Benefits of Centralized Materials Management: A Case Study in the Direct Selling Industry

J. Janicka
S. Strydom

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Authors

Jana Janicka  
janicka@kth.se  
(+46) 0722820539

Stephanie Strydom  
strydom@kth.se  
(+46) 0707301560

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Summary

It has often been cited that the competitiveness of an organization’s supply chain can be improved through better coordination of the material, information and financial flows. In Oriflame Cosmetics, it is believed that better coordination of material flow can be achieved through centralizing the management of raw materials and components, which is currently being done in isolation by the various factories supplying Oriflame with finished goods. This case study therefore investigates the benefits for Oriflame in centralizing materials management, specifically the planning and ordering functions.

To support the research question, the present situation and the associated problems were investigated first. This was followed by an investigation into a centralized materials management scenario. A list of potential benefits was developed, based on data collected through interviews with stakeholders at Oriflame, a survey and consultation of relevant literature, company documents and databases.

The research question was further supported through quantification of two of the potential benefits using data from a real case from one of Oriflame’s product categories – fragrances. Monte Carlo simulations were performed to quantify the cost and inventory savings of a centralized materials planning and ordering strategy for multi-sourced fragrances. The results proved the possibility exists to achieve mean cost savings ranging from 24.0 % to 20.6 %, and while optimizing costs, inventory savings were usually, but not always achieved, with median savings of 61.0 % to 71.9 %.

It is believed that the overall findings of this case study can support management facing the centralization decision – both in Oriflame and other fast-moving consumer goods companies in similar positions.
Table of Contents

1 Introduction .................................................................................................................. 1
  1.1 Scope ...................................................................................................................... 1
  1.2 Methodology .......................................................................................................... 2
2 Literature Study .......................................................................................................... 4
3 Oriflame Background ................................................................................................... 6
  3.1 Overview .................................................................................................................. 6
  3.2 Direct Selling Business Model ................................................................................. 8
4 Present Situation ......................................................................................................... 9
  4.1 Supply Chain Structure ............................................................................................ 9
  4.2 Organization Structure ............................................................................................. 10
  4.3 Problems and Disconnects ....................................................................................... 15
  4.4 Risks and Missed Opportunities .............................................................................. 16
    4.4.1 Risks .................................................................................................................. 16
    4.4.2 Missed Opportunities ........................................................................................ 17
5 Investigated Scenario ................................................................................................... 19
  5.1 Centralized Materials Management ......................................................................... 19
  5.2 Value of Centralized Materials Management .......................................................... 20
    5.2.1 Advantages ........................................................................................................ 21
    5.2.2 Disadvantages ................................................................................................... 23
    5.2.3 Implementation .................................................................................................. 24
    5.2.4 Survey ............................................................................................................... 24
  5.3 Example Case .......................................................................................................... 27
    5.3.1 Background Fragrances ..................................................................................... 27
    5.3.2 Simulation Model ............................................................................................... 29
    5.3.3 Simulation and Results ....................................................................................... 35
6 Analysis ....................................................................................................................... 38
7 Conclusions .................................................................................................................. 40
8 Recommendations ........................................................................................................ 41
9 Bibliography ................................................................................................................ 42
Appendix A: Oriflame’s Global Business ................................................................. A1
Appendix B: Subsystem Process Map ................................................................. B1
List of Tables

Table 1 - Oriflame overview in facts and figures................................................................. 7
Table 2 - Interview and survey participants ........................................................................ 20
Table 3 - Summary of survey results ........................................................................................ 25
Table 4 - Example supply schedule for one factory................................................................. 31
Table 5 - Inputs and outputs of the Monte-Carlo simulation .................................................. 34
Table 6 - The order quantity and price breakdown for the fragrance bottle. ....................... 35
Table 7 - Advantages and disadvantages of centralized materials management ............... 38
Table 8 - Supply schedules used in the example..................................................................... D1
Table 9 - The price breaks used in the example..................................................................... D1
Table 10 - Program stepwise results for $\Delta t = 1$ week......................................................... D1
Table 11 - Program stepwise results for $\Delta t = 2$ week, decentralized Option 1 ........ D2
Table 12 - Program stepwise results for $\Delta t = 2$ week, decentralized Option 2 ............ D3
Table 13 - Program stepwise results for $\Delta t = 2$ week, centralized Option 1 .............. D3
Table 14 - Program stepwise results for $\Delta t = 2$ week, centralized Option 2 ............... D4
List of Figures

Figure 1 - Research methodology. ................................................................. 3
Figure 2 - Oriflame business overview .......................................................... 7
Figure 3 - Oriflame’s supply chain. ................................................................. 9
Figure 4 - Product volumes produced by external factories. ......................... 10
Figure 5 - Oriflame’s operations. .................................................................. 11
Figure 6 - Supply schedule structure ............................................................ 12
Figure 7 - Horizontal view of the product supply subsystem. ....................... 14
Figure 8 - Oriflame’s current approach to materials management. ............... 15
Figure 9 - Multi-sourced products volumes. .................................................. 18
Figure 10 - Multi-product materials. ............................................................. 18
Figure 11 - Simplified model for centralized materials management. .......... 19
Figure 12 - Detailed graph of survey results. .................................................. 25
Figure 13 - Simplified model of the fragrance category’s supply chain. ....... 28
Figure 14 - Simulation explanation. ............................................................... 30
Figure 15 - Distribution of the number of orders per product received by INTRF. .... 31
Figure 16 - Distribution of the number of orders per product received by NRDME. ... 32
Figure 17 - The distribution of the order quantities received by INTRF. ........... 32
Figure 18 - The distribution of the order quantities received by NRDME ......... 33
Figure 19 - An example of TBOs for NRDME. ............................................ 33
Figure 20 - Histogram of the order quantity price breaks fragrance bottles. ... 35
Figure 21 - Relative cost savings distribution. ................................................. 36
Figure 22 - Relative inventory savings distribution. ....................................... 37
List of Abbreviations
The abbreviations used in this report.

**BOM**: Bill of Materials

**CIS**: Commonwealth of Independent States

**EMEA**: Europe, Middle East and Africa

**ERP**: Enterprise Resource Planning

**FG**: Finished Goods

**GSO**: Global Support Office

**MOQ**: Minimum Order Quantity

**MRP**: Material Requirements Planning

**MRP II**: Manufacturing Resources Planning

**NPD**: New Product Development

**SCM**: Supply Chain Management

**UFR**: Unit Fill Rate

**WFDSA**: World Federation of Direct Selling Associations
Glossary

The accepted definitions in this report:

**Bulk**: The contents of the packaging, e.g. the perfume inside the bottle.

**Component**: That what is used to contain and package the bulk of the product.

**Materials**: In this study the word *materials* always refers to the raw materials and components that are converted into finished goods.

**Material flow**: In this study *material flow* is only used in the narrow sense to refer to the flow of raw materials and components into the factories. The outward flow is generally not referred to.

**Materials management**: In this study the term *materials management* is taken to mean the planning and purchasing of materials.

**Minimum Order Quantity (MOQ)**: In this study MOQ only refers to the minimum order quantity requirement set by the supplier of goods (either materials or finished goods). However, in Oriflame this term is used also to refer to the varying order quantities associated with different price breaks.

**Multi-product materials**: Is used in this study to refer to materials that are used in more than one product.

**Multi-sourced product**: In this study is used to refer to a product code that is produced in more than one factory.

**Pricing**: Is used to refer to high-level price negotiations of raw material and components on an aggregated annual volume. It is also used in the broader sense to refer to establishing the framework agreement with materials suppliers.

**Purchasing**: Is used to refer to the actual act of ordering materials, it includes deciding to act on or change the planned material flow into the factory.

**Planning**: Is used to refer to the planning of material flow into the factory, it includes planning what, when and how much to order.

**Product code**: Each unique product has a product code, and thus the term *product code* is used to refer to a unique product.

**Finished goods**: The final product that remains after raw materials and components have passed through conversion processes.

**Factory**: The term factory is used to describe finished goods suppliers. They convert raw materials and components into finished goods, through mixing, filling and packaging processes. Therefore the terms *filler*, *finished good supplier* and *factory* is used interchangeably. In some instances the word *site* is also used to refer to the factory.
R: Statistical computing software.

**Raw materials**: Is the basic materials used in producing the bulk of the products.

**Supplier**: The term supplier refers to the raw materials and components suppliers. When referring to finished goods suppliers, it is explicitly stated or clear from the context.

**Supply schedule**: The schedule that indicates the weeks in which finished goods should be delivered.

**Unit Fill Rate (UFR)**: The rate at which product orders are fulfilled.
1 Introduction

This study was conducted by two Master’s students at Oriflame Cosmetics at the Global Support Office (GSO) in Stockholm under the supervision of the Strategic Planning Manager.

Oriflame Cosmetics is the 9th largest direct selling company in the world with annual sales of around €1.5 billion (Oriflame Cosmetics, 2012). In addition to skin care, color cosmetics, fragrances, personal and hair care and accessories, Oriflame added wellness to their product offerings in recent years. With an independent sales force of approximately 3.4 million consultants, Oriflame beauty products reach 60 markets around the world (Oriflame Cosmetics, 2012).

Direct selling of beauty products is a fast paced and competitive industry. Product offerings must be new, innovative and seasonal. Oriflame, for example, releases a new product catalogue every 3 weeks, i.e. 17 catalogues a year, in which approximately 50% of products are newly developed each year (Internal document, 2009). The direct selling business model faces several challenges such as retail competition, difficult demand forecasting and frequent product changes. Under these conditions, companies are forced to look inwards to their supply chains and operations, and through Supply Chain Management (SCM) gain a competitive advantage. Improving competitiveness of the supply chain can be achieved through two broad means: better integration of the organization involved, and better coordination of materials, information and financial flows (Lee & Ng, 1998), (Stadtler & Kilger, 2005). The possibility exists for Oriflame to become more competitive through SCM, by improved coordination of the planning and purchasing of raw materials and components.

For Oriflame, a step towards improved coordination involves centralizing materials management, i.e. centralizing the planning and the decision making power of the purchasing of raw materials and components from suppliers. The current situation in Oriflame is that materials supplier selection and pricing negotiations are done centrally at GSO, but the planning and purchasing of raw materials and components are done in isolation by the various factories supplying Oriflame with finished goods. This approach leads to missed business opportunities, and various other problems.

Many opinions exist in the organization on the potential benefits of centralization, but no structured investigation has previously been performed. The prime goal of this case study is to investigate what are the benefits for Oriflame in centralized materials management. The eventual aim of this case study is to generate knowledge on the subject and supply management with insight into the centralization of materials management decision.

1.1 Scope

This study is a case study conducted at Oriflame Cosmetics. This case study is done in the direct selling industry; however the results may be applicable to other fast moving consumer goods companies considering centralizing the management of materials for various factories.
To answer our research question: “What are the benefits for Oriflame in centralized materials management?”, a high-level study of the present situation at Oriflame with regards to materials management was conducted, followed by a high-level study of the advantages and disadvantages of an alternative materials management strategy, namely centralization. Two perceived and quantifiable benefits were further investigated through simulations, and the simulations were limited to data from one of Oriflame’s product categories – fragrances. The simulation results are believed to be of interest beyond this category. Whilst validating the benefit for Oriflame in centralized materials management for multi-sourced products, it cannot be taken for granted that the simulation results would be the same for other companies, since it is dependent on unique business data.

