Portfolio Model Supporting Development of Purchasing Strategies

A case study concerning raw material at Casco Adhesives

Malin Roos & Linda Rydman

Master Thesis LiTH-EKI-EX--2005/13--SE
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Logistics Management
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In this thesis a complete portfolio model for supporting development of purchasing strategies for raw material at Casco Adhesives is developed. The model consists of a classification tool which divides the raw material into four distinct quadrants with different main tasks. The second part of the model is a strategy template which gathers necessary information dependent on the quadrant.

Keywords
Akzo Nobel, Casco Adhesives, Purchasing, Portfolio Model, Classification, Strategy, Supply, Kraljic, Strategic, Bottleneck, Leverage, Non-critical
Abstract

Casco Adhesives develop, produce, market and distribute adhesives and adhesive equipment with the mission to increase the competitive strength of their customers by offering products at the leading edge of technology and with environmental awareness. To fulfil this mission high demand is set on every function of the company, not at least the purchasing function. It is important that the function is involved at an early stage since the purchased material for an adhesive represents a grand part of its final value and a lot can be gained from considering alternative materials early on etc. Naturally different strategies are appropriate for different purchases, to know what strategy that is most suitable can however be hard. Therefore a portfolio model was created in this thesis for supporting development of purchasing strategies for raw material.

The portfolio model was created in two steps that had to be performed in a sequential order. First a classification tool was formed where the purchased raw materials could be positioned into a purchasing portfolio matrix. The two dimensions of the matrix described the importance of purchase and supply risk. To further adapt the tool four steps were worked through. To begin with factors describing each dimension were selected through investigation and analysis. The classification tool was supposed to consider aspects affecting a purchase and investigated further were thus the purchasing function, R&D and some parts of production. Thereafter answers to the factors were sorted out and given rates, relative weights and the critical borders were settled. The classification tool could finally be brought together and used to depict raw materials into the four quadrants; strategic, bottleneck, leverage and non-critical items of the matrix.

The classification tool could not be too complicated to use why all aspects affecting a purchase was impossible to cover in this step. Therefore a second step was to design a strategy template containing further information needed for developing a suitable strategy. The template enhanced questions concerning the raw material, the supplier market, the actual purchase etc. However depending on which quadrant the raw material was classified in different information was requested. Hence a lot of inspiration to what topics to include in the template had to come from the main task of each quadrant. Nevertheless information also came from the classification tool, portfolio literature and Casco Adhesives’ line of business.

Finally the two steps were brought together into a complete portfolio and the result was achieved; a portfolio model supporting development of purchasing strategies for raw materials at Casco Adhesives.
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Nacka, February 2005

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1 Introduction

In this first chapter background, purpose and directives will be presented. Further the functions about to be studied and the two steps of the purpose will be explained.

1.1 Background

Akzo Nobel is a multinational group of companies active in the three business areas pharmaceuticals, coatings and chemicals. Casco Adhesives is a sub unit within the coating area and one of the biggest providers within the wood adhesive market; developing, manufacturing, marketing and distributing adhesives, adhesive equipment and resins for industrial use.

Casco Adhesives’ mission is to increase the competitive strength of their customers by offering products at the leading edge of technology and with environmental awareness. Their vision is to be global market leader. To be able to fulfil these two tasks and still show good company results, high demand is set on every function of the company.

Purchasing is an important function for Casco Adhesives since the purchased material for an adhesive represents a grand part of its final value. For a company like Casco Adhesives, dependent on inventive development, it is of great significance to involve purchasing at an early stage. If the purchasing function considers alternative materials early on, unnecessary expenses and supply risks can be avoided.

Casco Adhesives’ purchasing function has worked strategically with sourcing of material for many years mainly by differentiating their suppliers. In order to get a structured model for this they recently turned to a company specialised in purchasing and supplier analysis for assistance. This concluded in the use of a purchasing classification matrix to further show that different strategies must be used on different types of purchased products.

The most famous classification matrix is the one introduced by Kraljic (1983). By measuring the ‘Importance of Purchasing’ and the ‘Complexity of Supply Market’ for each purchased product, four different groups with separate main tasks are put together.

The idea of working with diverse strategies in this manner pleased the purchasing function but the actual tool developed was difficult to work with. Instead of separating the different items into clearly defined quadrants all products were gathered in between. Furthermore the tool did not function on its own since a lot of additional information needed to be collected for being able to develop purchasing strategies. The lack of
information preservation also made it hard to update the strategy continuously and to get
an overview of the strategy for each item.

Hence, there is at present insecurity about the development of appropriate strategies for
different types of products. The purchasing function at Casco Adhesives lacks a
standardised and practical model to use for classifying their purchased products and for
gathering the necessary information, when creating a strategy or making strategic
changes.

1.2 Purpose
The purpose of the thesis is to create a model for supporting development of purchasing
strategies for raw material at Casco Adhesives.

1.2.1 Functions studied
To be able to solve this task it is necessary to include all parts of Casco Adhesives that
are somewhat involved in the purchasing process of raw material. The system studied is
rather complex since it does not consist of one specific delimited function or activity.
The aim is to investigate the purchasing function but also R&D and some parts of
production, functions further explained in Chapter 2. R&D is responsible for developing
new adhesives and to write specifications for all raw materials, thereafter it is the
purchasing duty to find the most suitable supplier base. Requests from the production
entity also have to be considered by the purchasing function. A purchasing strategy is of
course also affected by the supplier market, but the information needed about this market
will be gathered from purchasing, because of the limited time.

1.2.2 Two steps
To be able to accomplish the purpose the elements of it have to be divided into more
manageable steps. Thereafter, each step must be concretised in order to keep the task at a
controllable size. Hence, a discussion of the purpose elements to be studied will follow.

The model for developing purchasing strategies will be divided into two steps, further
explained in Chapter 4. These steps have to be performed in a sequential order since the
second part is dependent on the first. The first step of the model aims at creating a
classification tool where purchased raw material can be positioned into a portfolio matrix.
This step must not be too complicated to use in order to decrease the threshold and
enhance the usefulness of the model. In the second step a template will be designed,
where important questions concerning the raw material, the supplier market, the actual
purchase etc. are enhanced and supplemented. The template will contain the information
needed for a purchaser, to be able to develop a suitable strategy for all individual raw materials.

1.3 Directives
The following terms of reference have been set up by Casco Adhesives.

- The thesis should focus on finding a model with a purchasing portfolio approach.
- The purchased products in this thesis will only include raw materials purchased for Casco Adhesives.
2 Company description

To inform the reader about the company studied in the thesis this chapter will give an introduction to Akzo Nobel in general and to Casco Adhesives more thorough.

