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IMPROVING THE SUPPLY CHAIN AGILITY OF A FASHION ACCESSORIES COMPANY

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For me, this part of the thesis is the most rewarding to write. Now it really feels that I have crossed the finishing line and now it is time to celebrate the success and say thank you for all the people who have made this 2013-2014 academic year and also the thesis writing project so interesting and successful one. It has been a challenging year but I am so grateful how much I have learned and how much high quality support I have received.

At the case company, I am really proud what we achieved during this time and I want to thank everyone who participated to this thesis directly or indirectly.

At the school, I met so many amazing people and learned a lot about industrial management and different industries. I would like to thank many of my classmates and lecturers for great can do attitude and for really good discussions. I would like to say special thanks to my thesis instructors, Marjatta Huhta and Thomas Rohweder, who provided such a remarkable support and guidance during this journey. Also thank you for Zinaida Grabovskaia for making this thesis more readable. This thesis ended up being a very different animal than what I and we in many times during this project anticipated it to be.

Super thanks to my wife for all the encouragement during this year – and apologies that the writing of this thesis took a bit longer than first planned! I want to say a special thanks to my son who turned two years old during this project - thank you for being such a positive person and going to bed without too much complaining at 8.30 pm every day which allowed time for daddy to start burning the midnight oil. Many thanks also to friends and family members who made this project possible.

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This thesis aims to improve the supply chain agility of a case company that is engaged in the design, development and worldwide marketing and selling of fashion accessories and design services. This thesis explores agility in context of supply chain management and in fashion industry where the typical challenges are that demand is highly volatile and hard to predict, the number of products per sales season is large and products have a fairly short life-cycles.

In this study, the research approach is action research due to the iterative and collaborative nature of the research. Collected data is then studied by using qualitative research methods.

The outcome of this thesis is a holistic set of improvement proposals for making the supply chain of the case company more agile. This is presented as a defined set of agility capabilities and agility providers for the case company and a list of improvement suggestions for taking the agility providers to a new level of performance. In this study, business capabilities are what a company needs for executing its strategy, and agility capabilities are those specifically linked to supply chain agility. Agility providers comprise business practices, methods and tools that could increase the performance of agility capabilities.

When implementing the proposed improvement suggestions and actions, the case company could become more information-driven, improve its market sensitivity and establish more flexible, faster and accurate ways to response to changes in demand. This will improve its ability to serve customers and therefore increase the customer satisfaction. The case company would also benefit from better collaboration among the supply chain partners, and by better internal and external process and information alignment. These improvements will also benefit the search of profitable opportunities in a volatile market place and therefore improve the whole corporate performance. A further benefit lies in improved adaptability; when change and fast response are built into the supply chain the system does not get disrupted as easily.

| Keywords | Agility, Supply chain management, Fashion Industry, Industrial engineering |
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Abbreviations and notations

AR  Action Research
B2C  Business-to-Consumer
BOM  Bill of Materials
CRM  Customer Relationship Management
CSA  Current state analysis
DC  Distribution Center
ERP  Enterprise resource planning
FW  Fall-Winter season
KPI  Key performance indicator
LSP  Logistics Service Provider
PLC  Product Life-Cycle
POS  Point-of-sale
SCM  Supply Chain Management
SCOR  Supply Chain Operations Reference
SKU  Stock keeping unit
S&OP  Sales and Operations Planning
SS  Spring-Summer season
SWOT  Strengths, Weaknesses, Opportunities, Threats
QR  Quick response

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1 Introduction

*It is not the strongest of the species that survive, but the one most responsive to change.*

–Quote often attributed to Charles Darwin

1.1 The Business Context of the Thesis

Due to globalization, Internet, growth of e-commerce and progress in different fields of information technology, fashion industry and Supply Chain Management (SCM) have changed a lot in the last 20 years. Now in the dawn of the 3D printing revolution, it is clear that 3D printing will disrupt and reshape both fields, as this technology provides agile manufacturing and therefore high flexibility and responsiveness to both Fashion Industry and SCM.

The case company of this thesis, that has its headquarter located in Finland, is engaged in the design, development and worldwide marketing and selling of fashion accessories and design services. The company focuses its product offerings in several key categories but it is especially known for leather bags. The company can be considered high-end design-fashion but not a luxury brand. Fashion as such is defined as a style or styles that are bought and used at certain time by groups of people. Typical characteristics in fashion products are that products have a short lifecycle, demand is highly volatile which makes it hard to predict, and consumers do highly impulsive purchasing. Due to these characteristics, product availability is critically important. (Christopher et al. 2000: 367) Also due to these characteristics, supply chain in the fashion industry has its unique combination of demand and supply rhythms and cycles.

Supply Chain Management (SCM) integrates supply and demand management within and across companies. This management involves information, material and cash flows that are related to the flow of products or services from its raw materials to finished goods to end customers. The aim of SCM is to integrate business functions and processes both inside and outside the organisation in order to achieve more coherent and effective operations. (Ayers 2006:10) For companies that want to be successful in fashion industry, it is essential to design and implement an effective and responsive supply chain to be able to respond fast to the constantly changing market conditions.
The case company is a small sized and on its headquarters it employs approximately 10-15 people. The internal organization structure is flexible and agile and it does the product design in-house. Production is outsourced to several countries where the manufacturing companies are small to medium sizes. From one distribution centre, the company is managing warehousing and distributing operations to all of its sales channels. The company has own branded retail and online stores and wholesale channel that serve wholesale customers in more than 25 countries. The company is privately owned and it is currently profitable and has good financial standing.

The company releases two collections (Fall/Winter and Spring/Summer) per year and each of the seasons contains hundreds of SKUs. On the products, bill of materials (BOM) is fairly simple. During the on-going season, depending of the supplier there is some reordering possibilities depending also of the assortment, amount, and frequency. The company faces typical challenges of the fashion industry so the demand is highly volatile and hard to predict, number of products is large per sales season and products have a fairly short lifecycles. Complexity rises especially due to sourcing products with short lifecycle from several suppliers in a global context. There, the case company sees the benefits in improving its supply chain agility.

Agility is a widely used term and approach in software development where it means an iterative and incremental development and a rapid and flexible response to change. Agility in the context of SCM does not have a standard definition but it is about the ability to respond to external influences or shocks and the ability to change. Improving the supply chain agility therefore focuses around speed, quality, flexibility and responsiveness and on building the capabilities around these areas. (Baramичai et al. 2007: 334; Kim 2013: 215). In context of the fashion supply chains, agility focuses especially around responsiveness and service optimization. One implication of agile supply chains is that they seek to be demand-driven and are more likely to be information-based (Christopher et al. 2004: 370). Due to challenges to predict the demand accurately in highly volatile fashion market there is therefore high risk that demand and supply are not in balance. Agility therefore also supports to balance more rapidly the gaps in demand and supply.

As the case company meets the typical challenges of the fashion industry, improvements in agility are required so that the company can better to respond to these chal-
Challenges. This topic has become also more relevant now, as the company has recently fully renewed its Enterprise Resource Planning (ERP) and Point-of-sales (POS) systems that help greatly in the demand sensing and demand fulfilment. Due to these improvements, the company has a solid foundation to build on top on and is now able to think in wider perspective about how to get its supply chain agility onto a new level. One another aspect is that because of the volatility of demand is especially high in certain sales channels then demand is therefore taken there as given.

1.2 Research Question and Expected Outcome

The research question of the study has been formulated as follows:

**How to make the supply chain of the fashion accessories company more agile, in order to be able to response to the fluctuating demand more effectively?**

The outcome of this thesis is a proposal for the case company that defines a set of agility capabilities and providers and suggests a list of improvements for the agility providers. When implementing these improvement proposals, the case company could establish more flexible, faster and accurate ways to the response to demand changes, which would then benefit the case company and its customers.

Improvements in the agility also benefit in the search for profitable opportunities in a volatile marketplace and therefore these improve the whole corporate performance. Another benefit is that when change and fast response are built in to the supply chain, the system does not get disrupted so easily.

The thesis looks to answer the above research question by merging knowledge obtained from the literature sources, best practice from other companies and data from the case company. Data is collected via interviews and from systems of the case company. The collected data is then studied by qualitative research methods.

The thesis is written in seven sections. Section 1 deals with the background of the fashion industry from the supply chain point of view and also reviews the background of the case company. This section also shows the goals and objectives of this thesis. Section 2 describes research approach, research design and specifies research meth-
ods and data sources. Section 3 includes current state analysis of the case company and it also reviews the strengths and weaknesses of the current state. This is done so that current state and the relevant gaps are understood with the existing processes before creating and proposing improvements. Section 4 introduces the relevant best practices of supply chain management and agility in fashion industry. This section also introduces a conceptual framework. While it is recognized that this literature research is limited in terms of scale, it does provide sufficient guidance with respect to the agility of supply chain. Section 5 covers the building of a first version of the suggested improvements. Section 6 covers an improved list that is built based on feedback from the case company. Section 7 covers the summary, discussion and validity of this study. This section also suggests a set of managerial implications.
2 Method and Material

This section overviews a research approach and a research design of this study. It also overviews data sources of the thesis. In the end of this section, a validity and reliability plan is presented.

2.1 Research Approach and Design

In this study, the selected research approach is Action research (AR) due to iterative, action taking and collaborative nature of this research. The iterated steps on the action research are plan, act, observe and reflect. Compared to an experimental research approach, AR focuses on real-life problems, it allows collaboration between the researcher and the client and it focuses on change (Gronhaug & Olson 1999:11). According to Gummesson (as cited in Coughlan and Coghlan. 2002), some of the other characteristics are that researchers take action during the research so they are not only observing something to happen. In Action research, goal is to solve problems and contribute to science and do this in an interactive way. Action research can include all types of data gathering methods but it requires from the researcher a breadth pre-understanding of environment, conditions and dynamics of the area of the study. (Gummesson. 2000: 116. As cited in Coughlan and Coghlan. 2002: 224).

Figure 1 describes how the action research design is applied in this study. Two iterative rounds are arranged and applied for diagnosing, planning, implementing the improve elements to the proposal and reflecting the proposal. Between the rounds the research question stays the same but the proposal gets adjusted based on the observations and reflections. The data collecting steps are highlighted on grey in the figure. Each of the steps are discussed in more detail below.
As shown in Figure 1, the study starts with the identification of the research question. Before finalizing the research question, the important and relevant business challenges that the company is facing are being studied. After challenge(s) have been scoped with the stakeholders and the research question has been crystallized, then scope of the study is identified and ways for collecting relevant data are reviewed.

The following stage analyses the current state of the case company from different business and operational perspectives. This is done so that the current state and the relevant gaps are understood with the existing processes before creating and proposing improvements. This phase contains Data collection 1, which includes analysis of internal data and stakeholder interviews.

Figure 1. Research design of the thesis.
Simultaneously, existing knowledge of supply chain management in the fashion industry is being searched and studied. The relevant supply chain approaches are reviewed in this section so that the best possible agility capabilities can be developed for the case company. In this section also reviewing best practice is used to determine and understand the possible gaps. Based on this section and the current state analysis section, a conceptual framework of creating and implementing agile supply chain in fashion industry is being created. This section also clarifies the requirements of the proposal that is reviewed following sections.

Next stage introduces the first version of the suggested list for the case company. Basis of this proposal originates from existing knowledge and the current stage analysis. This proposal is then iterated with the stakeholders and data is collected from the interviews. After the feedback iteration, the recalibrated version is introduced in the next section.

Stage of the validating the proposal contains merging the most relevant ideas into a proposal. This stage contains Data collection 3. This stage is again done in an iterative cycle of testing and validating the proposal with stakeholders. After validation, the final phase finalizes the research outcomes.

2.2 Data Collection and Analysis

This section covers the background of data collection and ways of analysing gathered data. Due to a small sample size, only qualitative research methods are feasible. There are three main sources of data that are utilized in the study. Table 1 illustrates the selected sources of data for this study. Best practice are used in the building phase, internal documents are used in the CSA and building phases and qualitative interviews are used in the all of the three phases.

Table 1. Sources used in the study.