1.2 Methodology

This research project was started with a review of the literature and literature findings are summarized in the next section. The field work was carried out at Oriflame Cosmetics in Stockholm over a 10 week period. Since the case study was only conducted at one organization, we have attempted to get the input from a wide array of sources, through several different means to ensure broad coverage of the topics under investigation. The methodology used in this study is shown in Figure 1 and the different means of data collection are explained in the subsequent paragraphs.

The data collection for this investigation was conducted first of all by interviewing employees within the global operations division at Oriflame Cosmetics. We interviewed people from several different functions and different hierarchy levels. The interviews were semi-structured to allow for ideas and views to flow and develop. The interviews were recorded as well as noted down, and transcripts were produced directly following the interviews. In addition to interviewing, direct observations were made around different groups and departments, to gain further insight into the different materials management practices that were being used. Historic data, including company presentations and reports, were consulted to deepen our understandings for the nature of the problem under investigation.

To substantiate our research questions and to obtain data from the multiple levels that was required we opted for survey based research. The survey was an “exploratory” type survey, with the main objective of helping us gain a better understanding for, and measure, the concepts of interest (Malhotra & Grover, 1998).

Lastly, quantitative data was collected from the company’s various information systems and used in general data analysis and in Monte Carlo simulations.
Research Question
What are the benefits for Oriflame in centralized materials management?

Literature Study

Present Situation
Decentralized Materials Management

Output
- Collect Views on:
  - Problems
  - Disconnects
  - Risks
  - Missed Opportunities

Method
- Interviews

Investigated Scenario
Centralized Materials Management

Output
- Collect Views on:
  - Advantages
  - Disadvantages
- Identify Key Potential Benefits
- Quantify Potential Benefits

Method
- Literature Review
- Interviews
- Survey
- Numerical Data and Simulations

Analysis

Recommendations

Figure 1 - Research methodology: This flow diagram is a representation of the methodology followed and methods used, in this thesis project.
2 Literature Study

The field of Materials Management has been given considerable attention in the literature and in practice, with the realization of the relative magnitude of the monetary investments tied up in materials (Bhat, 2009:8), (Sadiwala & Sadiwala, 2007). The view of the Materials Management function changed from that of being a cost center to being viewed as a profit center, posing opportunities of reducing costs and increasing cash flow (Bhat, 2009:9). Several textbooks have been written on the topic and a notable amount of them were published in India (Bhat, 2009), (Sadiwala & Sadiwala, 2007), (Gopalakrishnan & Sundaresan, 2006), (Gopalakrishnan, 2005).

When referring to the field of Materials Management, the literature generally refers to an over-arching, centralized function responsible for all activities relating to materials. Materials often include raw materials, components, spare parts and other items (Bhat, 2009). Gopalakrishnan & Sundaresan (2006) describes it as follows:

“The function responsible for the coordination of planning, sourcing, purchasing, moving, storing, preserving and controlling materials in an optimum manner so as to provide a pre-determined service to the customers at a minimum cost.”

Materials Management has also been the topic of several research projects, such as Ondiek (2009) that analyzed the attention and recognition that Kenyan firms are giving to Materials Management. The research presented findings such as that Kenyan firms spend on average 56% of their annual sales turnover on materials and materials related costs.

Asaolu, et al. (2012) examined the effect of Materials Management on the profitability of Nigerian food and beverage manufacturing firms by means of a case study in the bottling industry. They concluded that there is a significant relationship between efficient Materials Management and a firm’s profitability, and that it can result in cost savings and increased profitability.

This study differs from previous work in that it only focuses on certain aspects of Materials Management, namely the planning and purchasing functions mentioned in Gopalakrishnan & Sundaresan’s definition above. Further, this study is only concerned with the management of raw materials and components used in the manufacturing of finished goods. This narrowed definition is what is referred to when the term “materials management” is used in this paper. It is worth noting that Materials Management in the broad sense, assumes centralized functions, opposed to our study that is concerned with centralizing the planning and purchasing of materials for various factories, both internal and external to the organization.

A review of the literature on the benefits of centralizing (specifically) the planning and purchasing of materials resulted in the following findings:

The centralization of the purchasing function is a topic that has been extensively covered in the literature. The main benefits mentioned are that it allows businesses to take advantage of synergy opportunities between different sites of the organization (Rozemeijer, 2000). For
many organizations synergies exist in cost savings, both in the form of lower prices due to economies of scale and other savings such as more efficient resource utilisation (Rozemeijer, 2000).

Munson (2007:119) presents a list of the advantages and disadvantages of centralized purchasing compiled from both the researcher’s original ideas and concepts presented in various other sources. The literature often cites *quantity discounts* as the primary advantage of centralized purchasing (Karijalainen, 2011), (Munson & Hu, 2010).

The benefits of centralized planning on the other hand have not been covered as well by the literature. Literature on materials planning has been very much concentrating on the automation of the function. Materials planning information systems developed from Materials Requirements Planning (MRP) to Manufacturing Resource Planning (MRP II) to Enterprise Resource Planning (ERP), and the advantages, disadvantages, implementation challenges etc. have been extensively covered by the literature, (Hastings, et al., 1982), (Benton & Shin, 1998), (Ross & Vitale, 2000).

However, this study is interested in the benefits that can be achieved through centralizing the materials planning, currently being done at a number of different sites, where each site is running its own MRP or ERP system. We were unable to find literature discussing this situation as it is over-shadowed by the much more common situation of implementing an ERP system integrating many different functions, of which materials management is one.

**Summary**

The specific case of centralizing the materials planning and purchasing for a number of finished goods suppliers, and investigating the benefits thereof, has not been covered by the literature (to the best of our knowledge). This thesis aims to contribute to filling this gap in the literature through this case study conducted in the direct-selling industry.
3 Oriflame Background

The aim of this section is to provide an overview of Oriflame, their global operations and the direct selling industry.

3.1 Overview

Oriflame Cosmetics was founded in 1967 in Sweden by Jonas and Robert af Jochnick and Bengt Hellsten, and has since grown into an international direct selling cosmetics company. They are currently present in over 60 markets, and have approximately 3.4 million independent consultants.

The consultants who market Oriflame’s products with the aid of frequently distributed catalogues, are offered earning and training opportunities, and an attractive success plan, rewarding well performing consultants. Product offerings, which draw inspiration from the natural beauty of Sweden, include skin care, color cosmetics, fragrances, personal and hair care, accessories and wellness.

Oriflame’s operations stretch over four regions: Commonwealth of Independent States (CIS) and Baltics, including Russia and other former Soviet republics; EMEA, including Europe, Middle East and Africa; Asia; and Latin America. With such extensive global activity, maintaining high service levels and efficient operations can be challenging, and therefore the focus on one of Oriflame's four strategic corner stones (see Figure 2) is “World Class Service”. To this end, Oriflame strives to increase service levels, whilst optimizing every stage of the supply chain by:

- offering flexible and user-friendly systems,
- cutting lead times,
- improving information flow,
- sourcing closer to the market,
- building capacity to support growth,
- increasing in-house manufacturing, and
- operating sustainably.

Recent advancements in these areas include the implementation of a new supply chain information system that improved planning, reduced lead times and inventory levels, and improved the connection between the forecasting and planning functions (Oriflame Cosmetics, 2012). Further advancements include the construction of new production and distribution facilities in Russia, anticipated to lead to better service levels and increased in-house manufacturing capabilities. Many other advancements have been made in the fields of sustainability, strategic sourcing and logistics, to name a few.

Key facts and figures are shown in Table 1 and a complete summary of Oriflame’s global business, including information on the sales, sales force, markets, production, group distribution and offices, can be found in Appendix A.
Figure 2 - Oriflame business overview: As indicated in the figure “World Class Service” is one of Oriflame’s four strategic corner stones (source: Internal Document, 2013).

Table 1 - Oriflame overview in facts and figures

<table>
<thead>
<tr>
<th>General Facts and Figures (2012)*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Annual Sales</td>
</tr>
<tr>
<td>Number of full-time employees</td>
</tr>
<tr>
<td>Number of independent consultants</td>
</tr>
<tr>
<td>Years in business</td>
</tr>
<tr>
<td>Oriflame markets</td>
</tr>
<tr>
<td>Countries recently entered</td>
</tr>
<tr>
<td>Total number of Oriflame markets</td>
</tr>
<tr>
<td>Biggest competitors</td>
</tr>
<tr>
<td>Unique product offerings on average annually</td>
</tr>
<tr>
<td>Number of catalogues annually</td>
</tr>
<tr>
<td>Number of finished goods suppliers</td>
</tr>
<tr>
<td>Number of internal production facilities</td>
</tr>
<tr>
<td>Number of products produced per annum</td>
</tr>
<tr>
<td>Percentage products produced internally</td>
</tr>
<tr>
<td>Number of Group Distribution Centers</td>
</tr>
</tbody>
</table>

* Source: Oriflame Cosmetics Annual Report 2012
3.2 Direct Selling Business Model

Direct selling has been defined as “face-to-face selling away from a fixed retail location” (Petterson & Wotruba, 1996). Direct sales can be performed in a one-to-one setting, such as telephone or door-to-door sales, or a group setting, such as the famous Tupperware parties.

The salespeople working in direct sales are not employees of the company, but are instead independent consultants working against commission on their sales. It is common to employ a multi-level marketing scheme, in which a consultant can recruit other consultants, and subsequently also collects a smaller commission on their sales. Other performance based benefit systems are often used to increase consultants’ incentive.

The direct selling model offers the consumer services such as home delivery, personal consultations and product recommendations. The model does, however, translate into some challenges for the direct selling company. To sustain consumer interest in the products, it is necessary to maintain a high level of innovation, which means changing the products on offer frequently. The practice of selling small volumes of product to individuals, instead of bulk to retailers, leads to difficulty in accurately forecasting demand. Since sales operations are spread out over a large number of independent consultants and over many geographical markets, the distribution system is complex. Finally, there is ever increasing competition both from brick-and-mortar retailers and online shopping, where especially the latter is increasingly competing with direct selling, offering the convenience benefits of direct delivery, as well as low prices (IBISWorld, 2013).

Besides the challenges, direct selling remains a popular and successful business model. According to the World Federation of Direct Selling Associations (WFDSA), the direct selling industry accounted for over US$54 billion in sales in 2011, through more than 91 million independent sales representatives (WFDSA, 2013). In terms of sales, Alticor (Amway) is the largest direct selling organisation in the world, with a 2012 revenue of US$11.3 billion. Oriflame is the 9th largest, with a 2012 revenue of US$2.0 billion (Direct Selling News, 2013).
4 Present Situation

With the aim to investigate the benefits of centralizing the management of raw materials and components, the current state of operations was first investigated. The supply chain and organization structure is presented first, followed by a discussion on the problems and disconnects associated with the present situation which was the result of several semi-structured interviews conducted with Oriflame employees. Lastly the risks and missed business opportunities Oriflame is facing with the current materials management strategy is discussed in Section 4.4.

4.1 Supply Chain Structure

Oriflame’s supply chain stretches over several organizations involved in delivering products to consultants, starting with the raw materials and component suppliers and ending with the final distribution to the consultants and their customers. In Oriflame supply chains differ depending on product category, especially in the case of accessories, but in general the structure is as shown in Figure 3.