2.1 Akzo Nobel

The company Akzo Nobel was founded in 1994 through Akzo’s acquisition of the Nobel Industries shares. Both Akzo and Nobel were elderly companies formed by merger and together they created a diverse company with chemistry as a common denominator. Akzo Nobel has then continued to acquire companies and due to careful integration, incorporating cultures and technical knowledge, they have grown successfully. (Akzo Nobel, 2004)

Today Akzo Nobel is a multinational group of companies with operations in more than 80 countries and headquarters in Arnhem, Netherlands. In 2003 the group had close to 64,000 employees and sales were EUR 13,1 billion. (Akzo Nobel, 2004)

Akzo Nobel has rather decentralised business areas which are tied together for scale and power in corporate centres. The group is divided into three independent business areas namely:

- Pharma
- Coatings
- Chemicals

Pharma is active in markets for human as well as animal healthcare. Products manufactured and developed include antidepressants, oral contraceptives, infertility treatments and veterinary vaccines. This business area accounted for EUR 3,6 billion of total sales in 2003. In the second business area, Coatings, Akzo Nobel is world leading. The main activity in this area is manufacturing coatings such as paint and varnish for industrial usage. The Coating area answered for EUR 5,2 billion of total sales in 2003. The third business area, Chemicals, is a leading supplier of a wide selection of chemicals as raw and intermediate materials and accounted for EUR 4,3 billion of total sales in 2003. The portfolio includes over 2 000 products which cover a wide range of markets such as food, cosmetics, pulp and paper, agriculture, pharmaceuticals etc. (Akzo Nobel, 2004)
2.2 Casco Adhesives

The business area Coatings comprises of seven business units. The business unit Industrial Finishes is one of the world’s largest producers of both coil coatings and wood coatings. Casco Adhesives (through the thesis known as Casco), a sub business unit within Industrial Finishes, see Figure 2.1, was formed in 1928 when starting to produce adhesives for the Nordic market.

![Organisation chart for the business area Coatings](image)

Today Casco has its headquarters in Nacka, Sweden but works worldwide with development, production, marketing and distribution of adhesives and adhesive equipment for the woodworking industry. More detailed information about Casco’s products can be found in Appendix A. In 2003 the total number of employees was 862 and total sales EUR 144 million. (Casco Adhesives, 2004)

Casco’s vision is to be a global market leader in their core applications. The business concept is:

“To increase the competitive strength of our customers by offering adhesives, adhesives systems and services that is at the leading edge of technology and environmental awareness.” (Casco Adhesives Intranet, 2004)

2.2.1 Two main application areas

Casco has two main application areas, Industrial Resins and Wood Adhesives, see Figure 2.1. Industrial Resins is divided into Industrial Resins Europe and Industrial Resins Andean in Latin America, and works with development and manufacturing of resins for wood based panel producers, resins for foundry industry, process control systems and chemicals. The production sites for making resins are located in Sweden, Estonia,
Colombia and Ecuador while research and development mainly is conducted in Sweden and to smaller extent in Ecuador and Colombia. Industrial Resins answered for EUR 43 million of sales in 2003. (Casco Adhesives Intranet, 2004)

Wood Adhesives, on the other hand, is divided into four geographical areas, America, Asia, East Europe and West Europe. Wood Adhesives produces and sells adhesives, technical equipment and services for manufacture of veneering furniture, form pressing, parquet and laminate floor etc. Production of adhesives is located on sites in Europe, America and Asia. Research is organised in the same way as for Industrial Resins but with a laboratory in Asia as well. This application area accounted for EUR 101 million of total sales in 2003. (Casco Adhesives Intranet, 2004)

2.2.2 Markets
Most of Casco’s customers are within the woodworking industry. Casco divides the industry into four groups; structural timber, furniture industry, parquet floor industry and doors & windows. The customers of Casco can also be structured in another way; external customers, retailers and customers within the group of Akzo Nobel. Even though a retailer, mostly with reference to Swedish retailers, is involved Casco still has a lot of direct contact with the external customer since the customer value is very important. (Casco Adhesives, 2004)

For the total volume of adhesives sold, Europe stands for approximately 50 percent, America 35 percent and Asia for the last 15 percent. Europe is the biggest market but also the slowest growing one. Trends show that sales have moved from the Nordic market down to Central and Eastern Europe. America and Asia are both growing markets with great potential. (Casco Adhesives, 2004; Odda, 2004)

2.3 Purchasing
Casco has a rather decentralised purchasing organisation with one purchasing supervisor situated in Sweden and several local purchasing departments closer to the different markets in Europe, America and Asia. The purchasing manager has the role of coordinating the different local departments so that purchases are made in similar ways to avoid contradiction and lack of scale. Depending on the extent to which a specific product is used agreements are negotiated both locally and globally. The general idea is that the local purchase department is responsible for local suppliers. For some specific products Casco also uses Akzo Nobel’s contracts for better prices. (Odda, 2004)
The functions of purchasing have a mission of actively working together with other functions at Casco, with the aim of attaining the best total financial results in terms of costs. Purchasing will further continuously try to improve in terms of business competence and working methods. (SPS Purchasing, 2004)

### 2.3.1 The purchasing process

The purchasing process for a raw material can be initiated in various ways. R&D might be the initiator through the development of a new adhesive, the purchasing function or production may desire alternative suppliers for different reasons. All purchased raw materials have to be specified and approved by R&D. The purchasing department is in charge of everything included in the process of finding, choosing and contracting suppliers and must therefore listen to requests from production as well as the environmental department. A new supplier of a raw material is often looked for amongst existing ones first. All commercial matters included in a purchase are handled by the purchaser. When negotiating with suppliers the purchaser always has a prognosis for demand. After the supplier is contracted the purchasing function hands over the continuous responsibility of call-offs to production. The whole process of purchasing is represented in Figure 2.2. Approximately one to three new raw materials are purchased every year. The purchasing process for a new raw material varies a lot time wise but takes in general about two to three months. (Odda, 2004; Sjögren, 2004)

![Figure 2.2: The purchasing process for a new raw material.](image)

Production makes call-offs from contracted suppliers for every raw material, new or old, and after this transportation is booked and the raw material is delivered to the production site. On arrival the raw material is inspected and registered into the business system. (Arthursson, 2004)

A great limitation in the work of selecting suppliers is that R&D often chooses the supplier more or less unconsciously. Even if an alternative supplier with a similar product could be possible to use, the purchasing department can not consider alternative suppliers unless the specification from R&D matches exactly. (Odda, 2004)

At Casco, the purchasing function works strategically with purchased raw material mainly by differentiating the treatment of their suppliers. The different ways of setting
the raw materials apart are inspired by the purchasing portfolio approach but a structured model for this is not used. Instead the responsible purchaser does a weighing which has resulted in a somewhat vague classification of the current raw materials. The issues considered are mainly the value of the purchased material and the number of suppliers. Personal relations are therefore of great importance when considering suppliers. A policy of at least two suppliers of each raw material is used when possible. Today Casco purchases raw material of all character; standard products with low value and many suppliers, raw material that are chosen merely on price, bottleneck products with few suppliers and strategically important products with close relationships to the supplier. (Odda, 2004; Sjögren, 2004; Klintberg, 2004)

2.3.2 The suppliers
The supplier market is global but rather stable with basically the same actors present. Casco purchases about 100 different raw materials but only a few stands for the mere part of the total volume. The supplier base is approximately 1-3 approved suppliers per raw material and many of Casco’s suppliers supply more than one product. It is of great importance that the suppliers can meet the demand of cost efficiency, quality, technical competence and delivery capacity. Suppliers who can actively contribute to development and competitiveness will be preferred as well as ISO 9000 and ISO 14000 certified suppliers. A supplier evaluation of the existing supplier base is conducted at Casco once every year. The purchasing function then grade the suppliers according to performance criteria such as security in delivery, quality & health, commercial demands and lab related issues. Three groups of suppliers are received where group A contains the most prominent suppliers and C the ones to be replaced. (Odda, 2004; Klintberg, 2004; SPS Purchasing, 2004)