<table>
<thead>
<tr>
<th>Best practice</th>
<th>Qualitative interviews</th>
<th>Internal documents</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Current offering in the industry</td>
<td>• Internal stakeholders: Online Manager, Retail Manager, CEO, Chairman</td>
<td>• Data from ERP and POS systems</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Internal process descriptions</td>
</tr>
</tbody>
</table>
*Best practice*

The search for best practice was conducted with the help of literature, which included articles about agile supply chain management and especially about agility in apparel or fashion industries. A number of articles were collected, in order also to gain a deeper insight into agility and best practices also from other industries than fashion. While it is recognized that this literature research is limited in terms of scale, it does provide sufficient guidance with respect to the agility of supply chain.

*Interviews*

The data collection was conducted in form of semi-structured interviews. The interviews took place in spring and autumn 2014 and involved four people from different departments of the company. These people included Online manager, Retail manager, CEO and Chairman of the company. The interviewees were chosen based on their expertise and their responsibility areas. Face-to-face interviews were undertaken on the company premises in Finland. In all the interview events, the interviews were recorded and conducted in English, with the full agreement of the research participants. The interviews were conducted with the use of predetermined interview structure and themes. Questions may be found in Appendix A.

Table 2 shows the people, dates and covered themes in the first round of interviews. Outcomes of these interviews were used on the current state analysis and building and the conceptual framework but these were used also throughout this paper in order to illustrate important aspects and issues.
Table 2. Data 1: Interview respondents of the current state Appendix A.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Role</th>
<th>Date</th>
<th>Duration (hours)</th>
<th>Interview themes</th>
<th>Documented as (on Appendix 1)</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Online Manager</td>
<td>23.4.2014</td>
<td>1</td>
<td>Planning, online market, IT,</td>
<td>Field notes and recording</td>
<td>Section 3</td>
</tr>
<tr>
<td>B</td>
<td>Retail Manager</td>
<td>28.4.2014</td>
<td>1</td>
<td>Retail, distribution, IT, SCM,</td>
<td>Field notes and recording</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>CEO</td>
<td>27.4.2014</td>
<td>0.5</td>
<td>Planning, Strategy, Sourcing,</td>
<td>Field notes and recording</td>
<td></td>
</tr>
<tr>
<td>D</td>
<td>Chairman</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 3 shows the people, dates and covered themes in the second round of interviews. Discussions and outcomes of these interviews were used on the building and iterating the conceptual framework.

Table 3. Data 2: Interview respondents of the preliminary proposal Appendix B.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Role</th>
<th>Date</th>
<th>Duration (hours)</th>
<th>Interview themes</th>
<th>Documented as (on Appendix 2)</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>E</td>
<td>Online and Development Manager</td>
<td>17.10.2014</td>
<td>1</td>
<td>-Agility drivers, capabilities and providers -Market Sensitivity -Networking in supply chain -Virtual integration and collaboration -Process and information alignment</td>
<td>Field notes and recording</td>
<td>Section 5</td>
</tr>
<tr>
<td>F</td>
<td>Retail Manager</td>
<td>6.11.2016</td>
<td>1.5</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 4 shows the people, date and covered themes in the third round of interviews. Discussions and outcomes of these interviews were used on validating the suggested improvements and approving the chosen improvement areas.

Table 4. Data 3: Interview respondent of the validating round. Appendix C.

<table>
<thead>
<tr>
<th>Respondent</th>
<th>Role</th>
<th>Date</th>
<th>Duration (hours)</th>
<th>Interview themes</th>
<th>Documented as (on Appendix 3)</th>
<th>Analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Chairman</td>
<td>16.12.2014</td>
<td>2</td>
<td>-Reviewing background and the preliminary proposals.</td>
<td>Field notes and recording</td>
<td>Section 6</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>-Validating improvement proposals for the agility providers.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Internal documents

Due to a recent renewal of the case company’s ERP and POS systems, only fairly limited time window of good and sufficient quality data was available. When reviewing the current state of the company, this data was used where appropriate.

Also individual observations by the researcher that were obtained by working in the case company were also included as an additional information source.

2.3 Reliability and Validity Plan

Reliability is seen as an assessment of whether the same findings would be obtained if the research were repeated, or if someone else conducted it (Quinton and Smallbone 2006: 130). To increase the reliability of this study, following procedures are used. Firstly, the study employs different data sources and approaches to collect data. Secondly, only well-established and well-grounded references on the subject are used. Thirdly, the outcomes are presented to the relevant stakeholders to gather feedback, validate and challenge the proposals of the researcher.
Validity is the degree to which a study explores what it intends to study when the research was designed (Quinton and Smallbone 2006: 126). To increase validity in this study, the following procedures are planned. Firstly, the study includes detailed plan and processes for data collections and analysis. Secondly, during the study the interviewees are involved several times into the development and discussions of the goals and improvement proposals. Thirdly, collected data is reported in detail and all the interview summaries are verified with the interviewees. When appropriate, data is reported in full quotations.

In Section 7, this plan for validity and reliability is evaluated again against the actual results of the study.
3 Current State Analysis of the Case Company Practices

This section presents findings of the current state analysis of supply chain and agility of the case company. This analysis is based on the interviews and other relevant internal materials. This analysis is done so that current state and the potential improvement areas are understood with the existing processes before creating and proposing improvements. This section also includes an overview of the relevant information systems that are used in the case company. This section first starts by describing analysing and documenting approaches of the results.

3.1 Overview of Data Collection for the Current State Analysis

The current state analysis was lead in the form of interviews, observations and evaluations of different materials from the case company. The findings from these sources were collected and organized. In the end, there is summary of the main findings to reveal the strengths and weaknesses.

Each of the section are analysed with a SWOT Analysis that is shown in Table 5. SWOT stands for strengths, weaknesses, opportunities and threats. This analysis gives an overlook of the case company’s situation. The internal and external forces are divided into positive and negative. Internal forces are related to things that can be influenced inside the company. In the following sections, main focus is in the internal sections so in the strengths and weaknesses as these can be controlled by the company.

<table>
<thead>
<tr>
<th>Internal (Controllable)</th>
<th>Strengths (Build up)</th>
<th>Weaknesses (Minimize)</th>
</tr>
</thead>
<tbody>
<tr>
<td>External (Respond to)</td>
<td>Opportunities (Seize)</td>
<td>Threats (Counteract)</td>
</tr>
<tr>
<td></td>
<td>Positive</td>
<td>Negative</td>
</tr>
</tbody>
</table>

The following sections summarize the results of the current state of the different areas. Then findings of the strengths and weaknesses are presented. This section is concluded by summary of the key findings.
3.2 Strategy, planning and forecasting

Presently, the operations of the case company are organized in such a way that it launches two collections per year, and the preparation for new collection starts well in advance of the season. Ideas and inspirations for the collection are gathered in advance and these are then used in the design phase and then in the following sample development phase that is done together with suppliers. The designers create a product portfolio of several hundred products per season. Many products come in different colours so several hundreds of SKUs are selected for production every season. In the future, some of the product categories come also in different sizes so this will increase considerable the available SKUs in the system.

Figure 2 shows in a high level a yearly cycle of the case company. This figure shows different work phases and their timing.

![Figure 2. Yearly cycle of the Case Company.](image)

Planning of the season starts with the full catalogue of the new season. Based on feedback and presales from customers at the wholesale channel and also based on the business analyses and bottom-up plans from the internal sales channels, the first version of the bottom-up plan is done. This is followed by the top-down managerial adjustments. Figure 3 shows in a high level a creating process of the seasonal plan. This top-down plan has a major impact to the SKU level plans as it still changes quantities in the different price points.
Figure 3. Planning by channels.

In the industry where the case company operates, planning the season with a good accuracy is hard (Respondent A, Respondent B). One of the main planning concerns mentioned in the interviews was that “new products that don’t have sales data are especially hard to forecast. After 1-2 months it is easier to see the real demand” (Respondent A). Also demand of “special colours are hard to forecast” (Respondent B). Presently, “bloggers have huge influence to demand” (Respondent A, Respondent B). A positive publicity in widely read blog causes higher demand normally immediately at the online sales channel but only later to the retail sales (Respondent A, Respondent B).

In the wholesale sales channel, based on the feedback and presales of the new season to the wholesale customers, there is some opportunities to validate the demand (Respondent C). Challenge is still that in some geographical markets the product mix is very different as compared to other markets. Another comment was that demand is hard to predict because some wholesale customers are focusing more on the traditional products or sure sellers than, for example, on new products. (Respondent D, Respondent C)
Among the interviewees, it is commonly agreed that forecasting is hard to do and currently forecast accuracy is poor. It is also commonly agreed that early sales data is a good indicator of future sales.

The current forecasting process in the case company does not account for the errors in the forecasting. In the case company, it has been only recently possible to capture these early sales early enough. Even now, that there is more attention paid to early sales data, the forecasts of sales channels are updated only on the ad hoc basis, even thought augmenting the forecast with demand insights would improve the forecast quality. Table 6 summarizes the strengths and weaknesses of the current strategy, planning and forecasting elements of the case company. This data is gathered from the current state interviews and internal documents.

Table 6. Swot of Strategy, planning and forecasting.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Agile new product development</td>
<td>- Strategy is not well defined and put to the place</td>
</tr>
<tr>
<td></td>
<td>- Creating line sheets and planning guidance require a lot of time and resources due to very manual process.</td>
</tr>
<tr>
<td></td>
<td>- Internal planning guidance is too limited</td>
</tr>
<tr>
<td></td>
<td>- Poor planning accuracy especially on new products</td>
</tr>
<tr>
<td></td>
<td>- Maturity of demand and supply matching is in very basic level</td>
</tr>
<tr>
<td></td>
<td>- Operations are in reactive mode</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>- Increase supply chain agility to seize the opportunities</td>
<td>- Highly volatile market</td>
</tr>
</tbody>
</table>

As seen from the table, based on the findings from the current state for strategy, planning and forecasting, the key improvement needs in strategy, planning and forecasting are, firstly, crystalizing and communicating the strategy of the case company. Second-
ly, it is needed to provide better pre-seasonal planning guidance for internal sales channels. Thirdly, establish a light S&OP process for the case company. And fourthly, build and utilize different capabilities to capture market sensitivity. Selected improvement proposals are discussed in detail in Section 5.

3.3 Sourcing

This section reviews the procurement process of the case company. Due to confidentiality, the price, cost and lead-time related practices are placed outside the scope of this section. In the case company, sourcing is centralized to the headquarters and happens mostly with in-house resources. Different people are working with the suppliers, depending of the supplier, phase of the season and state of the relationship.

There are two collections (Fall/Winter and Spring/Summer) per year and each of the seasons contains hundreds SKUs. Bill of Materials of the products is rather simple. Production is outsourced to several countries, and in these countries the manufacturing companies are small to medium sizes. None of the supplier are dependent solely on orders from the case company. The case company prefers for long-term relationships with a limited number of suppliers but it is actively evaluating and engaging potential new suppliers. During the on-going season, depending of the supplier there is some reordering possibilities also depending of the assortment, amount, and frequency.

Screening new good suppliers is, according to Respondent D, “a mix of activitately looking and pure luck.” Depending of the job, the skill set might not be good enough or contract negotiations are not delivery good enough results due to e.g. “price, MOQ, lead times.”

According to Respondent D, one of the essential in developing the supplieries is to “know the people that you are working with”. It is important to communicate expectations, develop and educate. Then “testing what they can do”. “Because of them, you may loose customers because you don’t know that the product is bad before it is already in the market.”

When the relationship has develophed further, then there is still on-going reviews about development, new seasons and quality. A member of the staff visits the factories regularly to monitor the production is done according to the standard and to solve
outstanding issues. Quality concerns and issues are always communicated immediately to the suppliers.

The degree of responsiveness to demand changes (in volume and mix) quickly and at a reasonable cost varies between the suppliers. Respondent A: “There must be an opportunity to do a reorder.” Also for the must-win products there must be possibilities to do reorders during the season with reasonable lead-times (Respondent B).