![Supply Chain Diagram](image)

**Figure 3 - Oriflame's supply chain:** A simplified model of the structure of Oriflame’s supply chain.

Oriflame is supplied with finished goods from both internal and external factories. Approximately 42% of the product volumes during 2010 to 2013 were externally produced (see Figure 4). However Oriflame is currently striving to increase in-house manufacturing (Oriflame Cosmetics, 2012).
In the context of this study the relationship of Oriflame with the upstream supply chain members, i.e. the factories and raw materials and components supplier, are of interest. How these relationships are being managed is a function of the current organization structure.

### 4.2 Organization Structure

The organization structure includes more than the departmental boundaries and reporting lines, it determines the modes in which the organization operates and performs (Rummler & Brache, 1995:20). Rummler & Brache (1995:6-9) differentiates between the vertical and horizontal view of an organization. The vertical view resembles the traditional organizational chart, where vertical reporting relationships and the functional boundaries are clear. Opposed to the horizontal view, which includes the customer and the product, information and work flow across the functional interfaces. The horizontal view allows you to see how work actually gets done, and the internal customer-supplier relationships through which products and services are produced (Rummler & Brache, 1995:9). Our aim in the subsequent sections is to give the reader a clear understanding of the horizontal view of the relevant part of Oriflame’s operations.

A diagram that depicts Oriflame’s operations is shown in Figure 5. In the diagram the various functions and their boundaries can be seen. Our study is concerned with pre-finished goods processes, especially those related to raw materials and components, so we focused on the following three departments within Oriflame: Purchasing, Supply Planning and Manufacturing. The New Product Development (NPD) department also has an important role that directly relates to raw materials and components; they are responsible for selecting the materials for future products. However, NPD was to a large extent excluded from this study and we viewed the products’ Bill of Materials (BOM) as pre-specified input.

**Figure 4 - Product volumes produced by external factories:** On average approximately 42% of Oriflame’s’ products were externally produced during 2010 to 2013.
The Purchasing, Supply Planning and Manufacturing departments work together as a sub-system within the larger organization, and in broad terms are responsible to plan for and convert raw materials and components into finished goods, we therefore choose to refer to this as the “product supply” subsystem. Several different ways exist for a company to organize the purchasing, supply planning and manufacturing functions in terms of:

- scope of the responsibilities,
- degree of decision making power and accountability,
- outsourcing,
- physical locations,
- accounting structure, and
- relationships and interaction with other departments.

With a focus on the management of materials, the following sections discuss the organization and horizontal view of these functions in Oriflame, and a detailed process map can be found in Appendix B.

**Purchasing**

The Purchasing department’s main responsibility is controlling the direct and indirect company spend to ensure that a good cost base is achieved for all products (Oriflame, 2013). The department located in the Global Support Office (GSO) in Stockholm has the task of
evaluating and selecting suppliers (both for finished goods and materials) and negotiating prices and contracts.

When it comes to raw materials and components the Purchasing department has a functional configuration described by Munson & Hu (2010) as *Centralized pricing with decentralized purchasing (Scenario 2)*. In this scenario, price and contract negotiations for materials are performed at a central point, in Oriflame’s case at the GSO, but the ordering of materials are done at each local site.

**Supply Planning**

Supply Planning is done centrally at the GSO. The function involves managing the flow of finished goods to balance the hub inventories in order to meet the demand from the markets and end customers. Maintaining high Unit Fill Rates (UFR), i.e. the rates at which product orders are fulfilled, is a prime objective for Supply Planning.

It is Supply Planning’s task to actively manage the finished goods supply situation and any problems that might arise. They manage the relationships with the finished goods suppliers and serve as a point of contact with Oriflame. Supply Planning rarely deals directly with raw materials and components suppliers, since their prime concern is the finished goods.

Supply Planning share supply schedules on a weekly basis with the factories via an online portal, which is referred to as the Supply Chain Portal. The supply schedules show the finished goods needs for an 8 month period. We briefly discuss the supply schedules since it provides background knowledge for the simulations presented in Section 5.3.

The plans are divided into three time periods, namely liquid, slush and freeze periods, see Figure 6. The freeze period indicates “Committed Schedule Receipts”, or confirmed orders placed with finished goods suppliers. The slush period indicates “Firm Planned Orders”; during this period the finished good supplier confirms to Supply Planning its ability to produce the goods ordered. After confirmation these are considered “Committed Schedule Receipts”. The liquid period is a period in which demand will be recalculated on a daily basis and made visible on a weekly basis; orders during this period are referred to as “Planned Orders”. This period indicates forecasted demand.

<table>
<thead>
<tr>
<th>Period</th>
<th>W 1</th>
<th>W 2</th>
<th>W 3</th>
<th>W 4</th>
<th>W 5</th>
<th>W 6</th>
<th>W 7</th>
<th>W 8</th>
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</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>a) Freeze</td>
<td>b) Slush</td>
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</tbody>
</table>

**Figure 6 - Supply schedule structure:** The supply schedule indicate three periods a) Freeze period, indicating “Committed Schedule Receipts” b) Slush period, indicating “Firm Planned Orders” c) Liquid period, indicating “Planned Orders”.

12
Manufacturing

Oriflame currently has six internal factories, with an additional two under construction, and numerous external factories. Oriflame purchases finished goods from these factories, which in all cases are treated as separate legal entities. It is the responsibility of the finished goods supplier to manage their own facilities. It is also their responsibility to plan for and order the raw materials and components needed to produce the finished goods according to the “Committed Schedule Receipts” indicated in the supply schedules.

The Operational Service Agreement with the factories specifically states that the finished goods suppliers are responsible to “ensure that the production capacity and the component availability are optimized to ensure the highest UFRs to Oriflame” (Internal Document, 2013). It further requires the factories to manage materials flow “so as to ensure smooth operation and delivery of finished products in time and in full as to the plan”.

It can thus be said that materials planning and purchasing is currently decentralized in Oriflame. The cost of the finished goods includes both the cost of the materials and the cost of the services involved in producing the products, often referred to as the conversion costs.

In a broad sense the factories are concerned with materials planning and purchasing, and production planning. Materials planning and purchasing are closely linked; planning the flow of materials into the factory involves planning what and how much to order, and when to place orders so that deliveries are coordinated and on-time. To accomplish these tasks, the factories are aided by Enterprise Resource Planning (ERP) systems, such as Fourth Shift or Jeeves. Typically the Materials Requirement Planning (MRP) or Manufacturing Resources Planning (MRP II) modules of the ERP system are used to aid manufacturing companies in managing the material flow.

The MRP module takes various factors into consideration, such as inventory status, shelf-lives, lot sizes, lead times etc., in order to develop a Recommended Production Schedule and a Recommended Purchasing Schedule.

Horizontal View

The horizontal view of the product supply subsystem is shown in Figure 7, and is briefly explained below:

After back and forth negotiations between Purchasing, Manufacturing and New Product Development, the BOM for a product is agreed on. Purchasing then continues to find the right raw materials and component suppliers and negotiate framework agreements with them. These framework agreements specify the expected annual demand, average lead times, stock-holding agreements (in some cases) and the minimum order quantities (MOQs) and price breaks; the prices for materials decrease with increasing order quantities. The specific details of the framework agreements with suppliers are shared with the various factories. The prices negotiated are what they are expected to pay for materials and the lead times that were agreed on are to be used in further planning. Purchasing also negotiates contracts with the factories in which their production lead times, prices, production MOQs etc. are stipulated.
After the framework agreement is shared with the factories, the decision making power of what materials to order when, is with them. On a weekly basis the eight month forecasted demands for finished goods are shared by Supply Planning with the factories. The information shared offers no commitment for future orders, but serves the purpose of assisting the factories in planning and decision making. However, Oriflame is liable for materials ordered, 12 week forward cover, during the slush and liquid period according to the Operational Agreement. Forecasted demands are also sent to the materials suppliers to assist them in their planning. This is an attempt to reduce lead times, and thus to make the supply chain more responsive and reliable.

**Figure 7 - Horizontal view of the product supply subsystem:** The horizontal view shows the flow of materials and information across the functional boundaries.

**Summary**

To summarize Oriflame’s current approach to materials management: Oriflame has a structure of centralized pricing, with decentralized planning and purchasing. This means that prices and contracts for raw materials and components are negotiated centrally, while materials planning and purchasing are done in isolation by the various factories, with the help of their respective ERP systems. Figure 8 is a simplified model of the current configuration.
4.3 Problems and Disconnects

Several semi-structured interviews were conducted with members of each of the three departments, Purchasing, Supply Planning and Manufacturing, to gain an understanding for the major problems and disconnects in this decentralized approach to planning and purchasing of materials.

Standardized Processes and Agreements

A recurring problem mentioned by all the departments interviewed, was the lack of standardized processes and agreements. In some cases standardized processes existed, but it is unknown if it was being followed, because processes to enable follow up and feedback were not installed. The following problem areas were mentioned:

- No standardized process exists for sharing the forecasts with the raw materials and component suppliers. Even though it is required of the factories to share the forecast, there is little following up if this is actually being done in the intended way.
- No standardized process exists for prioritizing which factory receives materials when only a limited amount of materials are available from the supplier, and more than one factory has placed an order for it.
- The agreements with the materials suppliers lack the requirement to manage the orders they receive from factories as Oriflame orders; instead they are probably managed as orders from individual organizations. It is to a large extent unknown if the materials suppliers try to optimize and group Oriflame orders.
- No standardized process exists to ensure that the dependent processes receive the new information when agreements with suppliers are changed or updated, e.g. Supply Planning needs to be informed when a supplier’s agreed lead time change.

Visibility and Feedback

The current decentralized approach to materials planning and purchasing leads to the problem that information regarding the upstream part of the supply chain becomes invisible or difficult to access for other stakeholders in the organization. This has a detrimental effect on decision making and material and product flow coordination. Specific problem areas referred to during interview sessions include:
- Lack of transparency of all the factors contributing to the final costs of finished goods.
- Lack of feedback regarding whether original commitments and contracts made with suppliers are being met.
- Lack of knowledge of the reasoning behind materials purchasing decisions.
- Lack of visibility and difficulty in accessing the inventory level statuses of raw materials and components at the factories on a regular basis.

**Responsiveness**

Purchasing owns the relationships with the suppliers, but it is Manufacturing that deals with the suppliers on a day-to-day basis. Purchasing holds the decision making power of selecting suppliers, and thus when Manufacturing experiences problems with the suppliers, this information is often escalated to Purchasing. In turn this creates a lot of back and forth communication in attempts to solve the problems. This deteriorates responsiveness to problem solving and might lead to knowledge being lost as it travels across the functional boundaries.

**4.4 Risks and Missed Opportunities**

The problems and disconnects discussed in the previous section are all associated with Oriflame’s decentralized approach to planning and purchasing materials, but most points mentioned can be improved on without major changes to the current organization structure. However, the business risks and missed opportunities make it worth challenging the current structure. The risks and missed opportunities were collected through conversations with different stakeholders. We also took into consideration the Operational Service Agreement Oriflame has with its finished goods suppliers.