2.4 Research & Development
Working with research and development (R&D) is fundamental for a company like Casco. Continuously higher demands on the products, focus on lower costs and more stringent legislations set high pressure on this function. Today Casco has R&D on several places around the world but the central lab for Industrial Resins is located in Stockvik, Sweden and for Wood Adhesives in Nacka, Sweden. (Casco Adhesives, 2004; Odda, 2004)

On a year basis Casco develops between 30-40 new adhesive systems. This is necessary because a customer of Industrial Resins change products one or two times per year while the same figure for Wood Adhesives is even higher. (Odda, 2004)
Development of a new adhesive is initiated either by the customers, the R&D function itself, the purchasing function or as a result of a prohibition. When developing a new adhesive R&D uses a number of different chemicals in order to get the right quality. R&D is in charge of contacting suitable suppliers for buying new materials during this phase. Advanced testing for different climates and application areas are conducted during development. For some of the final adhesive recipes approval must be granted by various countries’ testing-authorities before it can be sold. When the recipe has been approved R&D writes a specification for all new raw materials and then hands over the responsibility of finding the most suitable suppliers to the purchasing department. All raw materials at Casco are connected to a person at R&D who is responsible for the quality and possible substitutes of the particular material. (Odda, 2004; Sjögren, 2004; Abrahamsson, 2004)

2.5 Production

As mentioned earlier, production within Casco takes place in different production sites in Europe, America and Asia. The sites are located close to the most important markets. The majority of products made for the European market are manufactured at the production site in Kristinehamn, Sweden. Production of hardeners is also done in Kristinehamn. To a minor extent Casco also uses contract manufacturing when needed. (Casco Adhesives AB, 2004)

The production is mainly based on customer orders and only a small part is made to stock. This is possible due to the fact that most of the customers are permanent and their need to some extent predictable and that the production process is rather short. Production has learned to deal with late orders and to plan the production quickly. The production schedule is set by a production planner for one week ahead. Keeping the adhesives in stock for a long time is often not possible because of the short durability. Low stock levels are prerequisite at Casco concerning both end products and raw material. (Arthursson, 2004)

When making an adhesive the right quantity of raw material is first entered into the system. These ingredients are thereafter mixed in a certain order and at a specific temperature and pace in a reactor tank. Heating and cooling are very important aspects when producing chemical products. The finished adhesive is transported from the reactor via pipes into storage tanks. Before the finished product is ready for delivery, tests are made to insure quality. The process time for making an adhesive differs greatly among the products but in 4-24 hours the adhesive is manufactured and in three days most of the
products can be all set for delivery. The chemical process needed for making an adhesive is dependent on every ingredient added. Therefore Casco does not discern some ingredients to be more value adding than others. (Arthursson, 2004)

While the purchaser is in charge of the commercial part of the raw material, the process engineer is responsible for all technical aspects of both the raw material and the end product. If a product does not pass quality tests the process engineer has to solve the problem by for instance adding a raw material and thereby diluting it. To be able to do this technical knowledge as well as knowledge about the characteristics of the raw material is necessary. The decision about whether to sell the product or not is made by the process engineer. If this decision can not be made, the R&D is contacted as a last resort. (Arthursson, 2004)
3 Frame of reference

In this chapter the theoretical foundation for the thesis will be presented. The literature used is mainly purchasing portfolio based with some minor exceptions.

3.1 Purchasing

3.1.1 Definition of purchasing

Many different terms and definitions are used to describe the area of purchasing both in reality and in the literature. Unfortunately there exists no agreement about the definitions of terms like procurement, sourcing, purchasing, supply management etc. and therefore these are used interchangeable. Throughout this thesis we have chosen to use van Weele’s (2002) definition of purchasing:

“obtaining from external sources all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company’s primary and support activities at the most favourable conditions” (van Weele, 2002, p.14)

3.1.2 Importance of purchasing

For sold goods in general, the largest part of the cost is taken up by purchased materials and services (van Weele, 2002). Between 50-80 percent of a company’s expenditure consists of purchased goods and services. This shows that reducing purchasing costs is a powerful way to improve shareholder returns. (Chapman & Dempsey, 1997)

The importance of the purchasing function differs a great deal between companies. Person and Virum (1996) claims that the following three factors mainly decide its significance;

- **The purchased amount in money.**
  When a company spends a lot of money on purchasing materials it often means that the purchasing function has a great influence on the company results.

- **The material costs part of the total costs.**
  If the material costs in a company constitutes of a big part of the total costs even small changes in the material costs will make a big difference on the profit margin.

- **The kind of material being purchased.**
  If the products are made after buyer specification and are technically advanced the purchasing function is often more essential. This is also the fact in monopoly markets or if an article is short in supply.
Thus purchasing has a lot to do with money and costs. But buying material is about so much more than just dealing with a price of the merchandise. Costs for producing, handling, storing etc. are also important for the final result. It is therefore important to have a foundation in a total cost concept where the price is just one variable affecting the total cost. An increase in one variable may lead to a decrease in another and so on. (Persson & Virum, 1998)

3.1.3 Development of purchasing
Harrington (1997) means that purchasing, traditionally, has been very transactional focused and never been seen as a key business activity. The tasks have been to get the right quantity and quality of goods to the right place at a decent cost and the time perspective has been very short. Further Chapman and Dempsey (1997), rather surprised, noted that many executives still think that improvement only can be done by informing their purchasing department to accomplish a cost reduction through affecting their suppliers to cut prices. Considering competition, price pressure etc. a more strategic approach to buying goods and services is required (Harrington, 1997). The conclusion being made by Chapman and Dempsey is that a company must define purchasing and supply management more broadly, than just through cutting supplier’s prices, to be able to use it as a fully adequate strategic weapon.

Today’s motto seems to be ‘concentrate on your core business’. There are many obvious advantages to this like the fact that specialised suppliers can perform activities at lower costs, the company increases flexibility and management’s focus can be on the core business. This is why, according to van Weele (2002), purchasing activities have received considerably more attention these last years. The modern way of looking at purchasing means more cooperation between customer and supplier, it is more long-term and logistical/market oriented. (van Weele, 2002)

3.1.4 Purchasing process
Even though the purchasing process is different for dissimilar products purchased and very dependent on the design of the surrounding organisation some main activities are always necessary. These activities are the six components of the purchasing process model shown in Figure3.1. All activities have been given names on the basis of their main tasks. The first three activities are further referred to as tactical purchasing or sourcing while the three latter ones are called order function or supply. (van Weele, 2002)
Purchasing will throughout this thesis be considered from a process approach according to van Weele (2002). This means that the various components of the model are closely linked and deficiencies in a preceding part will be transferred and visible in the following. (van Weele, 2002)

### 3.2 Strategic purchasing

#### 3.2.1 Strategic roles

Purchasing can in different and decisive ways influence and make a contribution to a company’s competitive strength. Three different strategic roles of purchasing are distinguished to easier understand these possibilities:

- **The rationalisation role**
  
Purchasing can make a contribution to a company’s competitive situation through rationalisation. This means that purchasing in the day-to-day activities aim to decrease the total costs.