Currently, there is a lot of differences between different suppliers and their data quality and about their capabilities to go further in data integration. With some there is constantly problems with data quality of confirmed orders, advanced shipping notices, packing lists and invoices.

The case company tries to actively minimize cost and risks. Risks are seen to be especially the quality control problems and supply uncertainty and unanticipated delays. There is also the flexibility and availability risk. Table 7 summarizes the strengths and weaknesses of the sourcing elements of the case company. This data is gathered from the current state interviews and internal documents.

Table 7. Swot of sourcing.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Wide experience of the industry</td>
<td>• Challenges with off-plans, which causes lot of fire fighting</td>
</tr>
<tr>
<td></td>
<td>• Manual processes with suppliers</td>
</tr>
<tr>
<td></td>
<td>• Complications in supply chain networks</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Process and data integration with the suppliers</td>
<td>• Risks in quality, supply uncertainty and unanticipated delays</td>
</tr>
<tr>
<td></td>
<td>• Risks in flexibility</td>
</tr>
</tbody>
</table>

Based on the findings from the current state for sourcing, the key improvement needs in sourcing are, firstly, improving management of the supplier relationships. Secondly, define and establish performance metrics for suppliers’ performance. Thirdly, create action plans and system for monitoring for continuous improvement for lagging and
new suppliers. And fourthly improve ways of working for a better process integration. Selected improvement proposals are discussed in detail section 5.

3.4 Operations and Retail

The case company manages its own distribution centre (DC). Products are shipped from suppliers to DC using a third-party couriers. From this DC, the company is managing warehousing and distributing operations to all of its sales channels. The company has own branded retail and online stores and wholesale channel that serve wholesale customers globally in more than 25 countries. In order to have high quality and fast outbound shipping, the company uses mostly airfreight or courier services. Figure 4 presents the physical logistics flow excluding returns from distribution centre towards the main sales channels of the case company. One of the sales channels is also Projects, but it is not discussed separately in following section because the basic process is same also for that channel.

![Figure 4. Sales channel structure of the case company.](image-url)
Using a DC, adds efficiency by consolidating products for shipment to customers. This premises is also used for quality controlling and when needed performing a broad range of other services (e.g. labeling, assembly, packaging, kitting, reverse logistics). The current placement of DC allows the positioning of operations to be close to major markets and customers. Currently there is also a separate online warehouse at the DC that contains products allocated only to online channels. As this is run outside of the ERP, this adds complexity, extra manual work and inefficiencies in availability. This should be combined with the rest of the inventory to allow inventory optimization.

In wholesale and own retail, target markets and typical customers are clear (Respondent D, Respondent C, Respondent B). In Online, the key markets are clear but outside those markets targets need clarifying (Respondent A).

For the wholesale channel, the order confirmation is done at the back-end. Based on the current work-load, due to data quality issues and fairly manual process this order confirmation can take “fairly” long and there isn’t a KPIs for this. There are great opportunities to utilize a real-time availability information, mobility and more tighter integration of the key accounts.

Between the DC and the stores, there is a real-time point-of-sale demand monitoring and sophisticated information exchanges to support store deliveries. At the stores, store managers maintain the optimum level of inventory by monitoring sales and stock at on-going basis, and replenishment is done rapidly. At the end of each season, coordinated timing of markdowns and limited-period sales is planned to ensure that certain overstocks are cleared.

According to Respondents A and B, information sharing across the supply chain and responsiveness towards changes need improving. Also better visibility to the pipeline and availability are needed. (Respondent A, Respondent B). For example it doesn’t make sense to run promotions if there are constraints in the supply (Respondent A). It is also easier to have back-up plans and products if it is known that there are hick-ups on some products (Respondent B). There should also be better segmentation of products so that the must-have products, and these models are known, will not run out of stock or those could be reordered and received faster (Respondent B).
Additionally, there should be better visibility to what is happening with bloggers and press as their work has major impact to the demand of specific products. The case company should also better capture the demand signals of the sold-out products (Respondent B). Table 8 summarizes the strengths and weaknesses of the operations and retail elements of the case company. This data is gathered from the current state interviews and internal documents.

Table 8. Swot of operations and retail.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Fast delivery to the stores if products are available at the DC</td>
<td>• Order confirmation process is too slow</td>
</tr>
<tr>
<td></td>
<td>• Not utilizing full possibilities of mobility</td>
</tr>
<tr>
<td></td>
<td>• Limited replenishment process to the stores</td>
</tr>
<tr>
<td></td>
<td>• Availability communication is too reactive</td>
</tr>
<tr>
<td></td>
<td>• Weakness in utilizing KPIs (retention)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• The rise of Multichannel</td>
<td>• Challenging financial situation in certain markets</td>
</tr>
<tr>
<td>• Speed of innovation in retail</td>
<td>• Market volatility</td>
</tr>
<tr>
<td>• Collaboration with customers</td>
<td></td>
</tr>
</tbody>
</table>

Based on the findings from the current state for the operations and retail, the key improvement needs in operations and retail are, firstly, moving to only one global DC that will serve all the sales channels. Secondly, improve management of hidden stock-out and provide better visibility to availability. Thirdly, improve collaboration with the major accounts. And fourthly, re-engineer processes in operations and retail for having more standardized ways of working. Selected improvement proposals are discussed in detail in Section 5.

3.5 Information Technology
Presently, the case company is using an Enterprise Resource Planning (ERP) to manage the most important parts of its business. One of the key motivations of the ERP is to integrate all departments across the company into a one system (and database) that can serve all the needs of the company and its different users. In the beginning of 2014, the company moved from several legacy systems to a new ERP and POS systems. This implementation has already had a wide and deep impact to the operational efficiency, and the company is able to track individual SKUs in store-level and real-time basis.

After ERP and POS changes in the case company, now the case company can capture significant amount of high-quality data and have it available in real-time. This allows combining relevant information to the sales and operations processes and making information available for designers for closing faster the feedback loop from sales channels to design.

Due to the fact that the new systems have been in place only fairly short period of time, it is not feasible to use data from the old legacy systems due to the limitations of the available data and also due to data quality issues. Now when better data exist and data quality is better it is possible for example to take N months or years of historical data for forecasting models. This is going to be beneficial for increasing the forecasting accuracy of fast-moving products but especially the new product introductions.

As seen from Figure 5, there is a unified and fully integrated global platform except for the online channel that is still running separate. The ERP and POS systems manage the entire business with a focus on the centralisation of all business data. The system set-up drives customer engagement by centralising the fundamental omnichannel elements and it allows managing all business data for creating insight.

![Figure 5. System set-up of the case company.](image-url)
In 2014, the company implemented Quick Response (QR) codes to the products for management and traceability purposes. With scanners these codes are used in warehouse operations and in the POS. The QR codes were chosen due to the fact that these codes can contain more information than barcodes. Figure 6 shows the structure and attributes of the items.

In the case company, RFID is seen to have a lot of potential, but due to tight implementation schedule of ERP it was decided that RFID is not implemented yet. There has been some software and hardware testing but there isn’t plan for a pilot or a rollout implementation yet.

The chosen ERP system was selected due to, for example, its fit with the functionality requirements. It is in the cloud which allows transparency and more speed; and it also allows the company to scale its operations. To make the system fit the company’s needs, there is still some development needs and also training needs. As the full company is still not using the system, then there is still room for improvement in data quality (Respondent A). Also KPIs and analytics must be develop further. Most of this was not possible earlier (Respondent D). Table 9 summarizes the strengts and
weaknesses of the Information Technology elements of the case company. This data is
gathered from the current state interviews and internal documents.

Table 9. Swot of Information Technology.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• New ERP and POS systems implemented and this allows easily scaling the operations</td>
<td>• Online channel is not integrated</td>
</tr>
<tr>
<td>• Centralized data management and ability to track SKUs in realtime</td>
<td>• Still some training needs based on different roles and further development of the systems</td>
</tr>
<tr>
<td>• Improved accuracy of inventory data</td>
<td>• Limited development resources</td>
</tr>
<tr>
<td>• Reduced labour of inventory management</td>
<td></td>
</tr>
<tr>
<td>• Reduced out-of-stocks</td>
<td></td>
</tr>
<tr>
<td>OPPORTUNITIES</td>
<td>THREADS</td>
</tr>
<tr>
<td>• Huge potential with the introduction of new technologies like RFID</td>
<td>• Security of the cloud services</td>
</tr>
</tbody>
</table>

Based on the findings from the current state for Information Technology, the key improvement needs in Information Technology are, firstly, improving information sharing and integration between different systems. Secondly, changing the company to be more information-driven and fine-tuning tools for analytics. Thirdly, keeping the momentum in regular tune-ups and trainings of the system. Selected improvement proposals are discussed in detail in Section 5.

3.6 Summary of the Current State

Based on the current state analysis above, it is clear that the maturity level of the processes are not high in many of the functions of the case company. Many of the basic things in planning, sourcing, operations, retail and IT need to be fixed to bring the company to the next level. Table 10 summarizes the strengths and weaknesses of the current state. This data is gathered from the current state interviews and internal documents.
Table 10. Swot of Current State.

<table>
<thead>
<tr>
<th>STRENGTHS</th>
<th>WEAKNESSES</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Agile new product development</td>
<td>• Strategy is not well defined and put to the place</td>
</tr>
<tr>
<td>• Agile internal resource allocation</td>
<td>• Poor planning accuracy especially on new products</td>
</tr>
<tr>
<td>• Wide experience and large contact network in sourcing</td>
<td>• Maturity of demand and supply matching is in very basic level</td>
</tr>
<tr>
<td>• New and highly scalable ERP and POS</td>
<td>• Operations are in reactive mode</td>
</tr>
<tr>
<td>• Centralized data management and ability to track SKUs in realtime</td>
<td>• Challenges with off-plans, which causes lot of fire fighting.</td>
</tr>
<tr>
<td></td>
<td>• Manual processes with suppliers</td>
</tr>
<tr>
<td></td>
<td>• Complications in supply chain networks</td>
</tr>
<tr>
<td></td>
<td>• Order confirmation process is too slow</td>
</tr>
<tr>
<td></td>
<td>• Not utilizing full possibilities of mobility</td>
</tr>
<tr>
<td></td>
<td>• Limited replenishment process to the stores</td>
</tr>
<tr>
<td></td>
<td>• Availability communication is too reactive</td>
</tr>
<tr>
<td></td>
<td>• Online channel is not integrated</td>
</tr>
<tr>
<td></td>
<td>• Still some training needs based on different roles and further development of the systems</td>
</tr>
<tr>
<td></td>
<td>• Limited development resources</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>OPPORTUNITIES</th>
<th>THREADS</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Increase supply chain agility to seize the opportunities</td>
<td>• Highly volatile market</td>
</tr>
<tr>
<td>• Rise of the multichannel</td>
<td>• Challenging financial situation in certain markets</td>
</tr>
<tr>
<td>• Speed of innovation in retail</td>
<td>• In sourcing, risks in quality, flexibility, supply uncertainty and un-</td>
</tr>
<tr>
<td>• Collaboration with customers</td>
<td>(continued)</td>
</tr>
</tbody>
</table>


Many of the weaknesses listed in the table above could be solved or minimized by increasing holistically the agility of the supply chain of the case company. This thesis will tackle most of above shown weaknesses, as many of these are related to internal parts of the supply chain and are therefore potentially faster and easier to solve. The proposals of the thesis will not be limited only to suggesting solutions to these weaknesses as some of the biggest opportunities for increasing the agility come from improvement for the increased agility or the improvements in the customer and supplier sides.

The next section introduces some best practices for establishing agility in the fashion supply chain and selects the methods needed for building the conceptual framework of the study. After that, the conceptual framework is used to build a proposal for a more agile supply chain that will address the issues discovered in this section.
4 Best Practice for Establishing Agility in Fashion Supply Chains

This section discusses the background of the industry and supply chain theories selected to back up this study. The sub-sections are written in more and wider detail than is required in the focused scope of this thesis. It is done to provide a brief but necessary background for further development of the agility for the case company purposes.