**4.4.1 Risks**

Each factory supplying Oriflame with finished goods are a separate legal entity, thus especially in the case of the external suppliers, their interest lies in managing their own costs and risks. However they make decisions that can affect Oriflame, for example in the two situations described below:

**Situation 1**

*Should we align our production MOQ with the MOQs of expensive materials, instead of with the actual capacity of our production lines? In doing so we avoid receiving finished goods orders below the materials MOQs, which leads to increased inventories and reductions in our cash flow?*

The factories, especially the external factories, have a strong incentive to align their production MOQs with the MOQs of expensive materials. The current decentralized approach to materials management requires the finished goods suppliers to buy the materials, thus reducing their immediate cash flows. The factories can protect themselves in some part from this risk by ensuring all materials are converted to finished goods through aligning the respective MOQs.
This has an adverse effect on Oriflame’s business, since it forces them to order a certain quantity of finished goods that is not necessarily aligned with actual demand.

**Situation 2**

*Should we just order the MOQ to meet confirmed orders (Committed Schedule Receipts) or use the forecast to order larger quantities and get lower unit prices (according to the agreement these larger quantities should not exceed 12 weeks forward cover of Planned Orders). Larger order quantities reduces our cash flow, but also increases “smooth operation and delivery of finished products in time and in full as to the plan” which is a requirement of the operational agreement.*

Risk homeostasis theory states that they are likely to adjust their behavior and decisions in response to the level of risk they perceive. Thus if the factories are confident in their own production lead times, they will delay ordering of materials until finished goods orders are confirmed. They might feel protected from the risk of supplier delivering later than the specified lead times, since Oriflame’s Purchasing department selected the suppliers and negotiated lead times.

Further, inventory levels are one of the Key Performance Indices (KPIs) for the factories. So again they might perceive the risk too high, to act on forecasted demand and risk ending up with large amounts of stocks in inventory, which also reduces their cash flow.

The suppliers decision to act on confirmed orders and not on the forecast, could lead to bad business for Oriflame, since they are missing out on quantity discounts – lowering the profit margin of the finished products.

**4.4.2 Missed Opportunities**

Missed opportunities we define as instances where Oriflame is not taking advantage of possibilities to be more economically efficient in the materials management of their current product portfolio. We identified two such instances relating to economies of scale for multi-sourced products and multi-product materials, and they are briefly discussed below.

**Multi-sourced Products**

Multi-sourced products are products that have the same material composition and are produced by more than one factory. An average of 16% of Oriflame’s total product volumes, during the last four years, was multi-sourced. The trend line for multi-sourcing in terms of product volumes, during 2010 and 2013, is shown in Figure 9. Oriflame is missing out on opportunities to combine the orders for materials for these products and take advantage of economies of scale and other benefits discussed in Section 5.2.1. The main reasons for this are that factories are operating in isolation and decision making is decentralized.
Figure 9 - Multi-sourced products volumes: The figure shows the percentage of product volumes that were multi-sourced during 2010 – 2013.

Multi-product Materials

Multi-product materials are raw materials and components used in more than one product, for example a standard pump used in several skin care products. Again Oriflame is missing out on the benefits of economies of scale. The reason for this is that there is no easy way of determining the raw materials and components that are used in several products. Since in the decentralized approach materials management is done by the various factories, no steps have been taken towards expanding the central information systems for this added functionality of optimizing materials planning across the product portfolio.

Figure 10 - Multi-product materials: Within Oriflame’s currently product portfolio there is currently several multi-product materials being used such as the fragrance bottle and shower gel cap shown in the pictures.
5 Investigated Scenario

In the previous section we investigated Oriflame’s current approach to materials management. It deepened our understanding of the problem under investigation and justified our study into the benefits for Oriflame in centralized materials management that is the focus of this chapter.

To summarize the finding from the previous section: Oriflame currently has a centralized pricing and a decentralized planning and purchasing configuration. In this chapter we will investigate a completely centralized model. A centralized model of materials management means that the decision making power of the pricing, planning and purchasing of raw materials and components are located in one place and the various units are served, in terms of information, from this central point. Since pricing and contract negotiations are already centralized in Oriflame, we only directed our efforts towards materials planning and purchasing. More details on this model are presented in Section 5.1.

In Section 5.2 we investigate the value for Oriflame of centralized materials management. We not only investigate the advantages, but also the disadvantages, to put things into perspective. We followed a structured methodology and used various methods including semi-structured interviews and a survey.

Finally in Section 5.3 an example case is presented where we support our research question through quantification of two potential benefits with centralization identified during the survey. A Monte Carlo simulation model was designed based on an example case, which was limited to one product category, namely fragrances.

5.1 Centralized Materials Management

In a centralized materials management model the planning for and the purchasing of raw materials and components for all factories supplying the organization with finished goods is done in one place, supported by an integrated computer systems. The organization gains complete control over the management of materials as information and decision making becomes centralized. Also several tasks relating to the materials planning and purchasing, such as materials requirements planning, ordering, inventory control, accounting etc. which in a decentralized model is performed by each sites’ respective ERP/MRP system, becomes centralized. In this scenario the organization’s relationship with the factories change from one in which the factories supply finished products, to one where factories offer filling/conversion services. A simplified model of this scenario is shown in Figure 11.

![Figure 11 - Simplified model for centralized materials management](image-url)

In this model pricing, planning and ordering of materials are centralized.
While the concept of centralized materials management is clear and easy to understand, making the shift from decentralized to centralized is a complex task that involves organization restructuring, business process reengineering, implementation of advanced information systems, migration of large amounts of data, changes in supplier relationships and agreements and securing the right competences. These are important aspects that a business must consider for its own unique position, but the focus of the subsequent sections are on the inherent advantages and disadvantages of such a model. The implementation challenges are only briefly discussed in Section 5.2.3.

5.2 Value of Centralized Materials Management

Moving towards a centralized materials management structure is worth considering as organizations are becoming more sophisticated in their management of their operations and supply chains. Technological advancements such as the internet and complex information systems are making it possible to coordinate materials, information and financial flows across the organization and supply chain, and to help organizations become more efficient and competitive in the long run.

To determine the advantages and disadvantages associated with centralized materials management the following methodology was followed:

1. Interviews were conducted with 14 stakeholders (see Table 2) belonging to Oriflame’s Global Supply Department to gather their views on the advantages and disadvantages with this scenario.
2. Literature was consulted on the topic.
3. A survey was developed, listing the advantages gathered, and stakeholders (see Table 2) were asked to rank the value of the respective advantages on a qualitative scale.
4. The results of the survey were analyzed and the highest valued advantages were identified.

Table 2 - Interview and survey participants

<table>
<thead>
<tr>
<th>Manufacturing</th>
<th>Interview</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Senior Director Manufacturing, Oriflame Production Sweden (OPS)</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Supply Chain Manager, (OPS)</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Supply Chain Manager, Oriflame Production Poland (OPP)</td>
<td>x</td>
<td>-</td>
</tr>
<tr>
<td>Planner, (OPS)</td>
<td>x</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purchasing</th>
<th>Interview</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Process Expert Purchasing</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Senior Buyer Strategic Sourcing</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Purchasing Analyst</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Director Purchasing Development</td>
<td>x</td>
<td>x</td>
</tr>
<tr>
<td>Purchasing Category Manager</td>
<td>x</td>
<td>x</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Supply Planning</th>
<th>Interview</th>
<th>Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vice President Planning and Logistics</td>
<td>x</td>
<td>-</td>
</tr>
</tbody>
</table>
5.2.1 Advantages

This section discusses the advantages of a centralized materials management scenario, which were identified through interviews and a literature review.

Decision Making

This scenario will centralize the decision making power and ensure all important decisions regarding materials are made by Oriflame, and not external organizations. Centralized decision making is an advantage discussed both by the stakeholders and literature (Munson, 2007). Centralized decision making has the ability to optimize over the entire system leading to a higher efficiency than when decisions are locally optimized for the different subsystems.

Communication

This scenario will reduce the number of communication channels with suppliers. The advantage lies in the reduction of the number of opportunities for misunderstandings and the time the supplier spends on administrative tasks. This can lead to improved supplier relationships.

Data Visibility, Accessibility and Reliability

With centralization, information systems will need to be consolidated, and thus data will become visible and more accessible for a range of functions (Ross & Vitale, 2000), opposed to being localized in a few functions across various sites. Data such as material inventory levels, supplier delivery reliability and exact cost contributions, will be visible and accessible and can thus be incorporated into day-to-day decision making. If data is centralized, the actual reliability of the data will become known, as you become less reliant on external parties’ feedback.

Process Standardization

Centralized materials management will standardize the materials planning and ordering processes. Standardized processes lead to consistent behavior among supply chain partners (Akkermans, et al., 2003), which reduces problem variations and improves predictability of outcomes (Morgan & Like, 2006). It will enable consistent performance measurements (Akkermans, et al., 2003), thus contributing to continuous improvement strategies.
Cost Control
Centralized materials management will allow for tighter cost control. With the planning and ordering centralized, the cost contributing factors in the conversion of raw materials and components into finished goods can be better monitored and controlled.

Economies of Scale
An advantage often cited by the literature and mentioned by the stakeholders is economies of scale (Munson, 2007), (Karijalainen, 2011). For Oriflame centralized materials management can allow economies of scale both in the case of combined ordering (discussed in the next section) and multi-product materials planning and purchasing.

Further, a central database with all Bill of Materials (BOM) data, including data on multi-product components and raw materials, will enable grouping of requirements across the portfolio, and taking advantage of economies of scale, leading to cost savings.

Combined Orders
For products that are multi-sourced (which means more than one factory produces it), centralized materials management will enable combined ordering of materials. This will lead to several advantages, discussed below:

- Inventory and Cost savings: Instead of each factory ordering the minimum order quantity (MOQ), when their actual need is below this quantity, orders from factories can be combined to reduce each factory’s excess quantity. This leads to inventory and cost savings and a reduction in inventory levels. Combining order quantities will also in some cases lead to achieving a higher order quantity level with a better price break, thus reducing per-unit costs.

- Risk pooling: Each order for materials has a certain associated risk, one such risk is the risk in variability of anticipated demand. When orders are combined this risk is shared amongst the factories. Risk pooling can also lead to a reduction in inventory levels. Risk pooling is cited as an advantage of centralized purchasing by Munson (2007).

- Increased flexibility: The risk associated with the variability of anticipated demand is further reduced with the increased flexibility achieved through combined ordering. Combined ordering will allow delaying the decision making point of the exact distribution of the ordered materials to the relevant factories. The decision making point can be delayed by the raw material and component’s production lead time.

- Lead time reduction: Combined ordering can lead to a reduction in lead times, since combined ordering will allow the supplier to better plan its production schedule and run longer batches. This will also lead to fewer production set ups, thus saving time.

In general reduced inventory levels lead to a reduction in obsolesces and increased cash flow.
Support Other Projects

Centralized materials management and its associated benefits will support current projects running in the organization. One such project is Right Sourcing, a project that aims to through structured performance measurement and evaluation aid the Purchasing department with future supplier selection. Centralized materials management will ensure that knowledge of supplier reliability, flexibility and responsiveness are closer to the decision making source, i.e. Purchasing, and not dispersed across numerous sites.

Future Strategies

Centralized materials management is a stepping stone for future strategies, for example developing a world class system, that can coordinate planning and aid decision making across the organization and supply chain as a whole.

5.2.2 Disadvantages

This section discusses the disadvantages of a centralized materials management scenario, which were identified through interviews and a literature review.