- **The developmental role**
  
The second role is to make sure that the company’s and suppliers’ research and development proceeds in the same direction. Attention should be paid to the advantage a supplier can create by being a developmental resource.

- **The structural role**
  
Finally purchasing has a function of controlling the structure and network the company is in. It is important to secure that the structure of the supplier markets is as beneficial to the company as possible.

  (Gadde & Håkansson, 1993)

#### 3.2.2 Developing a purchasing strategy

Several factors will influence the purchasing decision and must therefore be taken into consideration and then built into the purchasing strategy. These factors are illustrated in Figure 3.2. (Farmer, 1985)
When developing a purchasing strategy the starting point is usually the comprehensive strategy for the entire company. Business concept and visions will straighten out the conditions of the purchasing function. The purchasing strategy will thereafter to a wide extent affect the operational purchasing work. (Axelsson, 1998)

Further van Weele (2002) states that when developing strategies for purchasing and supply the key issue is influencing the balance of power between the company and its suppliers. The balance of power should if possible be in favour of the company, since the reverse may lead to overdependence on a certain supplier. van Weele further presents a number of questions which may be helpful in developing effective supplier strategies:

- Does the present purchasing strategy support our business strategy?
- Which is the power balance between our suppliers and our company?
- Are important products supplied from the best-in-class suppliers?
- What percentage of our purchased items is covered by long-term contracts?
- What difficulties in supply can be expected in the near future?
- What opportunities exist for cooperation with suppliers and are these being used?

Since purchasing, as argued in Chapter 3.1.1, in our time has become an important strategic issue the way to design suitable strategies for managing the supply base have developed in two different parallel ways. The first approach is the development of
purchasing portfolio models and the second one is the studies concerning industrial networks. (Dubois & Pedersen, 2002)

In further chapters the purchasing portfolio models will be especially enlightened since this is a prerequisite from Casco, see Chapter 1.3. The network approach will however also be mentioned to cover all aspects.

### 3.3 Purchasing portfolio models

For defining the portfolio concept the following description is used:

“The portfolio concept reflects the importance for balance in a collection of individual elements. [...] The basic idea is simplification of a complex problem (1) by classification of objects/subject in a (usually) two dimensional matrix and (2) by providing (strategic) recommendations for each cell of the matrix.” (Gelderman & van Weele, 2000, p. 291)

When designing strategies for commodities van Weele (2002) recommends using a portfolio-technique. The basis of this approach is that purchasing managers need to develop separate strategies towards their supply markets, because different suppliers represent dissimilar interest to the company. (van Weele, 2002) Lilliecreutz and Ydreskog (1999) also show that a supplier classification model is an efficient tool for improvements. According to Gelderman and van Weele (2000) there is further a considerable amount of literature where portfolio methods are viewed as a useful starting point for strategic analysis.

For a long time, the only tool for differentiating between purchases was the ABC-analysis. Olhager (2000) says that the use of ABC-classification aims to support the work of prognosis, warehousing management, inventory etc. This analysis categorises articles by criteria such as value of volume, time of delivery etc., but does not provide strategic recommendations for the different classes. Therefore the ABC-analysis can not be considered as a comprehensive portfolio method. (Gelderman & van Weele, 2000)

#### 3.3.1 The original portfolio model

In order to devise a tailor-made supply strategy, while maximising the buying power and at the same time decreasing the supply vulnerability Kraljic (1983) recommends the following approach.

**Classification**

The first phase is called classification and aims at differentiating the purchased material. According to Kraljic (1983) a company’s supply strategy need depends on two factors;
The Importance of Purchasing and The Complexity of the Supply Market. The definition of purchasing importance can be made in terms of volume purchased, percentage of total purchase cost, impact on product quality, impact on profitability etc. The supply market complexity on the other hand is assessed in terms of number of suppliers, availability, competitive demand, substitution possibilities, logistic aspects, complexity and so forth. After selecting suitable criteria for both dimensions all purchased items are evaluated and positioned into one of the quadrants of the Kraljic portfolio model, shown in Figure 3.3. (Kraljic, 1983)

![Figure 3.3: The Kraljic portfolio model (modified form Kraljic, 1983, p. 111)](image)

Each of the quadrants has a separate purchasing approach which requires information of different kind for developing a suitable supply strategy. Also the tasks for the four groups are diverse with regards to the differences in purchasing and supply risks. For specific requirements see figure 3.4. (Kraljic, 1983)
Depending on the item quadrant in the portfolio, decided during the first phase, the purchasing strategy will differ. van Weele (2002) presents a possible strategy for each segment of the portfolio. These strategies are as follows:

- **Securing continuity of supply for bottleneck items.** Securing the supply, if needed at a higher cost, will be the main policy. It is further very important to work at reducing dependency by developing substitute suppliers or products.

- **Competitive bidding for leverage items.** The purchasing strategy focuses on principles of competitive bidding seeing as the suppliers are more or less interchangeable. Priority is to uphold required quality and continuity of supply at a minimum cost. As a rule long-term contracts are avoided.

- **Systems contracting for non-critical products.** Reducing costs and complexity for administration and logistics are the aim of this strategy. This can be done for instance by standardisation of product range, reducing the number of suppliers, vendor managed inventory for indirect material, electronic catalogues, Internet-technology etc.

### Table: Classifying Purchasing Materials Requirements

<table>
<thead>
<tr>
<th>Main task</th>
<th>Required information</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Strategic items</strong></td>
<td>Accurate demand forecasting</td>
</tr>
<tr>
<td></td>
<td>Detailed market research</td>
</tr>
<tr>
<td></td>
<td>Long-term supply relationships</td>
</tr>
<tr>
<td></td>
<td>Risk analysis</td>
</tr>
<tr>
<td></td>
<td>Logistics, inventory and vendor control</td>
</tr>
<tr>
<td><strong>Bottleneck items</strong></td>
<td>Volume insurance</td>
</tr>
<tr>
<td></td>
<td>Control of vendors</td>
</tr>
<tr>
<td></td>
<td>Security of inventories</td>
</tr>
<tr>
<td></td>
<td>Backup plans</td>
</tr>
<tr>
<td><strong>Leverage items</strong></td>
<td>Exploit full purchasing power</td>
</tr>
<tr>
<td></td>
<td>Vendor selection</td>
</tr>
<tr>
<td></td>
<td>Product substitution</td>
</tr>
<tr>
<td></td>
<td>Targeted pricing strategies</td>
</tr>
<tr>
<td></td>
<td>Order volume optimization</td>
</tr>
<tr>
<td><strong>Non-critical items</strong></td>
<td>Product standardisation</td>
</tr>
<tr>
<td></td>
<td>Order volume optimization</td>
</tr>
<tr>
<td></td>
<td>Inventory optimization</td>
</tr>
<tr>
<td></td>
<td>Efficient processing</td>
</tr>
</tbody>
</table>

Figure 3.4: Classifying purchasing materials requirements (modified from Kraljic, 1983, p. 112)
For the strategic items further investigations must be conducted before deciding on suitable strategies. Therefore the following phases are most suitable only to go through with strategic items since these are most important and need the most market information.