The theoretical background of this research can be divided into two segments. The first part introduces the theories of lean and agility in the supply chain context. Even though these are presented as separate approaches, in reality these can complement each other. The second part focuses on agility in the context of fashion supply chain and among companies that selected due to the use of best practice. After the two parts are discussed, a synthesis of theory pulls the concepts together and builds a model to be used to address the findings from the current state analysis.

4.1 Fashion Industry from the Supply Chain Point of View

Supply chain management (SCM) integrates supply and demand management within and across companies. The aim of SCM is to integrate business functions and processes both inside and outside the organisation in order to achieve more coherent operations. SCM is responsible for the planning and the management of operations that are related to procurement, sourcing, operations and logistics management operations. Collaborating with other parties such as suppliers, intermediaries or and customers are part of SCM. (Ayers 2006: 10)

Figure 7 shows main flows of the supply chain management, which are material, information and financial flows.
Due to low predictability of the demand of fashion products, it is difficult to forecast the sales with any good planning accuracy (Rahman et al. 2011: 1019; Christopher et al. 2000: 367-368). Accurate forecasting is important to avoid lost sale opportunities or over stocking. (Rahman et al. 2011:1026). Figure 8 shows the actions of traditional pre-season ordering and potential additional orders that are based on the learnings from the early sales. Due to long lead times ordering often happens well before the season starts and therefore an early forecast could be out-dated already before the season starts. (Rahman et al. 2011: 1019).
For fashion products, demand typically has a peak shape that happens in a short time window. Peak shaped market demand is visualized in Figure 9.

This Figure also illustrates the consequences of high-level of obsolete stock if the time window of the demand peak is missed due to being late. There are also companies who have a strategy to run actively out-of-stock. This then supports the sense of newness and exclusivity of the fashion products in the consumers, with the result that the more of them will became regular store visitors to see what new products are on offer (Masson et al. 2007: 251).

There are companies who have a strategy of using an end of season discounts to deal with or avoid obsolescent stock and unsuccessful products, while other companies do
not to use discount. Due to high rental cost in key locations, stores have to make a significant profit just to cover these costs. Meanwhile, only some products will succeed while others will not and the unsuccessful ones are discounted and are then perhaps also sold through less fashion conscious outlets. (Masson et al. 2007: 239).

Table 11 shows typical decision making levels of the supply chain topics. Deciding what kind of supply chain philosophy to choose and implement is a strategic decision because it takes long time to change and implement a new philosophy. Fine-tuning and execution happens then in tactical and operational levels.

**Table 11. Decision making levels and timings.**

<table>
<thead>
<tr>
<th>DECISION MAKING LEVEL</th>
<th>TIMELINE</th>
<th>TYPE OF DECISION</th>
</tr>
</thead>
<tbody>
<tr>
<td>STRATEGIC</td>
<td>YEARLY</td>
<td>• Major investment</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• New product categories</td>
</tr>
<tr>
<td>TACTICAL</td>
<td>MONTHLY</td>
<td>• Policies about inventory, procurement etc.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Transportation strategies</td>
</tr>
<tr>
<td>OPERATIONAL</td>
<td>DAILY, WEEKLY</td>
<td>• Scheduling of resources</td>
</tr>
</tbody>
</table>

The ways and responsiveness of answering to the customer demand and orders is strongly linked to order fulfilment and sourcing strategy of the company. Some of the key decisions are the level of vertical integration, product customization and the different approaches that the company can use for its order fulfilment. These order fulfilment approaches and their extent are visible in Figure 10 below. Production and fulfilment lead-times increase when moving from left to right.
In Figure 10, on the left-hand side, products are built against a sales forecast and are available immediately and on the right-hand side, a product is designed and built based on the customer requirements.

In accounting, inventory is marked as an asset but there is also an inventory carrying cost on top of that and also possible other costs due to poor inventory management. Changing inventory policies deeply alters the supply chain’s efficiency and responsiveness. Inventory encompasses all the raw materials, work in process, and finished goods within a supply chain and there are three basic decisions to make regarding the creation and holding of inventory. Firstly, cycle inventory is the amount of inventory that is needed to satisfy demand for the product in the period between purchases of the product. Secondly, safety inventory is held as a buffer against uncertainty. Thirdly, it is a seasonal inventory that is built up in anticipation of predictable increases in demand that occur at certain times of the year.

Another enabling component in strategy and the company structure is the available Information Technology. This plays a critical role in this aligning and coordinating of the supply chain. Collecting information on consumer needs and creating forecasts require suitable tools to meet the future demand. In addition, there are business needs for handling procurement, manufacturing, distribution product information and inventory...
management and other functions. Presently, it is possible to have all of these in one tool, ERP.

Enterprise Resource Planning (ERP) is an umbrella term for the set of activities and the system that help a company to manage the most important parts of its business. One of the key motivations of the ERP is to integrate all departments across the company into a one system (and database) that can serve all the needs of the company and its different users. Moreover, for material and product tracking purposes there is scanning and reading technologies for capturing fast and accurately movement of the goods and also streamline the processes in warehousing and in the Point-of-sale. Many of the above technologies are enabling sharing and better analysing of data within the company and among the supply chain partners.

Kumar et al. (2008) argue that one of the main benefits of the improvements in the IT system is the visibility of products at all times. This also makes capturing, analysing and sharing information much easier. Due to the recent advancements of IT solutions, also customers have also started demanding more from suppliers, for example, in the areas of responsiveness and visibility. Therefore, having a competitive Information Technology foundation and tools has become paramount. (Kumar et al. 2008: 78)

*Product characteristics*

A lifecycle of a product is often divided into four phases: introduction, growth, maturity and decline. One of the main characteristics of the fashion products is that the life cycles are short even though the product as such can be long lasting. In the fashion industry, the product lifecycle can include a single season or even shorter time. “The short life-cycles allow companies to stick to the customers’ desires (pull) and to provoke new desires (push)” (Dari & Pache 2013: 22). Therefore, the products change often, but new products can be fairly similar compared to the products from the previous seasons. The product can, for example, just have a new colour in the new season.

In the distinction of functional versus innovative product, fashion products can be seen as an innovative product. Table 12 shows some of the characteristics of these innovative products versus functional products.

<table>
<thead>
<tr>
<th></th>
<th>Functional</th>
<th>Fashion</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Product life cycle</strong></td>
<td>Long</td>
<td>Short (x months)</td>
</tr>
<tr>
<td><strong>Seasons per year</strong></td>
<td>-</td>
<td>2, 4, ..., 20</td>
</tr>
<tr>
<td><strong>Product portfolio</strong></td>
<td>Small</td>
<td>Large</td>
</tr>
<tr>
<td><strong>Average volume per SKU</strong></td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td><strong>Forecasting error</strong></td>
<td>Low</td>
<td>High</td>
</tr>
<tr>
<td><strong>End of season markdown</strong></td>
<td>Rare</td>
<td>Common</td>
</tr>
<tr>
<td><strong>Order winner</strong></td>
<td>Price</td>
<td>Availability</td>
</tr>
<tr>
<td><strong>Profit margin</strong></td>
<td>Low</td>
<td>High</td>
</tr>
</tbody>
</table>

Even though fashion products are seen as innovative products, there could be also products in the product portfolio that could be considered as a functional product. Due to these differences and the predictability of the demand, a more responsive supply chain is a better fit for the innovative products.

4.2 Different Supply Chain Paradigms in Brief

Difference in fashion supply chains is often related to lean, agility and leagility philosophies are being discussed. Goldsby et al. (2006) argue that though these philosophies are anchored with relatively simple premises, their complexity becomes apparent during implementation. Goldsby et al. (2006) also argue that even with wide adoption of the philosophies these are still not well understood. (Goldsby et al. 2006: 57)

*Lean supply chain paradigm*
Lean management is a philosophy that focuses on reducing waste from a process. This process can be defined from the whole value chain of the company up to a certain minor process. Though lean mostly focuses on manufacturing and supply chain, lean philosophy can be also implemented to services. In the context of SCM, this is built upon cost optimization that is reached by understanding customer values and eliminating all types of non-value added steps from the process. Some of the key steps and components in the history of lean are summarised by Shah and Ward (2007). The history of lean is closely linked with The Toyota Production system (TPS). The early progress of their management philosophy and practices were done in Japan 1945-78 that introduced just in time (JIT) production strategy. In the next phase from 1973 to 1988, academic interest rose especially in North America, especially when the first Toyota factory was opened there. In 1990, Womack et al. (1990) introduced in their book the premise of lean production to a wider audience. This also established lean as a characteristic of the Toyota’s production system. (Shah and Ward. 2007: 787)

In Lean, waste is defined into seven categories that are overproduction, idle time spent on waiting, unnecessary movement of goods, performing more tasks than what a process requires, maintaining any excess inventory, unnecessary movement and making defective products. In Lean, efforts focus on the reduction of waste are pursue through continuous improvement, as well as radical improvement activities. Hence, perfection is the goal and the journey to perfection is never ending. (Womack and Jones. 2003)

Lean production practices also often reduce lead times drastically but when the market is volatile and characterized with short time windows, there are practical limits for leanness. While lean principles can reduce the delivery time to the final customers, lean is not helping those suppliers and retailers who need to fulfill consumer’s need in a very short time window. (Ahn et al. 2012: 18)

*Agility in supply chain management*

In the context of supply chain management, agility does not have a standard definition or a unanimously accepted framework and system for defining and measuring agility of the supply chain (Charles et al. 2010: 722). It can be argued that agility focuses around speed, quality, flexibility and responsiveness and on building the capabilities around these areas (Baramichai et al. 2007: 334; Kim 2013: 215). In context of the fashion
supply chains, agility focuses especially around responsiveness and service optimization. This also means that agile supply chains seek to be demand-driven and are more likely to be information-based (Christopher et al. 2004:370).

In order to be agile and prosper in unpredictable markets, companies need to have supply chain strategies and practices that can be described by alignment and flexibility in both physical collaboration and information systems. Alignment is needed so that a whole supply chain can quickly respond to the changes in the market. (Ahn et al. 2012: 18). Agility is further discussed in Section 4.3.

**Leagility - combining lean and agile approaches**

When integrating lean and agile approaches to around the decoupling point then a term leagility is being used. This is a hybrid solution of lean and agile. Figure 11 displays the basic of leagility by using postponement and information decoupling as central principles.

![Figure 11. Leagility with postponement and information decoupling (Hoek 2000: 199).](image)

Figure 11 displays a supply chain where sales orders are decoupled or entered at the level of manufacturing. Postponement strategy represents manufacturing of a generic product and putting off product configuration until the exact market demand is known. This approach allows rationalising of the stock management by reducing risks and costs associated with carrying finished goods inventory (Cheng & Choi 2010: 52) and by reducing the accumulation of obsolete products that will need to be sold off as they do not meet the demand (Dari and Pache 2013: 20).
Upstream from the postponement and information decoupling point, the supply chain may be organized around lean principles and driven by a forecast, whereas downstream from the decoupling point the supply chain may be organized around responsiveness and other agile principles. (Hoek 200:198). Moving the decoupling point closer to the end user will increase the efficiency (Dari and Pache 2013: 20).

Dari and Pache (2013) argue that an efficient supply chain is based on a speculation of the upstream side and a form, place or time postponement in the downstream side. In the leagility case, firstly, agility strategy consists in differing as much as possible the allocation of resources destined to differentiate the production depending on the attributes expected by the clients. Secondly, lean strategy in the contrary consists actors of the sales channels to constitute a stock greater than the projected demand in order to make economies of scale in manufacturing activities and/or in physical distribution and, therefore, to reduce costs linked to the management of orders. (Dari and Pache 2013: 20)

Evaluation of Paradigms

The characteristics of the supply chain environment require a corresponding supply chain and flexibility strategy. (Yi et al. 2011: 277). In Table 13, some of the supply chain attributes and characteristics of traditional, lean, agile and leagile strategies are summarized.

Table 13. Characteristics of the supply chain paradigms (Adapted from Faisal et al. 2006: 883).