Responsibility and Accountability

Centralization means that the responsibility and accountability of materials management is not located with the factories. Thus the factories’ incentive to be proactive and accommodating when deliveries become late decreases - in the case of the external suppliers. Losing control of purchasing decisions can also lead to frustration for local management (Arnold, 1999), (Matthyssens & Faes, 1996).

Speed and Responsiveness

The speed and the responsiveness with which the factories deal with problems might decrease (Munson, 2007). In the centralized model, all the responsibility and decision making power regarding materials management is located centrally, issues that before could have been solved between the factories and suppliers, might now need to be escalated to a middleman.

Unique Requirements

Centralization might lead to a lack of recognition of the unique operational requirements of each factory (Munson, 2007), and also decrease the utilization of the localized knowledge and expertise existing at these sites.

Realizing Benefits

Realizing the benefits of combined ordering might be impossible if coordination cannot be achieved, which is dependent on various factors such as: the product type and if it is multi-sourced, materials requirements, supply schedule, lead time etc. Especially supplier lead time could add extra complexity if factories are geographically far apart.
5.2.3 Implementation

The complexities and challenges in implementing centralized materials management is worth briefly discussing, as it was a subject often mentioned during the interviews with stakeholders.

Shifting from a decentralized to a centralized model would be a major change in the way Oriflame does business today. Two major factors involved in centralization are: restructuring of the organization and the successful implementation of sophisticated information systems.

Restructuring

Centralization will directly affect various departments in the organization, notably: Manufacturing, Supply Planning and Purchasing, and organizational restructuring will be needed. Redeployment of people (Siriginidi, 2000) and new expertise and resources will be required for implementation.

Relationships with the finished goods suppliers will drastically change, and new types of contracts and agreements will have to be negotiated.

Systems

To achieve centralization, the need exists for extending or complimenting the current central ERP system and managing interfaces with systems currently used at local sites. Both the selection and implementation of such systems are important, complex and high-stake processes, and are topics well covered by the literature (Siriginidi, 2000), (Chang, et al., 2002), (Ross & Vitale, 2000), (Bingi, et al., 1999).

The critical issues affecting implementation often mentioned are:

- implementation cost,
- implementation time,
- employee morale,
- top management commitment, and
- expertise and human resource requirements.

5.2.4 Survey

A survey was developed after initial interviews and review of the literature on the potential advantages and disadvantages of centralized materials management. This survey was pre-tested with the key stakeholders in order to give them a chance to give their opinion on the questions and possibly request some changes, as suggested by Eisenhardt (1989). After it was finalized, it was distributed amongst the stakeholders. The finalized document is presented in Appendix C.

The survey aimed to gather the opinions of Oriflame employees on the value of potential advantages of centralized materials management. The survey asked the employees to rank the
value of the benefit described on a scale of 1 to 5, where 1 indicated very little value and 5, great value.

The results of the survey are shown in Table 3 and a detailed graphical representation in Figure 12. The results are ranked from the highest valued to least valued advantage Oriflame employees foresee with a centralized materials management scenario. Both the sum of the total count and the average rating are shown in the table. More detailed discussion of the results follows.

Table 3 - Summary of survey results: The advantages are ordered with highest ranking advantages first and lowest ranking advantages last.

<table>
<thead>
<tr>
<th>Adv nr.</th>
<th>Advantage description</th>
<th>Sum</th>
<th>Avg.</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Reduce inventory levels</td>
<td>49</td>
<td>4.9</td>
</tr>
<tr>
<td>2</td>
<td>Process standardization</td>
<td>46</td>
<td>4.6</td>
</tr>
<tr>
<td>2</td>
<td>Increased accountability</td>
<td>46</td>
<td>4.6</td>
</tr>
<tr>
<td>2</td>
<td>Centralized decision making</td>
<td>46</td>
<td>4.6</td>
</tr>
<tr>
<td>3</td>
<td>Inventory control – earlier decisions</td>
<td>45</td>
<td>4.5</td>
</tr>
<tr>
<td>4</td>
<td>Quantity discounts</td>
<td>44</td>
<td>4.4</td>
</tr>
<tr>
<td>4</td>
<td>World class system</td>
<td>44</td>
<td>4.4</td>
</tr>
<tr>
<td>4</td>
<td>Facilitate design of stock-holding models</td>
<td>44</td>
<td>4.4</td>
</tr>
<tr>
<td>4</td>
<td>Data visibility</td>
<td>44</td>
<td>4.4</td>
</tr>
<tr>
<td>5</td>
<td>MOQ utilization</td>
<td>42</td>
<td>4.2</td>
</tr>
<tr>
<td>5</td>
<td>Data accessibility</td>
<td>42</td>
<td>4.2</td>
</tr>
<tr>
<td>6</td>
<td>Strategic utilization</td>
<td>41</td>
<td>4.1</td>
</tr>
<tr>
<td>7</td>
<td>Reduced communication channels</td>
<td>37</td>
<td>3.7</td>
</tr>
<tr>
<td>8</td>
<td>Inventory rebalancing - flexibility</td>
<td>36</td>
<td>3.6</td>
</tr>
<tr>
<td>9</td>
<td>Further material standardization</td>
<td>35</td>
<td>3.5</td>
</tr>
<tr>
<td>10</td>
<td>Lead-times (reduction in production set-up times)</td>
<td>33</td>
<td>3.3</td>
</tr>
<tr>
<td>11</td>
<td>Reduced duplicates of efforts</td>
<td>32</td>
<td>3.2</td>
</tr>
<tr>
<td>11</td>
<td>Forecast risk-pooling</td>
<td>32</td>
<td>3.2</td>
</tr>
</tbody>
</table>

Figure 12 - Detailed graph of survey results: The graph shows the distribution of the rank values the various advantages received from the stakeholders. It can for instance be seen that Advantage 10 received the most 5’s and also the highest total ranking.
Results Discussion

The main observation from the results is that Oriflame employees foresee great value in centralized materials management across the board, as all advantages scored above 3 on average. Both immediate and long-term benefits are valued.

The survey further revealed that Advantage 10 - reduced inventory levels due to risk-pooling and better MOQ utilization (that can be achieved through combined ordering for multi-sourced products), are the highest valued advantages stakeholders foresee with centralized materials management.

In joint second place were three non-tangible advantages relating to business processes, namely: process standardization, centralized decision making and increased accountability. This is in line with the findings from the interview stage, and that there was a lack of standardization within the area of material management, discussed in the previous chapter.

The survey results confirm that besides operational advantages, there is value in centralized materials management as it is a key step towards developing a world class system that coordinates the supply chain as a whole (Advantage 17) and aiding in designing appropriate inventory models (Advantage 15). This could be a reflection of Oriflame employees’ interest in long-term strategies and vision for the organization.

On average the stakeholders interviewed value improvements such as “Reduction in duplication of effort” and “Lead-time reduction due to fewer production set-up times” less, as these improvements can primarily be achieved at external organizations (i.e. materials suppliers and external factories).


5.3 Example Case

To support our research question “What are the benefits for Oriflame in centralized materials management”, we attempted to quantify two of the potential benefits of centralized materials management through Monte Carlo simulations. The benefits we investigated relate to the combined ordering of materials for multi-sourced products, which were identified as one of the missed opportunities associated with Oriflame’s current materials management strategy in Section 4.4.2. The benefit of inventory reductions that can possibly be achieved through such a combined ordering strategy were highly valued by stakeholders in the survey, see Section 5.2.4, and received the highest ranking. The other benefit investigated is potential cost savings that can be achieved through the same strategy.

For the purpose of the simulations, we limited the scope of this advanced study to Oriflame’s fragrance category, and data from week 32:2012 to week 6:2013 were used in the simulation model. The simulation model was implemented in statistical computing software called “R” (R Foundation for Statistical Computing, 2005) and plots were created with “ggplot2” (Wickham, 2009).

The aim of the simulation model was to quantify the potential cost savings and inventory savings of a centralized materials planning and ordering strategy for multi-sourced fragrances. To this end, both a centralized and a decentralized purchasing scenario were simulated and compared. Further details of the simulation are presented in Section 5.3.2.

The results of the simulations are summarized in Section 5.3.3. A manually worked out example of the simulations are shown in Appendix D, but first the background of the fragrance category is presented in the next section.

5.3.1 Background Fragrances

The fragrance category is one of Oriflame’s six product categories. The fragrance category generated over € 300 million in sales in 2012, which is a contribution of 20 % to Oriflame’s total sales (Oriflame Cosmetics, 2012).

Oriflame currently has two primary suppliers of fragrances; one located in Sweden and the other in the Ukraine. These suppliers convert raw materials and components into finished goods, through mixing, filling and packaging processes. We use the terms filler, finished good supplier and factory interchangeably in this study.

The factory in Sweden (hereafter referred to as NRDME) was bought by Oriflame in 2003. It specializes in the manufacturing of personal and hair care products and fragrances. Over 250 products are filled in this factory and the total capacity is over 100 million units (Oriflame Cosmetics, 2012).

The factory in the Ukraine (hereafter referred to as INTRF) is external to Oriflame. Oriflame first commissioned INTRF for the production of fragrances in August 2012.
A simplified model of the fragrance category’s supply chain is shown in Figure 13. As shown in the model, there are two factories, one internal and one external, producing fragrances for Oriflame. Both are supplied with raw materials and components from the same suppliers. It is believed that in general orders for raw materials and components from the two factories are treated as separate orders at the suppliers. Lastly, the finished goods produced by each factory are destined for different markets.

![Figure 13 - Simplified model of the fragrance category’s supply chain](image)

**Figure 13 - Simplified model of the fragrance category’s supply chain:** Two factories are producing the same products; both are supplied from the same raw materials and components suppliers.

During the period of August 2012 to August 2013, out of a total of 103 fragrance product codes, 24\(^1\) were multi-sourced i.e. produced by both NRDME and INTRF. Accordingly 13% of total volumes were externally produced.

NRDME and INTRF are operating in isolation. Every week each factory receives an updated supply schedule via the Supply Chain Portal (described in Section 4.2). The supply schedule indicates “Committed Schedule Receipts” or confirmed orders for subsequent weeks. Each factory operates its own ERP system, running its own MRP modules, which determines the time-phased material requirements and ordering schedules to meet the supply schedule. When ordering materials there are certain price breaks associated with order quantities; per unit costs decrease with increasing quantities. The term minimum order quantity (MOQ) is used for the lowest order quantity accepted, and this is set by the supplier to ensure the order quantity justifies overheads and production set-up to remain profitable.

It is believed that this decentralized approach and purchasing requirements give rise to the following sub-optimal scenario: factories order the MOQ when their materials requirements are less leading to unnecessary inventory and spend.

If the ordering of materials could be combined, such as in a centralized materials management scenario, it will lead to larger order quantities being achieved. This could lead to lower per-unit costs and possibly result in lowering inventory levels.

---

\(^1\) Only including fragrances packaged in bottles, i.e. excluding vials, aerosols etc.
What sort of cost savings can be achieved through centralized materials management? What are the effects on inventory levels? How much flexibility is there in the time period within which orders can be combined? These are the questions investigated through the simulation model, presented in the next section.

5.3.2 Simulation Model

The aim of the simulation model is to quantify the potential savings of centralized materials planning and ordering. To this end a centralized and decentralized purchasing scenario was simulated and compared.