**Market analysis**
During the second phase, called market analysis, the company weights its strength as a customer against the power of its suppliers. For evaluating the strength of the supplier market criteria like market size versus supplier capacity, bottleneck risk, cost structure and ROI are important. The strength of the company is estimated by factors like annual volume purchased, cost and price structure and market share. (Kraljic, 1983)

**Strategic positioning**
In the third phase, strategic positioning, the items are positioned into the portfolio, shown in Figure 3.5, which helps identifying suitable strategy towards the supplier. The idea is to exploit the supplier through favorable pricing and contract agreements when possible and to diversify by being defensive and looking for substitutes or new suppliers when the power of the supplier is big. In between the company should strive for a balanced midway strategy. (Kraljic, 1983)

![Figure 3.5: Strategic positioning (Kraljic, 1983, p. 114)](image)

**Forming action plans**
The fourth and final phase is when the action plans for the strategic items are formed. For every alternative in Figure 3.5 unique implications for elements of the purchasing strategy such as volume centralisation, supplier spread, material replacement etc. is necessary. The final product will be a set of concrete plans for relations with new suppliers, contract situations and so forth. (Kraljic, 1983)
van Weele (2002) also presents a possible strategy for the segment of strategic items. This strategy is as follows:

- **Partnership for strategic items.** The relative power position between the company and the suppliers will decide the purchasing strategy which will be aimed at either partnership or collaboration. This is done in phase two and three above. The object is to reach mutual participation based on planned co-operation which in the end will lead to fading borders between the involved companies.

However, according to Lilliecreutz and Ydreskog (1999) Kraljic’s model with two dimensions, the importance of purchasing versus the complexity of the supply market, is an efficient base model but not enough to capture the dynamics needed in relationships between buyer and supplier today. Every relationship is of special kind and has therefore different needs for integration. In order to get an efficient purchasing strategy it is necessary to have a way for handling relationships. (Lilliecreutz & Ydreskog, 1999) For that reason two further models are presented below.

### 3.3.2 A portfolio approach to supplier relationships

The portfolio model being discussed in this chapter aims to understand how to manage supplier relationships. This model, described by Olsen and Ellram (1997), is developed from Kraljic (1983) whereas some parts are very similar and therefore the focus will be on differences.

**Analysis of the company’s purchases**

The first step of this model is to analyse the company’s purchases. The essential ideas with two classification dimensions and different factors within each of them plus the part of depicting purchases into a portfolio model are compatible. However the focus on the two classification dimensions is a bit diverse. In this model, one of the dimensions is the **Strategic Importance of the Purchase** which focuses on internal factors to the firm. Examples of factors possible to use can be seen in Figure 3.6 and are divided into three groups. It is of great importance to understand that the listed factors not are comprehensive and that they must be adjusted among companies. (Olsen & Ellram, 1997)

In the first group, competence factors, the company gets knowledge of the strategic importance of the purchase by finding out if the item purchased is close to the core competence in any way. Another contribution that comes with evaluating the competence factors is to see if it could strengthen the knowledge and technology within the firm. To describe the economic importance of a purchase the economic factors are used. Furthermore they are supposed to capture the interdependencies between purchases...
which can be achieved through knowledge about whether the purchased items are useful to get leverage with suppliers for other buys or not. To describe the strategic importance of the purchase to the company’s image toward customers and suppliers the third group, image factors, is used. (Olsen & Ellram, 1997)

<table>
<thead>
<tr>
<th>Factors Influencing the Strategic Importance of the Purchase</th>
</tr>
</thead>
<tbody>
<tr>
<td>Competence factors</td>
</tr>
<tr>
<td>1. The extent to which the purchase is part of the firm's core competencies</td>
</tr>
<tr>
<td>2. Purchase improves knowledge of buying organization</td>
</tr>
<tr>
<td>3. Purchase improved technological strength of buying organization</td>
</tr>
<tr>
<td>Economic factors</td>
</tr>
<tr>
<td>1. Volume or dollar value of purchases</td>
</tr>
<tr>
<td>2. The extent to which the purchase is part of final product with a great value added.</td>
</tr>
<tr>
<td>3. The extent to which the purchase is part of a final product with a good profitability</td>
</tr>
<tr>
<td>4. Criticality of the purchase to get leverage with the supplier for other buys</td>
</tr>
<tr>
<td>Image factors</td>
</tr>
<tr>
<td>1. Supplier critical image/brand name</td>
</tr>
<tr>
<td>2. Potential environmental/safety concerns</td>
</tr>
</tbody>
</table>

Figure 3.6: Factors Influencing the Strategic Importance of the Purchase (Olsen & Ellram, 1997, p. 104)

The other dimension is mentioned Difficulty of Managing the Purchase Situation and has its focal point on external factors. Examples of factors belonging to this dimension can be seen in Figure 3.7 and in the same way as for the factors above they are divided into three groups, are not comprehensive and vary among companies.

The factors of the product characteristics describe to which extent the company has to pay extra attention to the supplier relationship. A new item might demand more attention/effort as well as a complex item. The second group also describes characteristics that might demand extra attention but consider company size, the number of suppliers, resource dependence and other characteristics concerning the supply market instead of the product. The environmental characteristics describe the risk and uncertainty connected to a purchase situation. (Olsen & Ellram, 1997).
Calculation methodology

To be able to categorise purchases in a portfolio model the factors being listed in Figure 3.6 and Figure 3.7 needs to be assigned weights. This part might be the most important one in the implementation process but at the same time it is very subjective (Olsen and Ellram, 1997). It has been concluded that the Achilles heel for portfolio models is measurement and recommendations should be applied with reservation. (Day, 1968 in Gelderman & van Weele, 2003) Different methodologies to assign weights to a number of factors exist. Olsen and Ellram have chosen to use a methodology described by Narasimhan (1983).

Summarised the method adds the factors that are to be utilised in the same dimension (in this case the dimensions Strategic Importance of the Purchase or Difficulty of Managing the Purchase Situation) with help of translations to quantitative values. To start with a weight is decided for each factor. In order not to be forced to compare all factors describing the dimension they are compared on different levels in the hierarchy, see Figure 3.8.