<table>
<thead>
<tr>
<th>Attributes</th>
<th>Traditional</th>
<th>Lean</th>
<th>Agile</th>
<th>Leagile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Market demand</td>
<td>Unpredictable</td>
<td>Predictable</td>
<td>Volatile</td>
<td>Volatile and unpredictable</td>
</tr>
<tr>
<td>Product variety</td>
<td>Low</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Product life cycle</td>
<td>Long</td>
<td>Long</td>
<td>Short</td>
<td>Short</td>
</tr>
<tr>
<td>Customer drivers</td>
<td>Cost</td>
<td>Cost</td>
<td>Lead time</td>
<td>service level</td>
</tr>
<tr>
<td>Profit margin</td>
<td>Situational</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Information enrichment</td>
<td>Very little</td>
<td>Desirable</td>
<td>Obligatory</td>
<td>Essential</td>
</tr>
<tr>
<td>Forecasting mechanism</td>
<td>Independent at each echelon</td>
<td>Algorithmic</td>
<td>Consultative</td>
<td>Both/either</td>
</tr>
<tr>
<td>Dominant costs</td>
<td>Both</td>
<td>Physical costs</td>
<td>Marketability costs</td>
<td>Both</td>
</tr>
<tr>
<td>Typical products</td>
<td>Standard</td>
<td>Commodi-</td>
<td>Highly Customized</td>
<td>Customized pro-</td>
</tr>
<tr>
<td></td>
<td>products</td>
<td>ties</td>
<td>products</td>
<td>ducts</td>
</tr>
<tr>
<td>--------------------------------</td>
<td>----------</td>
<td>--------</td>
<td>----------</td>
<td>-------</td>
</tr>
<tr>
<td>Capacity to absorb supply chain risks</td>
<td>Moderate</td>
<td>Low</td>
<td>High</td>
<td>Moderate</td>
</tr>
<tr>
<td>Eliminate muda</td>
<td>Low priority</td>
<td>Essential</td>
<td>Desirable</td>
<td>Arbitrary</td>
</tr>
<tr>
<td>Quality</td>
<td>Market winner</td>
<td>Market qualifier</td>
<td>Market qualifier</td>
<td>Market qualifier</td>
</tr>
<tr>
<td>Cost</td>
<td>Market winner</td>
<td>Market winner</td>
<td>Market qualifier</td>
<td>Market winner</td>
</tr>
<tr>
<td>Network integration</td>
<td>Non existent</td>
<td>Desirable</td>
<td>Necessary</td>
<td>Obligatory</td>
</tr>
<tr>
<td>Virtual integration</td>
<td>Low priority</td>
<td>Desirable</td>
<td>Necessary</td>
<td>Obligatory</td>
</tr>
<tr>
<td>Information decoupling</td>
<td>Non existent</td>
<td>Advantageous</td>
<td>Necessary</td>
<td>Desirable</td>
</tr>
<tr>
<td>Postponement</td>
<td>Non existent</td>
<td>Not required</td>
<td>Necessary</td>
<td>Desirable</td>
</tr>
<tr>
<td>Product conception</td>
<td>Producer</td>
<td>Producer</td>
<td>Producer &amp; customer</td>
<td>Producer &amp; customer</td>
</tr>
<tr>
<td>Measurement of quality</td>
<td>Defect rate</td>
<td>Defect rate</td>
<td>Customer delight</td>
<td>Customer delight</td>
</tr>
</tbody>
</table>

As seen from the table above, one size does not fit for all therefore different supply chain paradigms are needed to match the characteristics of the products and fulfilment requirements.

Goldsby et al. (2006) argue that agile supply chain strategy is needed in less predictable environments where demand is volatile and lean strategy works best in high volume, low variety, and predictable environments. Most organizations are forecast driven rather than demand driven. The lean strategy should be adopted when the winning determinant is cost, and agile when winning determinant is the service level. (Goldsby et al. 2006: 60) The same conclusion can be made from Figure 12 that shows different demand and supply characteristics and the well fitting paradigm to match them.
As seen from the logic illustrates in Figure 12, when demand is more predictable, then lean should be chosen; and when demand is more and highly unpredictable, then based on the lead times, either agile or leagile approach should be chosen.

For a company, it could also be that "one size fits all" approach does not fit for the entire product portfolio, as one part of the portfolio may have one approach and other part may use another. For example, when products from low-end price points are using lean approach, the products from higher end price points are using a more agile approach.

4.3 Elements of Supply Chain Agility in Fashion Industry

This overview is not intended to be an exhaustive literature review but rather a brief scan of the findings from literature search.

In the fashion industry, sometimes agility is mistaken with other similar but different concepts such as adaptability and resilience. While agility is being able to deal with and take advantage of uncertainty and volatility, adaptability is rather used for more profound medium-term changes. Adaptable supply chains adjust their design to meet structural shifts in markets and, modify and adapt the supply network to strategies, products and technologies. (Charles et al. 2010: 723)

An agile company designs its organization, processes and tools in such a way that it can respond to changes appropriately within a suitable time frame and impact. It is...
therefore critical for a company to have an understanding and pulse of the market so that it can respond to the changes. Figure 13 illustrates the key agility elements in relation to different sides of the business.

![Diagram showing supply chain agility elements](Image)

**Figure 13. Elements of supply chain agility in relation of a company.**

As seen from Figure 13, to be effective through its supply chain, the company must have ability to manage network as a whole and ideally to focus on the core competencies and strengths of the individual network suppliers. Managing the supplier network effectively might also include process integration where there exists collaboration and integrated processes and systems across the supply chain. This could be achieved through the notion of a virtual supply network, where collaborative planning, sharing of information and visibility across the supply pipeline is apparent.

**Market sensitivity**

Market sensitivity means that the company is capable of reading and responding to the real consumer demand (Christopher 2000: 38). In retail side of the fashion industry this is a vital requirement. Successful fashion retailers capture trends as they emerge using a variety of means. Point-of-sale data is analysed actively and it is used to determine replenishment requirements where the intention is to continue to make the product available. (Christopher et al. 2004: 370) Good market sensitivity also helps the company to reduce and better optimize its inventory buffers.
Information technology plays a critical role in improving the market sensitivity and capturing the market demand in real-time from the different sales channels and locations. Improved quality and availability of data provides better foundation for analysis, planning and decision-making. Recent development in Big Data, Social media and in mobility provides new opportunities and tools for improving the market sensitivity.

Virtual integration and collaboration

The agile supply chain is virtual in the sense when it is connected and integrated through shared information on real demand. Then everyone in the supply chain is using same set of numbers. There is a growing awareness that shared information among the supply chain partners can enable higher levels of product availability to be achieved with less inventory (Christopher et al. 2004: 370-371).

There are different levels of collaboration in the supply chain. This is more about trust between the partners than about the tools and processes that being used. If a one end is an arms-length kind of relationship where nothing is shared and there is no trust and fear that shared information could be used against each others. Then another kind of relationship is where there are joint agreement about ways of the collaborative ways of working and all the required information is shared and other party can use information to provide value adding services its or their both benefits. In the contexts of collaboration in the SCM, then in the one end is zero collaboration and in the other end is a vendor managed inventory. There between can be for example collaborative planning, forecasting and replenishment (CPFR) mode of collaboration.

Networking in supply chain

Baramichai et al (2007) argue that in the supplier front, the agile supply chain should either be created by establishing long-term collaborative relationships with agile suppliers or adapting the agile supply chain structures and relationships quickly and efficiently with the suppliers, or implementing both approaches concurrently. (Baramichai et al. 2007: 335)
Christopher et al. (2004) argue that a unique feature of agile companies is their use of flexible arrangements with a wide supplier base. The system is then flexible enough to cope with sudden changes in demand. Christopher et al. (2004) also argue that:

In an agile network there is a tendency for the focal firm to act as the ‘orchestrator’ of the network, the membership of which will change according to requirements. There is a good analogy with the director of a theatre play. For the specific season during which the play is being performed, the director will work very closely with a relatively small group of actors and actresses. Probably he or she has chosen this team from a much bigger pool of players who he or she has also worked with in the past. However, for the next play or season, that team will be disbanded and a new one assembled from the pool. Even though these relationships are not permanent, they are close. (Christopher et al. 2004: 371)

Process and information alignment

Christopher et al. (2004) argue that to achieve a more responsive supply chain this requires a high level of process alignment within partners in the supply chain. This alignment means an ability to create connections and share information without delays. These delays could be caused by, manual processes or buffers between different stages of the chain. This form of integration is becoming even more common, as companies focus on managing their core competencies and outsource all the other activities. (Christopher 2000: 39.)

In an agile network, process alignment is to enable different entities to be connected. In the fashion business, there can often be many different entities involved in the process that begins with product design and ends with the physical movement of the product onto the retailer’s shelf. Co-ordinating and integrating the flow of information and material is critical. (Christopher et al. 2004: 371-372) Process integration also means collaborative working between buyers and suppliers, common systems, shared information and seamless material flows.
4.4 Measuring Agility

Christopher et al. (2000) argue that there are three key lead-times that must be managed and measured by organisations that seek to compete successfully in fashion markets:

- **Time-to-Market** - how long does it take the business to recognise a market opportunity and to translate this into a product or service and to bring it to the market?
- **Time-to-Serve** - how long does it take to capture a customer’s order and to deliver the product?
- **Time-to-React** - how long does it take to adjust the output of the business in response to volatile demand? (Christopher et al. 2000: 367-376)

When measuring the current state of supply chain agility, a supply chain response matrix is a useful mapping tool for analysing lead times and responsiveness. This approach seeks to portray the critical lead-times within a particular process, as seen in Figure 14 below.

In Figure 14, the horizontal measurements show the lead-time for the product both internally and externally. The vertical plot shows the average amount of standing inventory at specific points in the supply chain. In this example, the horizontal axis shows the cumulative lead-time to be 42 working days. The vertical axis shows that a further 99 working days of material are held in the system. Therefore a total response time in this system is 141. Once this is understood, each of the individual lead times and inventory points can be targeted for improvement activity. (Hines and Rich 1997: 51-52)
When measuring agility, it is essential to measure maturity of the processes to be able to define what is the current state and what steps are required to achieve the next level. Figure 15 shows the levels (Grimson and Pyke. 2007: 330) for measuring the maturity of agility.

Figure 15. Levels of Process Maturity.

4.5 Best Practice of Selected Leading Agile Fashion Companies

This section discusses some of the best practice and characteristics of selected agile fashion companies, which are chosen due to their world-class agility performance.

When focusing only to the fashion industry; then one widely used example of fashion industry best practice is the postponement model of Benetton Group S.p.A.. Waller et
al. (2000) argue that Benetton has been one of the early successful adopter of the postponement strategy in the fashion industry. Postponement strategy allows delaying the decision of the final product and therefore more flexibility in developing different versions of the product as needed.

In the clothing industry, traditionally the yarn is first dyed and then knitted into garments, which is a lengthy process; Benetton first knits garments using bleached yarn and postpones dyeing until a latter step of production. Before postponement was used, there were always too many garments in colors customers did not want, whereas colors in demand were always sold out. The new strategy allows Benetton to be extremely responsive to rapid changes in customer demand for different colors in clothing. It also permits higher customer service levels. Benetton's market-oriented supply chain management is illustrated through the ability to adapt internal processes to create superior customer value based on information about customer demand generated at the store level. (Waller et al. 2000: 136)

One of the key objectives of the agile fashion companies has been to reduce the lead-times. Efficient consumer response (ECR) was designed specifically for grocery industry while Quick response (QR) approach was originally developed for apparel and text industries. In the recent years, Fast Fashion approach has been in one way a step further in this development. Even thought the case company is not operating in the field of Fast Fashion, there are several best practices from Fast Fashion field to be taken due to the fact that these companies are very agile in their practices and are able to design and produce a massive amount of SKUs per year. These companies are, for example, able to design and bring new products to the market even during the on-going season.