The simulation model consists of two factories producing the same product during a 6 month period. Each factory receives a supply schedule consisting of quantities and delivery dates, on a weekly basis. We make the assumption that finish goods orders directly leads to material orders. Two scenarios are then evaluated: each factory placing an order for a component in isolation (decentralized scenario); and combined ordering for the two factories (centralized scenario). An actual cost breakdown for a fragrance glass bottle was used in this example to evaluate the scenarios.

The simulations results for each of the scenarios are the total spend for the component for the entire supply period of 6 months, and the inventory of components remaining after the final orders have been processed. These results can then be compared to evaluate if centralized management leads to cost and inventory savings, and also provide insight into the effect of variation of the co-ordering time slot on the savings.

Method

A graphical representation of the simulation model is shown in Figure 14. The figure shows a pair of supply schedules, which is unique for each factory. The stars indicate confirmed orders for a product. The supply schedule stretches over a 6 month period and can be divided into week time slots. How the simulation algorithm works will now be described in detail.

For a simulation an order quantity price breakdown for the component and starting inventories are given as inputs. Each single simulation run operates as follows:

1. Generate a unique pair of supply schedules, one for each factory, as an input to the model. (How the supply schedules are generated is an important part of this simulation and described in detail in the next section).
2. Set the time slot according to desired input, either 1, 2, 3 week period.
3. Evaluate the total cost and end inventories for decentralized purchasing scenario over the 6 month period:
   a. Consider each supply schedule individually. Compare the first order quantity with the order quantity price breakdown. If the order quantity is less than the minimum order quantity (MOQ), order the MOQ and store excess units in inventory. If the order quantity is above the MOQ, order the exact desired quantity or the next price break, if it is more cost efficient. Store the costs
associated with the order. Move to the next order quantity and repeat the process, this time taking units in inventories into account. Repeat the process for all orders during the 6 month period and at the end sum all ordering costs and note the quantity of units in inventory. In the case of a wider time slot, 2 or 3 weeks, the algorithm checks if orders could be combined within this time slot for single factory. The algorithm selects the most cost-effective ordering combination if there is more than one way the orders can be grouped.

b. Sum the costs and final inventory quantities of the two factories; these are the total costs incurred and inventories built up during the 6 month period.

4. Evaluate the total cost and end inventories for centralized purchasing scenario over the 6 month period:
   a. Considering the supply schedules for both factories simultaneously, determine if for the specified time slot any opportunities exist for combining orders. If an opportunity exists, combine order quantities and compare it to the price breaks. If combined orders quantities did not reach the MOQ, inventories are distributed according to the original order quantity ratio for the two factories. Determine the total cost incurred. In the event that several ordering combinations exist, check for and select the lowest cost option. Move the time slot forward, and determine if new combined ordering opportunities exists.
   b. Sum all costs incurred and end inventories at the end of the 6 month period.

5. Compare the total costs and inventory quantities for the decentralized and centralized scenarios. Record the differences as savings.

Re-run this process 10 000 times over each time with a unique pair of supply schedules and each time recording the cost and inventory savings. Finally plot the distributions of the cost and inventory savings.

**Figure 14 - Simulation explanation:** Shown is a graphical representation of a pair of supply schedules for two factories for a 6 month period, each dot represents an order quantity for a specific product. \( \Delta t \) is the time slot within which orders are combined.
**Distribution Fitting**

As described above the first step of the simulation model is receiving a pair of supply schedules as an input. The supply schedule is the stochastic part driving the simulation. An example of a supply schedule for one product code is shown in Table 4. It is a composite of three aspects:

- the number of orders during the period,
- the quantities ordered, and
- the time intervals between orders.

<table>
<thead>
<tr>
<th>Week number</th>
<th>Order quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>12</td>
<td>50 800</td>
</tr>
<tr>
<td>13</td>
<td>72 400</td>
</tr>
<tr>
<td>16</td>
<td>115 000</td>
</tr>
<tr>
<td>17</td>
<td>120 000</td>
</tr>
<tr>
<td>31</td>
<td>108 000</td>
</tr>
</tbody>
</table>

**Table 4 - Example supply schedule for one factory:** The supply schedule indicates the expected weeks of delivery and order quantities for one product code.

To generate such supply schedules each of the three aspects were modeled by a distribution based on data gathered from Oriflame. The data used were two data sets of orders for fragrances each of the two factories (NRDME and INTRF) received during a 6 month period (week 32:2012 to week 6:2013).

Figure 15 shows the histogram for the number of orders INTRF received for unique products during a 6 month period. It shows that INTRF only received one order for approximately 40% of products.

**Figure 15 - Distribution of the number of orders per product received by INTRF:** The histogram indicates that for 40% of products, INTRF received only one order, and never more than 9 orders for a product during the 6 month period.
Figure 16 shows the histogram for the number of orders NRDME received for unique products during a 6 month period. It shows that nearly 30 % of products only received one order. We use these empirical discrete distributions in our simulations.

![Histogram of number of orders](image1)

**Figure 16 - Distribution of the number of orders per product received by NRDME:** The histogram indicates that for 30% of products NRDME received only one order, and never more than 10 orders for a product during the 6 month period.

Figure 17 and Figure 18, shows the histogram for the order quantities INTRF and NRDME received respectively during the 6 month period. In the case of INTRF it can be seen that approximately 23 % of orders had an order quantity of 55k. In the case of NRDME, nearly 32 % of the orders had an order quantity of 120k. In both cases the orders not of the above mentioned sizes were fitted well by Weibull distributions. Accordingly the total order quantities were fit by a mixed distribution with a point mass at 55k and 120k units respectively, and the rest described by two Weibull distributions.

![Order quantity distribution, INTRF](image2)

**Figure 17 - The distribution of the order quantities received by INTRF:** This histogram indicates that approximately 23 % of orders during the 6 month period had an order quantity of 55 k.
Figure 18 - The distribution of the order quantities received by NRDME: This histogram indicates that approximately 32% of orders received during the 6 month period had an order quantity of 120 k.

The third aspect, time intervals between orders (TBOs), is also modeled by the discrete empirical distributions taken from the data. There are 10 such distributions per factory: time to first order and time between orders 1 – 2, 2 – 3, etc. up to 9 – 10. An example of this is shown in Figure 19, which shows the time between order 2 and 3 for NRDME. As can be seen from the figure, it would be difficult to find suitable parametric distributions that fit the data, which is why the empirical distributions were chosen.

Figure 19 - An example of TBOs for NRDME: The distribution for the TBO 2 and 3 is shown in the figure. In approximately 37% of cases order 3 comes the week after order 2.

With all these distributions in hand, a supply schedule can be simulated by the following method:

1. Draw a number of orders $n$.
2. Draw $n$ order quantities.
3. For each of the TBOs 1, 2, …, n, draw a time interval in weeks.
4. Calculate the cumulative sum of the time intervals from step 3, thus getting week numbers for each order.

Assumptions
Some assumptions were made when we designed the simulation model, namely:

- That finished goods orders directly lead to material orders. The reason for this is that the actual material ordering data was not available to us, so we based our simulations on finished goods orders placed with the factories.
- That the lead times (the time from placing an order for components to the time of receiving the goods) are the same for both factories.
- That order sizes and time between orders are independent.
- That a product has ten orders or less during the 6 month period (this assumption is based on observations from the actual data).

Inputs and Outputs
The inputs and outputs of the simulation model mentioned in the previous sections are summarized in Table 5.

<table>
<thead>
<tr>
<th>Inputs</th>
<th>Outputs</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Supply schedule for each factory</td>
<td>Total spend for decentralized ordering.</td>
</tr>
<tr>
<td>Times and quantities to produce on a weekly basis. Stochastic, drawn from distributions fit to data.</td>
<td>Total spend over the period covered by the supply schedules.</td>
</tr>
<tr>
<td>2. Co-ordering or Grouping time slot</td>
<td>Total spend for centralized ordering.</td>
</tr>
<tr>
<td>Number of weeks in which orders should be combined (w=1, 2, 3).</td>
<td>Remaining inventory levels at each factory after period ends.</td>
</tr>
<tr>
<td>3. Initial inventory levels</td>
<td>Final inventory levels for decentralized ordering.</td>
</tr>
<tr>
<td>Inventory levels of each component at each factory.</td>
<td>Distribution of cost savings.</td>
</tr>
<tr>
<td>4. MOQ and order quantity price breakdown for the component.</td>
<td>Distribution of the difference in decentralized and centralized spend for 10 000 runs.</td>
</tr>
<tr>
<td>Lowest acceptable order quantity (MOQ) and per-unit cost of components associated with each order quantity.</td>
<td>Final inventory levels for centralized ordering.</td>
</tr>
<tr>
<td></td>
<td>Distribution of the difference in decentralized and centralized inventory levels for 10 000 runs.</td>
</tr>
</tbody>
</table>

Table 5 - Inputs and outputs of the Monte-Carlo simulation.
5.3.3 Simulation and Results

The simulation model was run for inputs based on Oriflame data. We briefly explain the reasoning behind inputs for the simulation:

1) Supply schedule: these were obtained as described in detail in the distribution fitting discussion in Section 5.3.2.
2) Co-ordering or Grouping time slot: the cases for one week, two week and three week time slots were simulated simultaneously. The reason for this was to be able to investigate the flexibility in the time slot and its effect on the final savings.
3) Initial inventory levels: these were set to zero for both factories.
4) MOQ and price breakdown: for the simulation it was important to select a realistic MOQ and order quantity price breakdown to make the result more aligned with the real-world case. So we investigated the distribution of the order quantity price breaks for glass bottles used in the production of multi-sourced fragrances, see Figure 20. From the figure it can be seen that the most popular price breaks were at 150k, 200k and 250k, and we therefore selected these for our simulations (150k being the MOQ).

![Histogram of the order quantity price breaks for multi-sourced fragrance bottles](image)

**Figure 20 - Histogram of the order quantity price breaks for multi-sourced fragrance bottles:**

Seen in the figure is that 150k, 200k and 250k are price breaks are the most popular price breaks negotiated for fragrance bottles.

Lastly, the prices associated with each price break were selected. When we investigated the data we found little consistency amongst the discount ratios between the different price breaks for the various glass bottles. We therefore decided to use a single case example from the data, and applied the price breaks as shown in Table 6.

**Table 6 - The order quantity and price breakdown for the fragrance bottle used in the simulations:** The per unit price reduces with increasing order quantities.

<table>
<thead>
<tr>
<th>Order Quantity Break (units)</th>
<th>Price per unit (€)</th>
<th>Discount Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>150k</td>
<td>0.550</td>
<td>1</td>
</tr>
<tr>
<td>200k</td>
<td>0.497</td>
<td>0.903</td>
</tr>
<tr>
<td>250k</td>
<td>0.464</td>
<td>0.844</td>
</tr>
</tbody>
</table>
Using the inputs described above and setting number of simulation runs to 10 000, the results for the simulation were plotted. Figure 21 shows the distribution of relative cost savings in the simulation for each of the three co-ordering time slots. The plots indicate that significant cost savings can be achieved through using a centralized ordering strategy opposed to a decentralized strategy.