![Figure 3.8: Hierarchy of selection factors (Olsen & Ellram, 1997, p. 112)](image)
To begin with the three groups of factors are compared. Example on a result is that product characteristics is the most important one and therefore has the highest weight, followed by environmental characteristics and less important supply market characteristics. The procedure then continues with comparing the factors of each group, product complexity is compared with novelty and so on. To read the general methodology see Appendix B. After having done all these comparisons each factor can be given a weight. That is done by following the factor up through the hierarchy and multiplying the weights on each level. (Olsen & Ellram, 1997)

Further the rate of the product complexity, novelty, suppliers’ power etc. has to be decided. A scale is used from which the factor of the group is given a value. It is important to use the entire scale when rating. Finally the rated value of the factor is multiplied with the weight, this is done for all factors within the same dimension. To be able to evaluate a purchase the factors are summarised and a single score is received. (Olsen & Ellram, 1997)

After this step it is possible to depict the purchases in a portfolio model. The model used is the one described by Kraljic (1983), see Figure 3.3. Since the entire relative scale is used the categorisation should give results possible to separate which makes an improvement of the resource allocation possible. The classification quadrants have each suggestions on how to manage the relationship connected with the purchases but these are similar to those presented by Kraljic and therefore not further explained. (Olsen & Ellram, 1997)

**Analyse the supplier relationships**

Step two in this model is to analyse the supplier relationships associated with the purchases. Olsen and Ellram (1997) recommend that the supplier relationships should be categorised based on the two dimensions **Relative Supplier Attractiveness** and **Strength of the Relationship**. Factors a company should discuss within the relative supplier attractiveness-dimension should answer why a company chooses a specific supplier. Examples of factors are listed in Figure 3.9 and as earlier the list is not comprehensive and should be adjusted to the company.
The same applies for the other dimension, factors included in this dimension are those that describe how companies create bonds. Examples can be seen in Figure 3.10.
An evaluation of the factors presented in Figure 3.9 and 3.10 is done by using the methodology of Narasimhan (1983), described earlier. After that a classification of the supplier relationships in a portfolio model, seen in Figure 3.11 takes place. The dimensions used in this model, Relative Supplier Attractiveness and Strength of the Relationship, have the same three levels; low, high or moderate which gives nine different categorisation possibilities. Furthermore each supplier relationship can be symbolised with a circle sized differently depending on how much of the resources that currently are being allocated to the relationship. This gives the categorisation a third dimension and is a possibility to enhance the analysis. (Olsen & Ellram, 1997)

![Figure 3.10: Factors Describing the Strength of the Relationship (Olsen & Ellram, 1997, p.107)](image)

**Factors Describing the Strength of the Relationship**

<table>
<thead>
<tr>
<th>Economic factors</th>
<th>Character of the exchange relationship</th>
<th>Cooperation between buyer and supplier</th>
<th>Distance between the buyer and the supplier</th>
</tr>
</thead>
<tbody>
<tr>
<td>2. Importance of the buyer to the supplier</td>
<td>2. Level and number of personal contacts</td>
<td>2. Technical cooperation</td>
<td>2. Cultural distance</td>
</tr>
<tr>
<td>3. Exit costs</td>
<td>3. Number of other partners</td>
<td>3. Integration of management</td>
<td>3. Technological distance</td>
</tr>
<tr>
<td></td>
<td>4. Duration of the exchange relationship</td>
<td></td>
<td>4. Time distance</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>5. Geographic distance</td>
</tr>
</tbody>
</table>

![Figure 3.11: Analysis of supplier relationships (modified from Olsen & Ellram, 1997, p. 107)](image)
Develop action plans

Step three is to develop action plans by comparing the two analyses described in this chapter. To be able to do this the nine cells are divided into three groups which can be seen in Figure 3.11. Strategies are recommended for each group but the strategies are dependent on the result of the first analysis, the one where the company’s purchases are studied. (Olsen & Ellram, 1997)

The allocated resources, represented by the sizes of the circles, also demand consideration. Mismatches between the allocated resources and relative supplier attractiveness/strength of relationship can come up in all cells and wherever such a situation is present an action plan should be developed. Obviously a number of action plans can be of interest to improve the current situation, thus the recommendation is that a few action plans should be in focus. (Olsen & Ellram, 1997)

3.3.3 Power-dependence portfolio model

Olsen and Ellram (1997) use, like Kraljic (1983), one internal and one external dimension in their portfolio models. Bensaou (1999) is moving away from this with the use of power-dependencies between buyer and supplier to differentiate between different types of relationship.

Many large manufacture companies are today leaving the conventional vertical integration and are headed for more inter-firm relationships. Bensaou (1999) points out the need for a differentiated way of dealing with relationships and further offers a framework for managing a portfolio of relationships.

In his research of the auto industry in Japan and the US, Bensaou (1999) found a significant correlation between the extent of specific investments made by either part to the relationship and activities commonly related to strategic partnerships, such as long-term relationships, cooperation, mutual trust, etc. The exchange of specific investments therefore founded the criteria for the comparison of relationships (Bensaou, 1999).

Contextual profiles

The first step of the research consisted of classifying the relationships between the company and the suppliers and identifying which type of relationship that matches the competitive conditions surrounding the product exchange. By looking at the relationships in the form of Buyer’s Specific Investment and Supplier’s Specific Investment, the axis in Figure 3.12, the position of the relationship could be set in the four segments of the portfolio. Buyer’s specific investments are for example investments in buildings, tooling,
equipment, people, time and effort or in processes and products customised to the items purchased from the supplier. The supplier’s specific investment on the other hand takes in warehouse location and layout, specialised engineers, compatible information systems and so on. (Bensaou, 1999)

The second step was to identify the contextual profiles of the different quadrants. In order to do this, three key factors needed to be considered:

- The exchanged product and its technology
- The character of the upstream markets
- The characteristics of the available suppliers

By looking at the relationships inside each quadrant important key characteristics were found. A few example features of the quadrants are presented in Figure 3.12. (Bensaou, 1999)

![Figure 3.12: Contextual profiles (modified from Bensaou, 1999, p. 38)](image-url)
**Management profiles**

In the third step management profiles for each type of relationship were designed. These profiles are based on three different mechanisms that help coordination and exchange of knowledge;

- Information sharing
- The characteristics of border tasks
- The social climate

Bensaou (1999) found that components having the same features tend to be managed in the same way. Successful relationships are the ones where the requirements of the relationship go with the actual capabilities of the relationship. To deliberately match the design of each relationship to its external context makes it easier to avoid the common traps of designing too much or too modest. (Bensaou, 1999)

**New perspective**

Like Bensaou (1999) Gelderman and van Weele (2000) felt the need to bring ‘power’ into the portfolio model and further make the role of power clear in decisions concerning strategic purchasing. Gelderman and van Weele (2000) therefore gained more insight in the power concept in buyer-supplier relationships while trying to bare the original comprehensive portfolio approach by Kraljic (1983) in mind. This showed that power and dependence are closely related and most treatments of power highlight the critical role of dependence. By making a distinction between high and low dependency the relationship can be classified. When mutual dependency appears, power is in balance. This led to four possible combinations of dependence namely:

- Low mutual dependence (balance of power)
- High mutual dependence (balance of power)
- Low supplier’s dependence (supplier dominated)
- High supplier’s dependence (buyer dominated)

These groups were compared to the classification of Bensaou (1999) and the dependency combinations were the same. Furthermore it was possible to add the four main tasks of the Kraljic portfolio approach to the model. This led to a combination of the original portfolio approach and the insights of resource dependency theory. (Gelderman & van Weele, 2000). The new mutual dependence-based purchasing portfolio model is presented in Figure 3.13.
3.3.4 Strategic directions through the purchasing portfolio

Another result worth noticing is that Gelderman and van Weele (2003) claim that having in-depth discussions, after the work of filling the matrix is finished, is the most important part of the analysis. To add information like overall business strategy, situation on supply market etc. is required. Further the study showed that experienced practitioners had two different types of strategies for each category in the matrix. On one hand there was the possibility to hunt other positions in the matrix while on the other hand actions could be taken to hold the original position. Maintaining a position in the matrix can be done for either positive or negative reasons. It might be the best position but there can also be a lack of realistic possibilities for change. The different possibilities with strategic directions are summarised in Figure 3.14. (Gelderman & van Weele, 2003)
### 3.4 Network approach