According to Lee (2004),

As soon as designers spot possible trends, they create sketches and order fabrics. This gives them a head start over competitors because fabric suppliers require the longest lead times. However, the companies finalize designs and manufacture garments only after they get reliable sales data from stores. This allows them to make products that meet consumer tastes, while reducing the number of items they must sell at discounts. (Lee. 2004: 102)
**Inditex SA and Zara - process integration, market sensitivity and internal agility**

After the Benetton model, the Zara model has become a kind of ideal view of agile supply chain for the fashion industry (Dari & Pache 2013: 1). Industria de Diseno Textil SA, known as Inditex SA, is a Spain-based company primarily engaged in the textile industry. They are operating through eight brands (Zara, Pull & Bear, Massimo Dutti, Bershka, Stradivarius, Oysho, Zara Home and Uterque) and especially Zara is well-known for its agility. This fashion manufacturing and retailing company has risen to become one of the top fashion manufacturer and retailers in the world and it is one of the leading Fast Fashion companies. It targets general fashion market with low prices and fashionable products. Information flow of consumer desires to designers is in world-class level which therefore allows the company to have one of the shortest lead-times in the industry of getting a new product from design table to the sales floor.

From the agility point of view, Zara is an example of best practices in process integration, market sensitivity and internal agility. Their model underlines a market driven supply chain where demand is pulling the whole supply chain and therefore one of their main objectives is to have the shortest lead-time in the industry. This is done by vertical integration, just-in-time manufacturing of small production batches and fast distribution and replenishment to stores. They are able to fulfill customer demand in a highly cost-effective way. They are running production in-house but to balance the demand they are also using extra capacity from other companies. According to Kim (2013), the suppliers’ role is mainly to provide extra production capacity when a particular style or color turns out to be in high demand. Zara demands such supply chain flexibility characteristics from its suppliers so that this demand can be responded effectively. Rather than aiming for economies of scale, Zara manufactures and distributes products in small batches and due to short lead times and small batch sizes there is more opportunities to solve the problems if the original demand and production forecast is not accurate. (Kim 2013: 220)

**Li & Fung – virtual agility and networking in supply chain**

Li & Fung Limited is a Hong Kong based holding company, which is mainly engaged in managing the supply chain for retailers and brands worldwide. Instead of owning the production facilities, it orchestrates some 14,000 factories in China and around the
world. It provides a “a one-stop shop for customers through a total value-added package: from product design and development, through raw material and supplier sourcing, production planning and management, quality assurance and export documentation to shipping consolidation Cao et al. (2008:393)”. Figure 16 shows an example of organizing a production run for a specific buyer and product.

Figure 16. An example of Li & Fung’s role as the orchestrator of the network (Cao et al. 2008: 393).

Li & Fung is an example of best practices in virtual agility and in orchestration of complex supply networks. Its role is to figure out a way to coordinate suppliers and factories in the network and increase their performance to a level that these companies would not achieve by themselves. As the different partners increase their performance the whole network benefits. Trust building and balancing the different interests inside the network is also a area that needs to be done effectively.

Mass customization – market sensitivity and process integration

Adidas AG and Nike are some of the largest sport brands in the world. They design, develop, produce, and market a wide range of athletic and sports lifestyle products with several brands.

In order to cope with customers’ demand, they have decided to undertake mass customization strategy in part of their portfolio. An example of their market sensitivity and process integration is their customisation services that allow customers to design their
own shoes and other gear and get that delivered to them in a reasonable time and price. (Nike. 2014., Adidas. 2014)

4.6 A Conceptual Framework for Implementing Agility in Fashion Supply Chain

This sub-section merges the key relevant elements of the best practice into the conceptual framework for implementing agility in a fashion supply chain. Based on the findings from the reviewed literature, which will be further applied in the subsequent sections of this study, there are three critical agility elements. Agility Drivers are recognized as the changes/pressures from the business environment for the company to become more agile. They answer to the question, why to become a more agile. Agility Capabilities are the essential capabilities that are needed in order to optimize the respond. Finally, Agility Providers are the sources from which the so-called capabilities could be obtained. Best practice also points to the need for the providers to be fully integrated with the support of information systems/technology. (Zhang et al. 2000: 498) Each of these elements are discussed in more detail below.

4.6.1 Agility Drivers

Baramichai et al. (2007) argue that “the fundamental drivers for agility include ever-shorter response cycles, representing a change from static systems with significant time allowances, batched information flows and periodic decision making, to dynamic systems where change, information flow and decision making are continuous.” (Bar- michai et al. 2007: 334) In the case of fashion industry, some of the key drivers also include shortening products of lifecycles, faster market changes, quicker delivery times and time to markets, and some of new software technologies.

The agility drivers and the level of agility needs is based on such factors as the degree of turbulence of the business environment, the characteristics of the environment in which the company competes, and the characteristics of the company itself. Once the agility need level is determined for a company, then the same must to be done for the agility capabilities. Based on the gap analysis, weak points and existing gaps can be identified for further development. (Zhang et al. 2000: 499)
4.6.2 Agility Capabilities

Capabilities are what a company needs to be able to execute its business strategy. In order to determine the agility capabilities that are needed to respond to the changes in the drivers, it is first necessary to establish which capabilities are effective in addressing a given driver and how effective those are.

Zhang et al. (2000) argue that:

the more turbulent an agility driver is to an organisation, the more important an agility capability connected to the driver; the more effective an agility capability is in coping with a driver, the more important the capability. The same principle holds for the connections between capabilities. (Zhang et al. 2000: 505)

Some of the key capabilities are described. Among these capabilities, responsiveness is the vital capability for any organisation, which needs to be agile. The other capabilities necessary elements in order to achieve responsiveness include:

*Responsiveness* is the ability to identify changes, respond rapidly to changes either reactively or proactively and an ability to recover from changes.

*Competency* is an extensive list of abilities that provide a company with productivity, efficiency, and effectiveness in achieving its aims and goals.

*Flexibility* is the ability to carry out different work and achieve different objectives with the same resources. In manufacturing environment, it contains flexibility of volume, configuration, organisational and people. This also includes organizational flexibility.

*Speed* is the ability to carry out tasks and operations in the shortest possible time. This includes quickness in time-to-market, deliveries and in operations. (Zhang et al. 2000: 507).

*Visibility* is the ability to access potentially in real-time to relevant information about the business.

Improvement in any of these capabilities will lead to increasing agility and allow potentially greater business results. Section 5 discusses in more detail what are the most
critical capabilities to the case company and it also discusses what capabilities to main-
tain and what to improve.

4.6.3 Agility Providers

Zhang et al. (2000) define that agile providers use business practices, methods, tools, and techniques that could increase the performance of the agility capabilities. These include both tools and practices that are already available to organisations as well as those that are still under development for example by the research community. (Zhang et al. 2000: 505)

In fashion industry, market sensitivity, virtual integration, networking, information alignment are some of the most critical agility providers to allow quick response to changing market requirements. Depending of priorities of the different drivers and capabilities, sufficient agility providers are also given priorities. Zhang et al. (2000) argue that a success is considered when correlation strengths between drivers, capabilities and providers is being established. (Zhang et al. 2000: 511)

4.7 Conceptual Framework of This Thesis

The findings from available knowledge and best practice point to a defined set of agility capabilities and providers that, in their turn, suggest a list of improvements for the agility providers. When merged together, these key elements comprise a conceptual framework for implementing agility for a fashion supply chain in this study, as shown in Figure 17 below.

In this Figure, the first pillar defines agility drivers that are the changes or pressures from the business environment for the company to become more agile. This pillar answers to the question, why to become more agile. The second pillar shows agility capabilities, which are the essential capabilities that are needed in order to optimize the response. The third pillar shows agility providers that are the sources from, which the so-called capabilities could be obtained. These providers are to be sought from, for example, market sensitivity, organisation, people, technology, and innovation. It is also suggested that the providers need to be fully integrated with the support of information technology. (Zhang et al. 2000: 498) This conceptual framework is validated with the
case company and each of these pillars are discussed in more detail in the subsequent sections.

Figure 17. A conceptual framework for implementing agility (Adopted from Zhang et al. 2000:498, Christopher et al. 2004:371).

From the above conceptual framework, the agility providers are analysed and built forward in more detail for the case company. Figure 18 presents a toolkit that is used in thesis as a framework for improving the performance of the agility providers.

In Figure 18, the agility providers and their sub-components are listed on the vertical axis. Maturity of the process (from 1 to 5), business priority (low, mid or high), required level and improvement recommendations are placed on the horizontal axis. In Section 5, an example content of different maturity levels is populated and ways of improving all these agility providers are discussed in more detail.
This toolkit will tackle many of the highlighted weaknesses from the current state analysis and in terms of agility; it holistically provides several agility improvement elements also at the customer and supplier interfaces.
5 Increasing Agility in the Supply Chain of the Case Company – A Preliminary Proposal

This section describes the building of a preliminary proposal for increasing agility in the supply chain of the case company. First, it describes how data collection and analysis were done and presents the steps in the proposal building. After that, improvement for several agility providers is discussed. This section ends in a summary of a preliminary improvement proposals and recommendations.

5.1 Data Collection for the Preliminary Proposal

As the current state analysis revealed, agility of the supply chain was recognized as an important area for improvement; but the analysis also revealed that there was not clear strategy and action plan for the case company what to do next. Once the current state analysis was completed, the initial level and findings were taken as a starting point for building the improvement proposal. Figure 19 shows that the building blocks of the proposal to improve it.

As seen from Figure 19, the proposal is a combination of the findings from the current state analysis, relevant best practice found from literature, improvement ideas gathered from the theme interviews and the researcher’s conclusions.

Theme discussions

Two individual theme sessions were organized to form and validate elements of the improvement proposals. In these theme discussions, participants were first briefed about the relevant findings of the current state analysis. According to Respondent F, “it
was unfortunate that there were so many weaknesses”. Then a list of agility drivers and industry trends was gone through.

This part was followed by discussion on the agility capabilities. The preliminary suggestions on the agility capabilities relate to Zhang et al. (2000) and these were prepared by the researcher and then tested during the theme discussions. The participants were asked to provide their comments and confirmation to the initial ideas. Both Respondents agreed on the initial agility capabilities and according the Respondent E, “these are well-defined and these are the very basic things that we should have”.

This analysis was followed by a more detail discussion of the different agility providers and their importance for the case company. The preliminary suggestions on the agility providers relate to Christopher et al. (2004) and these were prepared by the researcher and tested during the theme discussions. The target was also to collect ideas and reflections from the participations and evaluate if the suitable sub-elements and improvement ideas were presented. The participants were also asked to indicate from their perspective the maturity level of the sub-elements of the agility providers and the level what should be aimed to. The participants were also asked about the business importance of the different sub-elements. This business importance feedback is utilized for presenting proposal and priorities to the management in the Section 6. Then participants were asked to provide their comments and confirmation to the initial ideas. Both respondents contributed to agility elements and ideas and their feedback and reflections were later used for building the recommendations for the agility improvements.

Thus, the preliminary proposal for increasing agility in the supply chain of the case company is based on the current state analysis, relevant best practices found from literature, improvement ideas gathered from the theme interviews and the researcher’s conclusions. These recommendations would increase the agility in the supply chain of the case company and could be implemented with reasonable time, effort, cost and resources. They are opened up and presented as recommendations in the following sub-sections.

5.2 Recommendations for Market Sensitivity of the Case Company

Market sensitivity is recognized as an important provider of agility (Respondent E) because this demand information is used as an input for rest of the supply chain and
company. This allows combining relevant information to the sales and operations processes and making information available for designers for closing faster the feedback loop from sales channels to design. Improvements in market sensitivity also allow the company to have required information faster, which allows quicker fact-based decision-making and faster time-to-market and time-to-react intervals. Better demand sensing also allows lower inventory levels but still keeping good availability.

In the area of market sensitivity, the defined sub elements are customer segments, sales channels and relationship and tool in channels and segments. Based on the feedback from the theme discussion, the current maturity level is seen as low compared to the required level that is established by the respondents. Also all the sub-elements are given a high business priority, therefore, these need to be improved. The main suggestions for the recommendations for improving the market sensitivity element are shown in Figure 20 below. The sub-elements are discussed in more detail in the following sub-sections.

![Diagram of market sensitivity sub-elements]

Figure 20. The recommendations for market sensitivity improvements.