In the case of the one week co-ordering time slot, the mean savings were 24.0 %, whereas co-ordering time slots of two and three weeks, recorded mean savings of 20.6 % and 21.0 %, respectively. The decrease in the mean relative cost savings can be attributed to the decentralized ordering also becoming more efficient with a wider time window. The reason for this is that the simulation allowed combined ordering for the factory within the time slot – even in the decentralized case, since it is possible to do this even without centralizing.

The maximum savings when co-ordering for two factories is 50 %, which is achieved when each factory requires precisely half of the MOQ, the plot confirms this. Similarly, in the case of three factories, maximum cost savings of 66.6 % can be achieved.

All else being equal a bigger time slot, allows for larger absolute cost savings both in the centralized and decentralized cases. However, a bigger time slot requires orders to be “frozen” earlier (see Section 4.2) – which reduces forecast accuracy. So the time slot should be chosen to be as large as possible within constraints set by the desired forecast accuracy.

**Figure 21 - Relative cost savings distribution:** The figure indicates the relative cost savings that can be achieved through a centralized purchasing strategy compared to a decentralized strategy. The results for one, two and three week time slots are shown, resulting in means savings of 24.0 %, 20.6% and 21.0% respectively.

Figure 22 shows the distribution of relative inventory savings in the simulation for each of the three co-ordering time slots. Again significant savings can be achieved with median savings at of 61.3 %, 66.3 % and 71.9 % for one, two and three week time slots. The median is the point on the plot where 50 % of the simulation had savings below this and 50 % of simulations had
savings above. In this case median savings is a better representation of the relative saving that can be achieved, since the distribution of relative savings included large outliers in the direction of increased inventory levels in some, but very few of the cases. The reason that inventory levels can increase due to co-ordering is because the algorithm minimizes the total costs and in some cases this can be achieved through ordering larger quantities in order to achieve a higher price break level.

**Figure 22 - Relative inventory savings distribution:** The figure indicates the relative inventory savings that can be achieved through a centralized purchasing strategy compared to a decentralized strategy. The results for one, two and three week time slots are shown, resulting in median savings of 61.3 %, 66.3 % and 71.9 % respectively.
6 Analysis

In this section we reflect on the methodology and methods we used in our pursuit to answer our research question and we analyze our findings.

Several different methods were used in this project: interviews, literature reviews, a survey and simulations. The outcome of these methods supported us in answering our research question.

Through interviews with knowledgeable stakeholders we gathered information on Oriflame’s current decentralized approach to materials management and the problems and missed opportunities associated with it. We believe we recorded the current situation correctly, not only owing to information collected during the interviews, but also owing to the guidance offered by our experienced supervisor.

The current approach was documented in detail to serve as a guide to wider audiences in determining if the findings of this case study are useful to them. The problems and disconnects we found related to:

- lack of standardized processes and agreements,
- lack of visibility and feedback, and
- slow responsiveness.

Further, the missed business opportunities and situations in which risks can arise were identified. The missed opportunities can be divided into two broad categories relating to: multi-sourced products and multi-product materials. In both cases Oriflame misses out on opportunities to take advantage of quantity discounts.

Our findings into the present situation justified our research into centralizing materials management. Both the literature and stakeholders were consulted and an inexhaustive list of advantages and disadvantages were compiled as shown in Table 7. We believe the list covers the main points since they repeatedly arose during interviews with people from several different functions, different hierarchy levels and sometimes even different countries.

Table 7 - Advantages and disadvantages of centralized materials management.

<table>
<thead>
<tr>
<th>Advantages</th>
</tr>
</thead>
<tbody>
<tr>
<td>Centralized decision making.</td>
</tr>
<tr>
<td>Reduced communication channels.</td>
</tr>
<tr>
<td>Increased data visibility, accessibility and reliability.</td>
</tr>
<tr>
<td>Planning and purchasing process standardization.</td>
</tr>
<tr>
<td>Tighten cost controls.</td>
</tr>
<tr>
<td>Economies of scale for materials of:</td>
</tr>
<tr>
<td>- multi-sourced products, and</td>
</tr>
<tr>
<td>- multi-product materials.</td>
</tr>
<tr>
<td>Combined ordering, leads to:</td>
</tr>
<tr>
<td>- inventory and cost savings</td>
</tr>
<tr>
<td>- risk pooling</td>
</tr>
</tbody>
</table>
Based on the findings presented above we designed a survey, and distributed it among Oriflame employees, in order to identify which advantages are perceived as most valuable. Ten participants from the Purchasing and Supply Planning departments completed the survey. It was not able to get the input from the Manufacturing department; however we still believe the results are relevant.

Inventory reductions ranked as the most valuable perceived advantages. The results also revealed that overall Oriflame employees hold a high interest in, and have great perceived value of centralized materials management, as all advantages scored on average above 3 out of 5.

Finally, we attempted to quantify two of the potential benefits of centralized materials management through Monte Carlo simulations. We investigated the cost and inventory savings that can be achieved through combining orders for multi-sourced products. For the purpose of the simulations, some reasonable assumptions were made. The results should be considered in light thereof. However the results of the simulations did prove that significant cost and inventory savings can be achieved. It was found that mean cost savings ranging from 24.0 % to 20.6 % can be achieved, depending on the investigated co-ordering time slot. While optimizing of costs, inventory savings were usually, but not always achieved, with median savings ranging from 61.0 % to 71.9 %.

Overall the different methods indicated that centralized materials management would be beneficial to Oriflame. This is supported by the literature, employee opinions and numerical simulations. Above that, a list of potential benefits was generated to answer our research question: “What are the benefits for Oriflame in centralized materials management?”
7 Conclusions

The goal of this case study was to investigate what are the benefits for Oriflame in centralized materials management. Through interviewing key stakeholders and consulting the literature we generated a list of potential benefits. A survey, distributed among Oriflame employees, revealed that they perceive inventory reduction as the highest valued benefit that can be achieved through centralization. Based on the overall results of the survey we concluded that Oriflame employees hold a high interest in, and have great perceived value of centralized materials management.

The eventual aim was to generate knowledge on the subject of centralized materials management and supply management with insight into the centralization of materials management decision. We therefore not only investigated the advantages and disadvantages of centralization, but also the problems, risks and missed business opportunities of Oriflame’s current decentralized approach.

Monte Carlo simulations were performed to quantify the cost and inventory savings of a centralized materials planning and ordering strategy for multi-sourced fragrances. It was found that mean cost savings ranging from 24.0 % to 20.6 % can be achieved, depending on the co-ordering time slot. While optimizing of costs, inventory savings were usually, but not always achieved, with median savings of 61.0 % to 71.9 %.

Overall this study concluded that that centralized materials management would be beneficial to Oriflame and a list of possible benefits was presented.
8 Recommendations

Based on our study the following recommendations can be made to Oriflame. Centralized materials management is the key to achieving better material and information flow in the upstream supply chain. Without centralization it is unlikely that major, long-term, sustainable improvements in materials planning and purchasing can be achieved. Today there are many internal stakeholders that foresee great value in centralization.

The interviews however brought to light several problems and disconnects, such as non-standardized processes, which can be addressed immediately, without centralization, and lead to improvements in the current management of materials.

In our study only the benefits of combined ordering for multi-sourced fragrance products were investigated in a quantitative manner. This could be followed up with a broader investigation over the entire product portfolio to gain insights into the overall cost and inventory savings that can be achieved.

Lastly, we recommend that Oriflame should conduct a proper investigation into the implementation of centralized materials management considering both organizational restructure and systems implementation.
9 Bibliography


# Appendix A: Oriflame’s Global Business


<table>
<thead>
<tr>
<th>Sales &amp; Sales Force</th>
<th>Group</th>
<th>CIS &amp; Baltics</th>
<th>EMEA</th>
<th>ASIA</th>
<th>LA</th>
</tr>
</thead>
<tbody>
<tr>
<td>A sales force of approximately 3.4 million independent Oriflame Consultants is marketing Oriflame’s wide portfolio of beauty products, together creating annual sales of around €1.5 billion.</td>
<td>Average sales force decreased by 13% to 1.8 million Oriflame Consultants and contributing with 54% to total sales.</td>
<td>Average sales force increased by 4% to 0.9 million Oriflame Consultants and contributing with 28% to total sales.</td>
<td>Average sales force increased by 5% to 0.5 million Oriflame Consultants and contributing with 11% to total sales.</td>
<td>Average sales force increased by 7% to 0.2 million Oriflame Consultants and contributing with 7% to total sales.</td>
<td></td>
</tr>
</tbody>
</table>

| Markets | Oriflame is currently present in more than 60 markets, including markets operated by franchisees. | Armenia, Azerbaijan, Belarus, Estonia, Georgia, Kazakhstan, Kyrgyzstan, Latvia, Lithuania, Moldova, Mongolia, Russia, Ukraine | Algeria, Bosnia, Bulgaria, Croatia, Czech Republic, Egypt, Finland, Greece, Hungary, Morocco, Macedon.| China, India, Indonesia, Pakistan, Sri Lanka, Thailand, Vietnam |

| Production | 600 million products are sourced annually from about 60 suppliers. Six own production facilities in five countries plus one under construction. | Moscow, Russia – Global factory supplying all regions. Lipsticks, Lip-glosses | Warsaw, Poland – Global factory supplying all regions. Skin Care, Body care/toiletries, Colour Cosmetics | Noida, India – Skin Care, Body care/toiletries, Colour Cosmetics |

<table>
<thead>
<tr>
<th>Group Distribution Centers</th>
<th>Two Consolidation Hubs and four Group Distribution Centres in four countries.</th>
<th>Kiev GDC, Ukraine – Serving the Ukrainian market.</th>
<th>Warsaw GDC, Poland – Serving nine markets.</th>
<th>Kunshan and Beijing, China – Skin Care, Body care, Colour Cosmetics, Wellness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Noginsk GDC, Russia – Serving primarily the Russian market.</td>
<td>Warsaw Hub, Poland – consolidating volumes sourced from primarily European and Far East suppliers.</td>
<td>Budapest, Hungary – Serving eight markets, three additional markets to be added in 2013</td>
<td></td>
</tr>
<tr>
<td>Offices</td>
<td>Catalogue Printing</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------------------------------</td>
<td>--------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Corporate Offices in Fribourg, Switzerland and Luxembourg</td>
<td>A new Oriflame catalogue is distributed every three weeks. Russia printed in Finland. All other CIS markets printed in Ukraine</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Support Offices in Dublin, Ireland, New Delhi, India, Prague, Czech Republic, Stockholm, Sweden, and Warsaw, Poland</td>
<td>A new Oriflame catalogue is distributed every three weeks, except a few markets. Romania, Egypt and Turkey printed locally in each market. All other EMEA markets printed in Poland</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Office in Moscow, Russia</td>
<td>A new Oriflame catalogue is distributed every four weeks. Printed locally in each market.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Office in Warsaw, Poland</td>
<td>A new Oriflame catalogue is distributed every three weeks. Produced and printed in Chile for all Latin American markets</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Office in Bangkok, Thailand</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Regional Office in Santiago, Chile</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Appendix B: Subsystem Process Map

**NPD**
- New Products
- Product Struct.
- Annual Demand

**PURCHASING**
- Product
- Annual
- Cost released in IFS
- Negotiate Prices & MOQ
- Bulk suppliers/filler & Comp. suppliers awarded
- Stock Holding Agreements
- Highlight to SP PUR any constraints

**MANUFACTURING**
- New
- Internal Filler
- RM
- External Filler
- Provide first forecast indication to RM and PM Suppliers
- Receive first supply plan and preliminary confirm first
- Continuously assess supply plan and share forecasts with PM &
- Highlight to SP/PUR any constraints
- Confirm first frozen orders
- First frozen order dispatched

**SUPPLY PLANNING**
- Component
- Act as consultant to Buyer to ensure correct final choice of suppliers, based on supplier performance and
- IFS & JDA network, sourcing and parameters set-up
- First supply plan issued based on GLOBALS
- Supply plans issued every week
- Solve with Purchasing and Fillers any
- First planned orders enter Slush period
- First PO issued
- Stock high, stock low, urgent orders, alert fillers

Timeline:
- ~1.5-1 year before launch
- ~12-8 months before launch
- 8-5 months before the launch
- 5-4 months
- ~12-11 weeks
# Appendix C: Survey

**List of Advantages of Centralized Planning and Ordering of RM & Comp.**

Name: …………………………………………

This survey is part of our investigation into Materials Management (MM). The aim is to gather stakeholder’s opinions on the benefits we have identified with a MM model, namely centralizing the material requirements planning and ordering of raw materials and components (RM&C), both for internal and external suppliers (fillers).

