could be to look at the example of H&M, where basic products are accepted to have longer lead times due to their relatively lower demand volatility. At TFC, production is geographically dispersed due to the type of garment produced (yarn, tricot etc) and not based on demand volatility of the product. So far the separation of basic and contemporary products have not been discussed very much in this paper, but their distinction in terms of demand volatility should definitely be able to use when selecting suppliers for the respective product.
- With the geographically dispersed supplier base TFC currently are using, the company's products have to carry a high transportation cost. Further, transportation increases lead time, especially if the product is manufactured in Asia, while fabric sourcing is made in Europe. Even though it might not in all cases be possible, we would recommend to keep fabric sourcing and product manufacturing as close as possible, to minimize transportation lead time and cost. Further, while TFC has their main market in central Europe, with most a majority of production located in Southern and Eastern Europe, the location of central warehouses in Sweden seems unwise. As the warehouse situation is currently an issue TFC is addressing, since the current warehouse is already operating on its limits, we would like to propose a new warehouse location in central Europe. We support this recommendation by emphasising on the importance of keeping down transportation lead times (and transportation in itself does not give the product additional value). Also, this would mean a geographical concentration with similar characteristics as the Zarah-model, with production facilities surrounding the central warehouse.

Finally, we would like to conclude that as much as the problem studied in this paper are caused by the identified conditions in this chapter, TFC's characteristics as a fast growing company should not be forgotten. Bradford (1997) has stated that growth figures in the regions of 30% are not manageable and will cause problems in filling customer orders. This issue should not be forgotten.

## 6 Final conclusions

In this study we have examined the forecasting and planning process at TFC in which they are struggling with inaccurate predictions. As their initial forecast is used when placing an initial order to their suppliers, it effectively limits the range of adjustments of the final order. A set of underlying conditions for the process have also been investigated and the final conclusions are:

- TFC's current forecasting method is only done in an aggregated form and therefore lacks potential in taking for example country specific demand patterns into account. Further, it handles own store orders, which is a predicted demand by TFC, the same way as customer orders when forecasting, which leads to a distorted prediction about customer demand. These, among with a couple of other proposed changes could lead to more accurate forecasts.
- Fashion products by their very nature are hard, some sources argue impossible, to forecast. Therefore TFC's experienced problem should not to be considered as solved by only changing the forecasting method. Instead, our recommendation is that TFC is taking alternative actions to decrease their dependency on accurate forecasts. This study has shown that dependency on forecasts can be decreased by cutting lead times and/or reaching more flexible terms with suppliers.
- TFC can cut lead times and reach more flexible terms with suppliers by putting greater value to these factors in their supplier selection process. Today, their off-shore sourcing strategy in many aspects seems characterized by cost-management, with price and quality as the most important factors. We argue for a re-consideration of the flexibility and lead time issues as these are causing the critical problem area as much as the forecast inaccuracy, to which possible reactions are proved to be limited.

## 7 Final discussion

### 7.1 Criticisms of the study

We believe there are some important issues to address regarding the way this study has been conducted.

Firstly, criticism could be given to the relatively few number of respondents used. An underlying reason for this was the additional time constraint that the pilot study imposed on the main research. For the pilot study, mainly one key person was used as respondent due to the person's key role in the company's logistics department. As the final problem area was discussed, three additional employees from the logistics department were used as respondents in the main study. The logistics department in total only employs six people. The distribution director is to be considered as the main respondent also during the main study, because of his/her high involvement in the processes studied.

With respect to the forecasting process investigation TFC is very dependent on the distribution director and it was therefore natural to use this person as the main respondent. The person had a deep knowledge of the company but in some cases it is not enough with one person's thoughts. For the logistic flow and sales process, other respondents were interviewed. But for forecasting, TFC did not have any other respondents which were able to answer questions and that was involved in the process. If there had been a number of persons involved in the forecasting process that we could have used as respondents, we might have found some differences in the in-house forecasting method which had affected the result.

However, a weakness in terms of respondents used should be addressed towards the lack of respondents from outside the logistics department. The supplier selection process could have been studied more closely by asking people from the purchasing department. The sales process could have been further investigated with more input from sales people. However, the time constraint for the study as well as the busy schedule at TFC was main constraints for these initiatives.

Thurén (1997) argues for the risk of not using the most relevant sources in the study. The field we chosen had a lack of previous research material in terms of case studies. It was somewhat easy to find earlier research examining big fashion companies like H&M and Zarah but the area was limited when it came to small and medium sized fashion companies. At the same time we are in the belief that articles proved to be a good source, providing the study with up to date and relevant information. Especially since the industry environment has been changing during the latest years.

Fabric suppliers could have been respondents in order to get another perspective of the problem, fabric supplier perspective. So is the case also for other fashion firms, struggling with the same industry environment as TFC. But the time limit for the thesis was again the main constraint against such initiatives.

## **7.2 Suggestions for further research**

Following our pilot study, several additional interesting areas have been identified which we believe could be of interest to study further.

### **Warehouse**

The global perspective of TFC is an interesting aspect. It is taken to its extreme when fabrics are bought in one country and transported to a factory in another country. The central warehouse in Sweden is in the upper region of Europe. Considering TFCs customers' locations, transport cost calculations and the different transportation routes with transportation mode and time could show the best location for a warehouse for TFC.

### **Information system**

A new information system is about to be implemented. Extended and more reports with POS data are one benefit. A question to be raised is whether that could help distribution director in the forecasting adjustments and

### **Supplier selection**

TFC has a number of requirements in the supplier selection process. We have mentioned them and discussed the flexibility. A deeper study towards TFC's purchasing process with supplier selection focus would be of interest with both geographical, cost, flexibility and lead time perspective.

### **Quantitative study**

A generalisation with several fashion companies could be a way of use "best practice". If they experience or have experienced the same problem, one can study if one solution that a company implemented could be applicable at another fashion company. This goes hand in hand with the limitation of research material for small and medium size fashion companies.

Hugo Boss, as stated in 3.1.5.3, solved the lead time problem by almost remove sea freight as a way of transport goods. A further study could examine TFC's possibilities to cut lead times in addition to higher freight costs.

### **Changed buying behaviour in base products**

We believe it is interesting that TFC has observed that customers tend to order smaller quantities of base products during the sell-in season as customers seem to know that TFC holds these products on stock during season. From TFC's perspective, this distorts their forecast about what products are attractive and the behaviour is therefore unwanted. On the other hand, we argue that as customers can benefit from lower risk taking the final sales can actually be higher. Whether or not this is true can be an interesting point to study further.

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