The sub-elements of market sensitivity, shown in Figure 20, include the following recommendations.

**Customer Segments**

The main recommendation in the area of Customer Segments is to actually create and implement the customer segmentation so that company is able to better understand needs and priorities of different customers and to be able to serve them better and faster accordingly. When similar customers are clustered together then market sensitiv-
ity of the cluster is easy to improve. There are several methods for creating the segmentation but the recommendation is a multi-variable segmentation containing but not excluded to frequency and recency of purchases.

This also allows improving the sales forecast based on the increasing understanding of what are the most critical and useful demand signal in different segments.

Other recommendation is to improve the customer relationship management across the own channels for a more seamless experience and establish a loyalty program with a singular customer profile across the channels. This is related to the segmentation but it will also allow additional benefits and visibility for and of the loyal customers.

_Sales channels_

The case company has internal and external sales channels. The internal sales channels are those ones that are owned by the case company and where the sale happens with the end-user. In these channels, it is potentially easier to catch consumers’ buying impulse because the connection is direct.

For the internal sales channels, recommendations are improving insights of market demand thought to POS and capturing emerging trends by listening to consumers. In the retail, POS data is in key role but data must be gathered and looked more holistically which then requires capturing customer awareness via social media, e-commerce, customer care and churn across the sales channels. Another recommendation is to monitor the lost or potentially lost sales, as this information is especially important in product categories that contain sizes. Final recommendation is to implement social listening tools that help you find and follow up automatically when the brand is mentioned online. All of these improvements can increase opportunities for increasing the market sensitivity.

In the case company, RFID and iBeacon are seen as very interesting technologies that would enable increasing the market sensitivity but these are still kept out of scope for the time being. Therefore, the recommendation is to still follow up this development closely.
In the external sales channels, recommendation is to use more systemically insights from the market signals (sales, orders, shipments, inventory data and different market indicators) for availability and execution management but also for planning and predicting future demand. The use of channel data in advanced analytics to sense and translate demand.

Final recommendation related to market sensitivity is to create a truly omnichannel strategy and map the customer journey in all the channels.

*Tools and relationships within sales channels and customer segments*

Based on the customer segmentation, a recommendation is to provide different offerings (cost, agility, service) to different segments and also different tools for helping them in various stages of the customer journey. At the same time, it should be coupled with improving market sensitivity from different segments in the most effective way. With B2B customers, better market sensitivity will allow better replenishment planning.

5.3 Recommendations for Virtual Integration and Collaboration within the Supply Chain

The agile supply chain is virtual in the sense when it is connected and integrated through shared information of real demand. In the area of virtual integration and collaboration, the defined sub elements are Sales and operations planning, and the same set of numbers and Collaboration with suppliers and customers. The main suggestions for the recommendations for virtual integration and collaboration element are shown in Figure 21 below. The sub-elements are discussed in more detail in the following subsections.

![Figure 21. The recommendations for virtual integration and collaboration improvements.](image-url)
The sub-elements of virtual integration and collaboration, shown in Figure 21, include the following recommendations.

*Sales and operations planning and same set of numbers*

A recommendation is to implement a light version of sales and operations planning process and expand using a one set of numbers in the supply chain. In this case, the company can systematically and proactively manage the supply chain constraints and stay in synchrony with customers and suppliers. This allows combining business plans into one integrated plan, which is reviewed by stakeholders on a monthly and weekly basis. Monthly level sales and operations plans are created to manage the company level performance; and weekly level demand and sourcing plans are shared within the supply chain to relevant stakeholders. Execution of the plans still happens on a weekly and daily level. This allows to systematically share numbers within the supply chain and it will reduce the need for having different silos with different sets of numbers.

*Collaboration with suppliers and customers*

In order to reduce demand volatility and increase end-to-end visibility, a recommendation is to improve and increase collaboration with the key customers, key channels and key suppliers. These activities include shared information on real demand, collaborative planning, better visibility and more standardized work processes. Following the sales and inventory data of the most important customers and sales channels, these improvements allow also better communication and having a contingency plan, which will support the increasing of trust and agility between the partners.

In the case company, the technology foundation already enables improvements in many of the above processes. Another recommendation is to align the KPIs, scorecards and incentives with corporate goals and strategic need to increase agility.

5.4 Recommendations for Networking in Supply Chain

In the area of networking in supply chain, the defined sub elements are Supply chain orchestration skills and Upside flexibility and adaptability. The main suggestions for the recommendations for networking element are shown in Figure 22 below. The sub-elements are discussed in more detail in the following sub-sections.
Figure 22. The recommendations for networking improvements.

The sub-elements of networking in supply chain, shown in Figure 22, include the following recommendations.

**Supply chain orchestration skills**

For the supply chain orchestration skills, the main recommendation is improve the resources, skill and processes to act as network orchestrator who is managing the relevant material, financial and information flows even across several tiers and depths. The case company and the whole network benefits, when the performance increases to a level that these companies could not have achieve by themselves.

Another recommendation is to developing the suppliers and potential suppliers and better leveraging the supplier’s core competencies. In some cases, this requires educating and even investing in strategic relationships also with some of the critical tier 2 or 3 suppliers.

**Upside flexibility and adaptability**

One of the focus areas must be the improvement of suppliers capability to respond quickly to unpredictable demand in order to minimize stock outs, but also in the case of late delivery the potentially required mark-downs and obsolete inventory.
The main recommendation is, when selecting and improving the suppliers, to have more focus on lead-time and activities that reduce the inbound lead-times. Additionally, the ability to do small batch productions and reorders must be increased. One option is to move toward a model where more inventory is held as work in progress awaiting for order for build or configuration and replenishment is driven by actual data collected at the customer's interface.

Other recommendations but that are harder to implement are that incentivizing the key suppliers to change their inventory strategies in order to keep more buffer stock, parts or finished goods. Other recommendation for the case company is to if possible to use, then implement more modular design in order to postpone the decoupling point and move towards a more agile supply chain.

5.5 Recommendations for Process and Information Alignment

Presently, there is lot of time-sensitive information in the business of the case company, but currently there is poor information synchronization, alignment and still many manual processes are used that slow down the information flow. To improve time-to-market and time-to-serve, more focus should place on the process integration and managing holistically the processes, instead of managing separate functions in silos.

In the area of process and information alignment, the defined sub-elements include the processes and information alignment in the upstream, internal and downstream areas. The main suggestions for the recommendations for process and information alignment element are shown in Figure 23 below.
Figure 23. The recommendations for process and information alignment improvements.

The sub-elements of process and information alignment, shown in Figure 23, include the following recommendations.

*Upstream processes and information alignment*

Upstream stage of the process involves all the activities with the suppliers of the case company. With the suppliers the lack of standardized or effective ways of working, have resulted in wasted resources, inefficient use of time and additional costs due to fire fighting.

Since several of the suppliers have limited IT resources or there are low volumes of transactions per year, therefore one size can not fit for all, and there should be more than one-mandated protocol for the integration solution. Main recommendation is to fix the basics with low performing suppliers and improve process and information alignment with those suppliers who have capabilities for a more advanced process and information alignment. This step will improve, for example, the communication and decision synchronization with the suppliers. Some of the first steps will include standardization and alignment of all the processes and ways of working. Along with information alignment, transactional messages related to pricing, ordering, order responses, dispatching, possible returns and invoicing must be improved with several suppliers to
introduce more accurate and standardized formats and the communication related to these must be made more agile.

Another recommendation related to processes and information alignment is to take further initiatives to increase visibility to the production and in-bound shipping in order to increase agility. This improves also the agility of exception management with the suppliers.

Final recommendation concerning process and information alignment is to implement relevant KPIs for monitoring in more standardized way the suppliers and products in relation of time, quality and quantity. This allows establishing a feedback loop from the actual performance for improvements.

*Internal processes and information alignment*

The first recommendation is to systematically standardize transactional work processes and automate processes where possible. This allows focusing to more on value adding work and also on better inventory management and faster order fulfilment.

The second recommendation is to integrate data from multiple domains and improve data synchronization and sharing. Especially online channel still needs to be integrated to ERP of the case company. Also quality of data is something that needs improving. This requires more focus to data integration, master data and to information lifecycle management. Also quality of inventory data must be improved across locations. This requires more a change in mind-set than a technical change.

The third recommendation is to remove last channel dedicated warehouse in order to have one global warehouse for all the sales channels. This requires even more accurate inventory data so that all the customer commitments can be met. Then in the future, forecast would be still done by sales channel but execution would be demand driven. If needed a strict allocation to certain sales channel would be still possible. Integrated sales and operations planning process would also cover this allocation.

The fourth recommendation relates to applying predictive analytical models that will continuously integrate supply and demand without human intervention. Such tools and
models would, based on product availability, automatically offer for example campaigns to customers.

Final recommendation related to internal processes and information alignment is to choose or align the company KPIs to support process improvements and agility.

*Downstream processes and information alignment*

In the downstream stage, the process involves all the activities with the customers interface. Main recommendation is to improve the processes and information alignment, so that the customers could have the same level of buying experience and agility level within different channels.

When the previously recommended segmentation and service offering is done, the second recommendation is to improve the process and information alignment per segment as this involves more closer collaboration with some of the key customers.

The third recommendation is to implement a new web-store for wholesale customers in order to use of single tool and site. This will improve the service experience, information sharing and highly increases responsiveness.

Final recommendation related to downstream processes and information alignment is to increase usage of mobility for example in order receiving and order confirmation. This single change, even if done already alone, would allow major improvement in agility as this allows real-time processing of information.

**5.6 Summary of the Preliminary Proposal**

This section presented a holistic view for agility improvements. When looking for improvement, one of the key goals typical of best practice is to reduce complexity but also create or optimize the business processes. This study suggests that some of the challenges identified in the case company can be solved quickly and with simple solutions. When a simple solution is not available, then a more high level recommendation is given to the improvement area.
In this study, building the recommendations started by analysing in more depth the strengths and weaknesses of the current state analysis. Other building blocks of the proposal were developed as a combination of the relevant best practices found from literature, gathered improvement ideas gathered from the theme interviews and the researcher’s conclusions. Based on this analysis, several recommendations to improve the supply chain agility were identified. A holistic framework and understanding of different needs was proposed instead of single point solutions that would solve only a particular challenge. These proposals included high-level agility themes related to improvements in market sensitivity, virtual integration, collaboration and in process and information alignment. On a more detail level, the sub-elements of these themes could help to improve the agility of the case company. Based on the scoring and gaps from the theme interviews, all the other elements are presented to the management except for the element of supply chain orchestrating skills due to already a good score (4) and low gap between the current maturity level and the required level. The other improvement recommendations can be said to be the central and vital for increasing the supply chain agility of the case company.

As there was but a small number of interviews conducted for building the proposal, some improvement areas may have become over or underemphasized in this part of the study. Prioritizing of the business importance of the agility providers and their sub-elements is done together with the key stakeholders and further discussed in Section 6.
6 Feedback on the Agility Proposal

This section describes iteration and validation of the proposal for increasing agility in the supply chain of the case company. First, the section describes how data collection and analysis were done. After that the received feedback on the preliminary proposal is being described. This section ends with the final proposal for the case company.

6.1 Data Collection, Analysis and Conclusion Validation for the Final Proposal

For validating the initial proposal, a discussion session was organized with the management to discuss elements of the improvement proposal. The participant was first briefed about the relevant findings of the current state analysis and agility drivers. This was followed by discussion on the agility capabilities and providers and importance of different providers to the case company. The respondent contributed by giving detailed feedback and sharing ideas on further development of the proposal. These inputs are discussed below.

6.2 Feedback and Ideas Proposed by the Management

General feedback from the respondent was that the improvement proposals were “really good” and these help to “seeing another point of views”. The respondent agreed about the presented agility drivers and current state analysis. According to the respondent, several challenges identified in the current state analysis could be solved with improvements proposed for internal and external communication. The respondent also agreed about the suitability of the presented agility capabilities for the case company.