Please indicate on the scale the value of the benefit mentioned. If the benefit is not applicable, not achievable or incorrect, please indicate this by marking the X-column.

<table>
<thead>
<tr>
<th>1 - Very Little Value</th>
<th>2 – Little Value</th>
<th>3 – Some Value</th>
<th>4 – Good Value</th>
<th>5 – Great Value</th>
<th>X – Not Applicable</th>
</tr>
</thead>
</table>

## Procurement and Lead Time

<table>
<thead>
<tr>
<th>Benefit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>MOQ utilization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Combined ordering of RM&amp;C for multi-sourced product codes leads to less frequently ordering below the MOQ.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Supplier LT</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Reduction of RM&amp;C supplier lead time, because of combined orders, which can reduce production set-up times.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Quantity discounts</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>A more aggregated approach to procurement leads to quantity discounts (centralization includes “automating” BOM explosion and grouping/coordinating material requirements.)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

## Communication and Decision Making

<table>
<thead>
<tr>
<th>Benefit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Effort</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Reduced duplication of effort.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Supplier relationship</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Reduced communications channels with RM&amp;C suppliers and better follow-up on agreements with RM&amp;C suppliers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Process standardization</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Centralization will lead to planning and ordering process standardization.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Accountability</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Centralization will increase accountability of the planning and ordering of RM&amp;C, especially in the case of the external suppliers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Centralized decision making</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Centralized decision making, so as to avoid that organizations external to Oriflame make important procurement decisions on Oriflame’s behalf.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Data accessibility</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Centralized data will make it easier to access data and use it in decision making.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
</tbody>
</table>

## Inventory and Forecasting

<table>
<thead>
<tr>
<th>Benefit</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>X</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Inventory levels</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td>Reduced inventory due to risk-pooling and better MOQ utilization.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>X</td>
</tr>
<tr>
<td><strong>Inventory control</strong></td>
<td>Opportunity to make pro-active decisions earlier in the process (during materials phase opposed to FG phase) because of increased visibility of materials flow.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----------------------</td>
<td>--------------------------------------------------------------------------------------------------</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inventory rebalancing &amp; flexibility</strong></td>
<td>Increase flexibility, because after materials are produced by the RM&amp;C Supplier, the centralized purchasing function can still revise the decision before the physical dispatch as per each filler’s updated production needs.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Risk-pooling</strong></td>
<td>Shared risk associated with forecast changes among fillers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Visibility</strong></td>
<td>Visibility of RM&amp;C inventory levels at fillers.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Future Strategies</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Inventory models</strong></td>
<td>Centralized data of RM&amp;C can make it possible to develop sophisticated stock-holding models for RM&amp;C suppliers, which can significantly reduce lead time.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Strategic sourcing</strong></td>
<td>Centralization and better RM&amp;C follow up will contribute to right sourcing.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>World Class System</strong></td>
<td>Centralization is a step towards developing a World Class System that coordinates the supply chain as a whole.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Materials standardization decisions</strong></td>
<td>Centralized data on BOM explosions can be used in RM&amp;C selection process; to reduce unnecessary variations in product design.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Additional benefits not mentioned</strong></td>
<td>1 2 3 4 5 -</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Supplier = Supplier of raw materials and components (RM&C).  
*Filler = Supplier of finished goods (both internal and external).
Appendix D: Worked Example

To illustrate how the simulation works, an example of one run is discussed in this section. The input data used for this run are the supply schedules shown in Table 8 and the price breaks shown in Table 9. The actions for a one and two week time slots are shown below. We attempted to make the worked out tables as self-explanatory as possible, but for more details please refer to Section 5.3.2 if needed.

Table 8 - Supply schedules used in the example

<table>
<thead>
<tr>
<th>Week number</th>
<th>Order quantity</th>
<th>Week number</th>
<th>Order quantity</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>40 000</td>
<td>5</td>
<td>105 000</td>
</tr>
<tr>
<td>13</td>
<td>77 500</td>
<td>18</td>
<td>120 000</td>
</tr>
<tr>
<td>21</td>
<td>120 000</td>
<td>19</td>
<td>65 000</td>
</tr>
<tr>
<td>22</td>
<td>41 500</td>
<td>20</td>
<td>49 000</td>
</tr>
<tr>
<td>25</td>
<td>58 500</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 9 - The price breaks used in the example

<table>
<thead>
<tr>
<th>Quantity</th>
<th>Per Unit Price (€)</th>
</tr>
</thead>
<tbody>
<tr>
<td>150 000</td>
<td>0.550</td>
</tr>
<tr>
<td>200 000</td>
<td>0.497</td>
</tr>
<tr>
<td>250 000</td>
<td>0.464</td>
</tr>
</tbody>
</table>

Centralized/Decentralized for $\Delta t = 1$ week:

No combined ordering is possible, since no two orders are in the same week. Thus in this case for $\Delta t = 1$ week, the centralized and decentralized ordering scenario give the same results. The results are shown in Table 10.

Table 10 - Program stepwise results for $\Delta t = 1$ week

<table>
<thead>
<tr>
<th>$\Delta t = 1$ week, centralized/decentralized</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factory 1</td>
</tr>
<tr>
<td>Week number</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>6</td>
</tr>
<tr>
<td>13</td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td></td>
</tr>
<tr>
<td>Factory 2</td>
</tr>
<tr>
<td>Week number</td>
</tr>
<tr>
<td>-------------</td>
</tr>
<tr>
<td>5</td>
</tr>
<tr>
<td>18</td>
</tr>
</tbody>
</table>
For $\Delta t = 1$ week the combined total spend for the two factories is € 495 000, and the total inventory is 223 500 units. In this case combined ordering was not possible and the results are the same as for a decentralized ordering strategy.

**Decentralized for $\Delta t = 2$ week:**

For the $\Delta t = 2$ week time slot with a decentralized scenario, there were two options for combining orders within the respective factories. However in both cases the same savings were achieved, namely total spend for the two factories is € 495 000, and the total inventory is 223 500 units. Which is also the results that were obtained in the case for $\Delta t = 1$ week. If the savings for option 1 and option 2 were different, the algorithm would have selected the option with the highest cost savings.

**Table 11 - Program stepwise results for $\Delta t = 2$ week, decentralized Option 1**
Table 12 - Program stepwise results for $\Delta t = 2$ week, decentralized Option 2

<table>
<thead>
<tr>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>40 000</td>
<td>150 000</td>
<td>110 000</td>
<td>5</td>
<td>105 000</td>
<td>150 000</td>
<td>45 000</td>
</tr>
<tr>
<td>13</td>
<td>77 500</td>
<td>0</td>
<td>32 500</td>
<td>18</td>
<td>120 000</td>
<td>150 000</td>
<td>75 000</td>
</tr>
<tr>
<td>21</td>
<td>120 000</td>
<td></td>
<td></td>
<td>19</td>
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<td></td>
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<tr>
<td>22</td>
<td>41 500</td>
<td></td>
<td></td>
<td>20</td>
<td>49 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grouped</td>
<td>161 500</td>
<td>150 000</td>
<td>21 000</td>
<td>Grouped</td>
<td>114 000</td>
<td>150 000</td>
<td>111 000</td>
</tr>
<tr>
<td>25</td>
<td>58 500</td>
<td>150 000</td>
<td>112 000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Centralized for $\Delta t = 2$ week:

For the centralized scenario several order grouping combinations are also possible. The program determines all the possibilities, compares them and selects the grouping scenario with the lowest cost. In the case of grouped orders and excess stock, inventories are distributed proportionally to the original order quantity required. Two grouping scenarios are shown in Table 13 and Table 14, but several more that may exist are not shown here. Groupings are indicated with different colors and the grouped order value is shown in brackets. In this case the results for option 1 and option 2 are the same, with total spend for the two factories is € 420 146, and the total inventory is 104 879 units.

Table 13 - Program stepwise results for $\Delta t = 2$ week, centralized Option 1

<table>
<thead>
<tr>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>40 000</td>
<td>40 000</td>
<td></td>
<td>5</td>
<td>105 000</td>
<td>105 000</td>
<td></td>
</tr>
<tr>
<td>Grouped</td>
<td>145 000</td>
<td>150 000</td>
<td>5 000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 14 - Program stepwise results for $\Delta t = 2$ week, centralized Option 2

<table>
<thead>
<tr>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
<th>Week number</th>
<th>Order quantity</th>
<th>Quantity Ordered</th>
<th>Inventory after order</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>40 000</td>
<td>40 000</td>
<td></td>
<td>5</td>
<td>105 000</td>
<td>105 000</td>
<td></td>
</tr>
<tr>
<td>Grouped</td>
<td>145 000</td>
<td>150 000</td>
<td>5 000</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>13</td>
<td>77 500</td>
<td>150 000</td>
<td>73 879</td>
<td>18</td>
<td>120 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>21</td>
<td>120 000</td>
<td>46 121</td>
<td></td>
<td>19</td>
<td>65 000</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Grouped</td>
<td>95 121</td>
<td>150 000</td>
<td>54 879</td>
<td>Grouped</td>
<td>185 000</td>
<td>181 379</td>
<td>0</td>
</tr>
<tr>
<td>22</td>
<td>41 500</td>
<td>150 000</td>
<td>135 109</td>
<td>20</td>
<td>49 000</td>
<td>49 000</td>
<td></td>
</tr>
<tr>
<td>25</td>
<td>58 500</td>
<td>0</td>
<td>76 609</td>
<td></td>
<td></td>
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<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>End Inventory</td>
<td></td>
<td></td>
<td></td>
<td>End Inventory</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>76 609</td>
<td></td>
<td></td>
<td></td>
<td>28 270</td>
</tr>
<tr>
<td>Combined Tot. Spend</td>
<td>420 146 (€)</td>
<td>Combined Tot. Inventory</td>
<td>104 879 (units)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

For each time slot the results from the most cost efficient option is stored for the centralized and decentralized scenarios, respectively. These are then compared with each other and recorded as savings.
**Runs**

The simulation completes these actions 10,000 times, each time with a different supply schedule for each factory. The results are stored each time, and the final results are presented in graphs, indicating % savings in terms of spend and inventory, that can be expected with centralized materials management.