Isolated relationships between companies are not independent of other connected relationships. One specific supplier may deliver a wide range of products or services to a number of companies. Industrial purchases are further often repeated which means that previous and future purchases play a big part. (Dubois & Pedersen, 2002)

Using the industrial network approach for modeling and understanding relationships is according to Dubois and Pedersen (2002) quite different from purchasing portfolio approaches. This approach has the whole inter-firm relationship as analysis unit rather than just the product or the two firms directly involved, see Figure 3.15. Resources and capabilities of the supplier’s other relationships can be accessed when developing a supplier relation. By restraining the analysis to a given item in a dyadic context it is possible to obscure potential for increasing efficiency and innovativeness. (Dubois & Pedersen, 2002)
When using a network approach all activities, resources and actors are seen as interconnected. To be able to understand and build up suitable strategies the whole pattern must be analysed. It is important though, to remember that the pattern constantly changes. (Gadde & Håkansson, 1993)
4 Problem Definition

In this chapter the problem presented in the introduction will be discussed more thoroughly. The two parts of the purpose presented in Chapter 1.2 will be further concretised and broken down into a number of research questions.

4.1 Classification tool

The first step, the classification tool, is meant to be something that is easy to use, explain and understand for people involved in the strategic work of purchasing. Results received after having used the tool should serve as a starting point for the continuous work of developing a strategy.

To make sure that the company achieves cost efficiency when making a purchase, plenty of things can and should be reflected. Though, to consider all elements affecting a purchase is impossible. By using the portfolio concept mentioned in Chapter 3.1.3, a complex problem can be made simpler by using a matrix. Since the aim is to get a simple tool, possible to use as a base facilitating the work of developing different strategies towards suppliers, the concept is suitable. The use of a classification matrix in this thesis will make it possible to consider elements of importance, without losing the core regarded to cost efficient purchasing. Furthermore, in Chapter 3.3, van Weele (2000) recommends using a portfolio-technique for developing strategies for commodities. A purchasing portfolio matrix is two dimensional and each dimension represents a subject matter, see Figure 3.3. To come to the conclusion of which subject matters that should be utilised, it is of great significance to hold in mind that the subject matters need to be as comprehensive, applicable and interesting from a purchasing perspective as possible.

4.1.1 The base of the classification

As can be read in Chapter 3.3, Kraljic (1983), Ellram and Olsen (1997), Bensaou (1999) and Gelderman and van Weele (2000) have each developed a tool that classifies purchased articles. In common for the four tools is that they are built up from two dimensions but the subject matters of the dimensions do differ. Both Kraljic and Olsen and Ellram have one dimension representing the company’s internal conditions and one dimension representing the external conditions. After having done comparisons of these two authors’ dimension pairs, these are considered to be quite similar and possible to combine. Bensaou and Gelderman together with van Weele on the other hand have chosen other subject matters for their dimensions, mainly treating the buyer supplier relationships like the power-dependencies between buyer and supplier. The idea of this
part of the purpose is to classify a purchased article and not a relationship. The aspects
treated by Bensaou and Gelderman and van Weele are therefore not considered here.

To create the base of classification the subject matters that should be used for each
dimension in the portfolio matrix are decided. The dimensions are determined from the
discussion above, from the term of reference that raw materials are to be classified and
from the fact that there is an awareness of the original purchasing portfolio model at
Casco. The subject matters for the dimensions in this thesis will be named Importance of
Purchase and Supply Risk and are inspired by the ones developed by Kraljic (1983) and
Olsen and Ellram (1997). These subject matters are considered to be as comprehensive
and applicable to the line of business at Casco as possible. Further the portfolio matrix is
divided into four quadrants. Since the dimensions are very similar to the ones of Kraljic
and Olsen and Ellram and due to the fact that they use the same grouping of the
quadrants, see Chapter 3.3.1 the choice is to use their quadrants; non-critical, leverage,
bottleneck and strategic. The base of the classification tool can be seen in Figure 4.1.

![Figure 4.1. The base of the classification tool](image-url)
4.1.2 Adapting the tool

To be able to create a practical applicable tool for Casco the steps of creation need to be more specified. First factors describing each dimension will be gathered from theories and adapted to Casco. The factors will be collected in two lists and serve as base for an investigation for the classification tool. The next step is to secure that no factor, of great significance to Casco and not mentioned in theory, is left out. By answering the following question the lists of factors should be as comprehensive as possible:

1.1. What additional factors, with respect to the line of business, may be of importance for each of the settled dimensions?

After that the most important and relevant factors for each dimension needs to be discerned. It should be added that an essential aspect, needed to constantly be considered when choosing the factors, is that Casco has a wish to retain the classification tool as easy as possible. At this stage focus will be on the following question:

1.2. Which are the most important factors, from the lists finished in question 1.1, for each of the settled dimensions?

The tool will contain the factors and their answers. To be able to depict the product into the matrix the factors should have answers that are very easy to interpret, without losing the relevance of the task. Hence the question to be answered next is:

1.3. What are the possible answers of the factors from question 1.2 and how can they be measured?

Further the factors within each dimension might be of different importance why it will be vital to compare the factors and grade them, see Chapter 3.3.2. The aim is to get an accurate positioning and therefore the next question is:

1.4. What are the relative weights of importance in between the factors?

To be able to classify the raw material the answers from question 1.3 have to be connected with question 1.4. Thereafter the value of the borders between the quadrants will be a central issue to decide. The classification will place a product in one of the quadrants non-critical, leverage, bottleneck or strategic and since the main task for each quadrant differ it is important to place the border correctly to get an accurate classification and thus a good starting point for the following work. The last question is:

1.5. What should the value of the borders between the quadrants be?
After having worked through the questions carefully the process of classifying the articles will be manageable.

4.2 Strategy template

As stated earlier, it is of great importance to consider all the aspects influencing the purchase when developing a purchasing strategy. In Figure 3.2 Farmer (1985) presents these aspects as four factor groups to take into consideration. By performing a classification, according to the first step of the portfolio model, internal aspects such as the importance of the purchase, from the company’s point of view, will be considered. But also external aspects that have to do with the supplier market will be illuminated. However, these areas will be far from covered and according to Farmers factor groups there will still be a lack of aspects for external sales and internal production and engineering. These parts will therefore be completed in this second step of the thesis.

Our portfolio model consists of one classification tool that separates the purchased raw material into four categories according to Chapter 3.3.1. These categories are the starting point of this second part, consisting of the development of a strategy template. As stated in Chapter 3.3.1, the original portfolio model developed by Kraljic (1983) argues that after classification of the items it is really important to seek further information about the surroundings in order to develop a suitable purchasing strategy. The purchasing portfolio model developed by Olsen and Ellram (1997) furthermore points out the importance of continuing the search for further important information after the first classification phase. Also Gelderman and van Weele (2002) emphasise the need to add information after the classification.