On the high level, the respondent agreed on the improvement proposal for the agility providers and the toolkit for improving the performance of the agility providers. Following the feedback and comments given to different areas of the improvement proposals, the following ideas were formulated: 1) Supplier integration was seen as challenging, as suppliers in general have different capabilities for integration. 2) Modularity and Leagile are seen as a promising concept but were recommended to be presently excluded from the proposal 3) Upside flexibility and adaptability in the supply chain were seeing as more important than as evaluated by the other respondents. It was suggest-
ed that this area could bring more benefits after implementing agility initiatives. 4) Process and information alignment in upstream must be gotten right and therefore in all the activities with the suppliers improve and standardize the ways of working. It was recommended to review with suppliers the ways of working again, if there is extra complexity that could be removed, and if there are requirements that would make the whole process faster from their end. As expressed in the validation discussion, “it will save so much time if there is less issues”. 5) In the process and information area, the feedback was to increase the priority to get the online integration implemented.

Summing up the feedback, validation discussion and suggestions for the final proposal, the following general conclusion can be made. Some of the original weaknesses found at the current state phase could actually be seen as symptoms of lacking a holistic framework and a company-wide strategy for improving agility of the supply chain, even though this is seen as an important area by the management.

6.3 Final Proposal Based on the Feedback

The preliminary proposal for the improvements was created in Section 5 and this final proposal is built on the basis of the preliminary proposal and modifications introduced based on the Management interview. Based on the management feedback, this final proposal answers to the research question and it also gathers improvements that could bring benefits that are higher than the cost of its implementation. This final proposal also provides guidance to the priorities and importance, which helps in the decision making and building the momentum to the implementation. Also in this final proposal the agility elements are already broken down to into smaller and easier steps, so that to make the proposal more actionable. The final proposal incudes improvement recommendations that are divided by the agility providers and their sub-elements and are summarized on the right-hand side on the following figures:

The final proposals for the Market sensitivity and its sub-elements are illustrated in Figure 24 below.
Figure 24. Proposals for market sensitivity improvements.

The final proposals for the *Virtual integration and collaboration* and its sub-elements are illustrated in Figure 25 below.

Figure 25. Proposals for virtual integration and collaboration.

The final proposals for *Networking in supply chain* and its sub-elements are illustrated in Figure 26 below. During the management interview, the required level and the business priority of the upside flexibility and adaptability were increased to the highest level.
The final proposals for *Process and information alignment* and its sub-elements are illustrated in Figure 27 below.

As can be seen from the final view of the four key elements of the Proposal, the updated proposals were mostly fine-tuned from the previously presented improvement proposals.
7 Discussion and Conclusions

This final section summarises the content and the outcome of the study. After that it concludes some practical implications that the case company should consider to increase its supply chain agility. In the end, the outcome, reliability and validity of the study are evaluated.

7.1 Executive Summary

The target of this Thesis was to improve the supply chain agility in the case company and the research question was *How to make the supply chain of the fashion accessories company more agile, in order to be able to response to the fluctuating demand more effectively?* To reach this objective the study proposed, in sections 5 and 6, a defined set of agility capabilities and agility providers for the case company and a holistic list of improvement suggestions for taking the agility providers to a new level of performance. The study was conducted as an action research due to the iterative and collaborative nature of the research. Collected data was then studied by using qualitative research methods.

As a starting point, the study evaluated the current state of the supply chain in the case company. It was done by analysing the current state of the case company supply chain from the perspective of its planning, sourcing, operations and retail, and IT. The current state analysis revealed that, in its current form, the case company has a good foundation to build on a more agile supply chain, but it still needs to improve many of its agility elements.

While conducting the current state analysis, the existing literature and best practice of agile supply chain in fashion industry were studied. From this work a conceptual framework was established for implementing agility. The conceptual framework includes agility drivers, agility capabilities and agility providers and an additional toolkit was established as a framework for improving the performance of the agility providers.

Based on this approach, the first version of the suggested improvements was built. This vision was validated and further improved based on the feedback from the man-
agement. The final proposal includes a holistic list of improvement proposals to the different agility elements for the case company, instead of single point solutions that would solve only a particular challenge. High-level agility themes of the proposal include: improvements in market sensitivity, virtual integration, and collaboration and in process and information alignment. The proposed sub-elements of these themes, could help to improve the agility of the case company.

7.2 Implications for Practicing Managers

*Even if you're on the right track, you'll get run over if you just sit there!*

–Quote often attributed to Will Rogers

Based on the findings of this study, several recommendations can be made in order to increase supply chain agility of the case company. The supply chain of the case company is a highly time sensitive system and increasingly complex. The supply chain is a significant contributor to the performance of the case company, and therefore it must be constantly improved and measured. The managerial implications of this study, which need to be considered when taking the proposals into practice, are listed below:

1) To increase the agility of the supply chain, the supply chain must be managed holistically, cross-functionally and from end to end as identified and advised on pages 25, 50, 54, 58 and 61. This agility improvement must be a part of continues improvement of the company and the heads of the departments must be accountable for it.

2) Based on the current state analysis of the company in the section 3, the company must fix the basics that may go beyond the scope of improving supply chain agility but that are important for the performance of the company. Most of these improvement needs are related to improvements in communication and training as identified in summary of the section 3. The heads of the departments must be accountable for it.

3) The most important implication to the management is a request to commit to the agility vision and to the required transformation, as improvement in agility will call for change management across the organization and individuals. This means to get the right people with right competences to work on the defined steps and the established agility improvement goals that are defined in section 6, and to follow up to achieve the
desired impact. To succeed in increasing the agility of supply chain, the case company will need to develop the short and mid-term visions/plans for most of the previously suggested improvement proposals in section 6. The heads of the departments must be accountable for this work.

7.2.1 Quick Wins

To improve agility of supply chain, there are two partly overlapping approaches available to the case company. Either it focuses on the improvement of the capabilities and providers that are important and easiest to implement; or it focuses on those capabilities and providers that help to achieve the desired agility level.

Some of the proposal elements could be implemented and tested quickly and with small efforts and resources, yet they would have an impact on supply chain fast. In the area of Market Sensitivity, segmentation of the customer base and creating a different agility offering for different segments will lead to immediate improvement. In the area of Virtual Integration, implementation of a light version of S&OP will make a visible impact on balancing the supply and demand. In the area of Process and information alignment, internal standardization of transactional work processes and potential automation for increasing responsiveness will lead to opportunities for reallocating resources for more value adding work and to a faster order fulfilment. Several of these suggestions have a small enough risk of failure and a high possible return for trying them improving the agility of the case company.

7.2.2 Barriers of Success

When implementing the agility improvement proposals, there is a low risk of failing in the implementation and from moderate to high return on the required investment. In certain cases, the proposals may have higher risks of failure, as for example, with the proposals related to supplier integration and collaboration that may be hard to implement with certain suppliers, which causes barriers among them.

On the case company level, setting the vision for improved agility is easy. Coordinating and agreeing what needs to be accomplished and by when, is not seen as a barrier to success. However, due to very limited internal resources, implementation of the required changes faces more challenges. Finally, as in any company considering im-
provements, the case company must reflect whether the organization culture would be willing to change and optimize their ways of working, as these require changes in the structure, processes, resource allocation, accountabilities and more focus on development. Strong and good leadership solves most of these barriers.

7.3 Evaluation of the Thesis

This sub-section evaluates how well the outcome of the study reaches its target and how reliable and valid the study is.

7.3.1 Outcome versus Objective

The objective of this thesis was to increase supply chain agility in the case company. To conclude, the outcome, which was set as a target for the study, namely developing recommendations for improving supply chain agility, were produced, so therefore the objective can be considered to be met. Based on the interviews at the case company, the proposed supply chain agility improvements could very well achieve this target.

The most important contribution of this study was to produce valuable improvement proposals to the case company. In addition to this, the best practices section of this study offers a broad review of different supply chain paradigms, as few of the sub-sections are written in more and wider detail than is required in the focused scope on of this thesis. This was done to provide a brief but necessary background for further development of the agility for the case company’s purposes. Even though some of these supply chain paradigms and agility elements are presented as separate approaches in reality, they can complement with each other to achieve a better result.

The results of this study may also lead to ideas for further research. Firstly, it would be interesting to study the agility impact of the implemented proposals; as well as define specific and measurable agility objectives and study them more using quantitative research methods. So far, the potential positive impact of enhanced agility is evaluated using soft methods and is hard to quantify. Research questions could be "When agility is improved, the case company will be x% more responsive..." Secondly, it would be interesting to collaborate even deeper with the suppliers and customers for increasing
agility. Thirdly, it would be interesting to study the impact of the predictive analytics for increasing the speed and accuracy of the operations.

7.3.2 Validity and Reliability

According to Section 2.3, the validity and reliability in this study were assured by taking a number of different steps. To increasing validity, the following procedures were practiced. Firstly, the study included a detailed plan and processes for data collections and analysis. Secondly, during the study the interviewees were involved several times into the development and discussions on the goals and improvement proposals. Thirdly, collected data was reported in detail and all the interview summaries were verified with the interviewees. When appropriate in the thesis, data was reported in full quotations.

Using different data sources and research methods ensured the reliability of the study. Firstly, the study employed different data sources and approaches to collect data. Secondly, only well-established and well-grounded references on the subject were used. Thirdly, the outcomes were presented to the relevant stakeholders to gather feedback, validate and challenge the proposals of the researcher.

Finally, this study does have some challenges in terms of validity. Firstly, all of the respondents were from the same industry and same company, which may make generalization difficult. Secondly, another difficulty was the subjective criteria of current state of some of the agility elements. Thirdly, due to time limitations the researcher did not interview the suppliers to gather their perspective for the proposals. On the other hand, the researcher employed his experience from the case company and the industry, which limits the challenges in validity related to data collection.
References


**Appendix 1: List of Questions in Semi-Structured interview about the Current State**

The questions are used in interviews to clarify the current state of the case company.

<table>
<thead>
<tr>
<th>Person</th>
<th>Date</th>
<th>Area</th>
<th>Theme of the discussion</th>
<th>Notes</th>
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<td>Planning</td>
<td>• Could you give a short overview of the planning?</td>
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<td>• What works and what does not?</td>
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<td>• What are the largest challenges in planning?</td>
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<td>• What are the best practices in forecasting?</td>
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<td>Sourcing</td>
<td>• Could you give a short overview of the sourcing?</td>
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<td>• How do you describe the relationship between the company and your suppliers?</td>
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<td>• What works and what does not?</td>
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<td></td>
<td>• What measures have been taken to deal with sourcing uncertainties?</td>
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<td>Operations and retail</td>
<td>What is the target market and what is the channel strategy?</td>
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<td>• Could you give a short overview of the operations and retail?</td>
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<td>• What works and what does not?</td>
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<td></td>
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<td></td>
<td>• How do you describe the relationship between your company and your distributors or clients?</td>
<td>Notes</td>
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| Information technology | • What measures have been taken to deal with uncertainties with the customers?  
|                        | • Could you give a short overview of the IT?  
|                        | • What works and what does not?  
|                        | • What are the largest challenges in used system? |

The actual data has been removed. It has been presented for instructors to review.
Appendix 2: List of Questions in Semi-Structured interview about the building of the Agility improvement proposal

<table>
<thead>
<tr>
<th>Person</th>
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<th>Theme of the discussion</th>
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<td>Comments to Agility Capabilities</td>
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<td>Ideas on improving the virtual integration and collaboration</td>
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<td>Ideas on improving the Networking in supply chain</td>
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<td>Ideas on improving the process and information alignment</td>
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Appendix 3: List of Questions in Semi-Structured interview about the final Agility improvement proposal

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<td>Additional comments to Agility Capabilities</td>
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<td>Additional comments on Agility elements</td>
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<td>Additional comments on the improvement proposal of the Market Sensitivity</td>
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<tr>
<td>Additional comments on the improvement proposal of the virtual integration and collaboration</td>
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<td>Additional comments on the improvement proposal of the Networking in supply chain</td>
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<td>Additional comments on the improvement proposal of the process and information alignment</td>
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<tr>
<td>Comments of the business priorities</td>
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The actual data has been removed. It has been presented for instructors to review.