Our aim with this second step is to create a template consisting of relevant questions concerning important aspects of the purchase for each of the four quadrants from the classification. By using this template the purchaser will be able to develop a suitable strategy for each raw material. This template must be user-friendly and therefore not needlessly comprehensive, but it will contain questions of a more qualitative character and therefore be more complex to finish.

4.2.1 The basic idea

Kraljic (1983) reaches the next step of his purchasing portfolio model when suggesting an investigation of relative strength between the company and the suppliers. Even though this investigation is suggested mainly for strategic items, it is stated that more information is needed for each quadrant of the classification matrix in order to build a
stable strategy. Olsen and Ellram (1997) instead investigate the supplier relationship and seek more information for all four quadrants in order to develop a suitable strategy.

The information needed vary since the prerequisites as well as the main tasks are different for each quadrant. As stated in Chapter 3.3.1 Kraljic (1983) and Olsen and Ellram (1997) have a mutual ground for the classification which means that the prerequisites and also the main tasks are similar. The prerequisites of each quadrant, in our classification set by the subject matters Importance of Purchase and Supply Risk, differ along the axis and decide the mission for the particular group. The overarching goal for the raw material strategy is set by the main tasks for one of the respective quadrants. The questions of the template will provide the information necessary to find a way of reaching this goal. The main task is the light of the tunnel and the template will provide the needed information to find the best possible way. Figure 3.4 states the main tasks in full while Figure 4.2 shows a summarised version.

The four quadrants will consequently require different information from the strategy template. This supports the definition of the portfolio concept as stated in Chapter 3.1.3. Even though the same information is required for the respective quadrants every raw material needs an individual template describing its specific characters.
4.2.2 Aspects complementing the classification
The classification will be made rather simple, as stated in Chapter 4.1. Since the strategy template will take off from the finished quadrants it is very important that the template contains clear information about the classification, to make the purchaser understand the starting point and the main task of the strategy. The information includes concrete values to the factors in the classification like for instance the name and number of suppliers used today, the total value of the purchased raw material etc. This leads up to the following question to be answered.

2.1. What information is necessary in order to make the position of the respective raw material in the classification tool understandable?

Making the classification tool simple to use means not being able to consider all possible aspects that could affect the raw material’s position in the matrix. When classifying according to Olsen and Ellram (1997) multiple factors are being used, in order to enlighten all aspects and make a classification very advanced and close to the truth. This thesis also wants a good classification tool but it has to be simple. Some affecting aspects may have had to be left out in step one which is why these aspects will be dealt with in this second step. If for example the factor profit of final product is left out, and a specific raw material with low value is a key ingredient in a final product with great profit, this factor still needs to be considered. The importance of this purchase is then high even though the value of the material is low and this will affect the final strategy.

It is also possible due to lack of correct or updated data concerning supplier market and potential suppliers that the purchaser of a raw material works with the raw material wrongly which will lead to an incorrect classification. For instance, only working with one supplier of a raw material does not mean that the raw material is really a bottleneck item if there actually is more than one possible supplier out on the market. Kraljic (1983) also points out the importance of knowing the market in order to develop a strategy for business on this market. Hence, the following question will be answered next.

2.2. What further information about the importance of the purchase and the supply risk, with respect to the main tasks, is necessary?

4.2.3 Supplementary aspects
After having collected all this information it is time to start gathering information from aspects not connected to the actual classification. It is still important to keep in mind that the respective four quadrant tasks set the goals for the strategy. As mentioned above, both Kraljic (1983) and Olsen and Ellram (1997) suggest further investigations in their
respective models by focusing on important aspects of strength and relationships, see Figure 3.5 and 3.11. The information in these models may well be important for Casco when developing a purchasing strategy.

There are however other ways of using a purchasing portfolio approach that differs greatly from the two main theories having been used throughout this chapter. Bensaou (1999) argues that the most important aspect to consider is the power dependence between the buyer and the supplier in the form of investment. Also Gelderman and van Weele (2000) felt the need to bring the power aspect into the portfolio model, see Figure 3.13. For both Bensaou and Gelderman and van Weele, see Chapter 3.3.3, the main tasks to work with are still the same as for Kraljic (1983). The information collected through these approaches, see Figure 4.3 may possibly be important also in Casco’s situation and will therefore be looked into more closely in below mentioned question 2.3.

Finally, the network approach will also be considered in a simplified way. Even though this approach does not fit under the purchasing portfolio theory it will be investigated whether it is important for Casco or not.
The information gathered from this stage must however to some extent be adjusted to the four different quadrants since the objectives of each group is somewhat different. This implies the following question to be answered:

2.3. What supplementary information, suggested by the purchasing portfolio literature, is necessary in order to cover important aspects of the purchase?

To leave room for aspects not covered in the portfolio literature but still necessary for a purchasing strategy template question concerning this will be added:

2.4. What additional information is necessary in order to cover important aspects of the purchase?

When finding the answers to above four research questions all aspects of Figure 3.2 presented by Farmer (1985) will be covered. Also the number of questions presented by van Weele (2002) in Chapter 3.2.2 will have been considered.

The strategy template will finally also contain information of more common character like for example name and number of the raw material, responsible person etc. to simplify the handling of the template and facilitate updating and filing.

By categorising a raw material with the classification tool and thereafter, based on the specific classification quadrant, fill out the strategy template that covers the situation of the raw material, the purchaser will possess the necessary information to develop a suitable strategy.
5 Methods of research

In this chapter the methods of research will be illustrated. It will be performed through a discussion about the scientific perspective, a description of the research methodology and the organisation of the work to finally be concluded with a critical discussion about the method chosen.

5.1 Scientific perspective

Within the area of business economics and management there are, according to Abnor and Bjerke (1994), three scientific perspectives; the system perspective, the analytic perspective and the actor perspective. The difference between the perspectives is substantial and the chosen perspectives will hence have a significant impact on how a study is conducted.

In order to investigate the right components at Casco a system perspective was chosen. This perspective was appropriate since it assumes that the reality is not additive and can therefore not be explained by the sum of the system components. The relevant part is instead the relation between the sub components. In order to find a suitable solution for Casco there was a need to have a thorough understanding on how different components like for instance R&D, purchasing and production interact with and affect one another. The system perspective is suitable for tasks of logistic character since these kinds of inquiries often are complex and difficult to measure. (Abnor & Bjerke, 1994)

The analytic perspective was necessary to use for the analysis of data collected and for some parts of the investigation relating to each component as well. When digging deeper into purchasing, R&D and production interviews was conducted to find out the aspects important for each component. The analytical perspective, which assumes that the respective component does not affect any other part but the result in the corresponding way, was used in order to bring out the essence of each component involved. Interaction between components, which in some ways was relevant for our task, was not considered here. (Abnor & Bjerke, 1994)

For the final phase of this thesis the analytical analysis was discharged in a result of system perspective character. The relations between the components were once again considered when completing the portfolio model. Purchasing strategies are not isolated occurrences and must therefore be treated in a system environment.
The *actor perspective* was however rejected, seeing as this view presumes that reality and all activities performed are social constructions influenced by humans. This perspective was therefore not apposite on the task aimed to be solved. (Abnor & Bjerke, 1994)

### 5.2 Research methodology

While the purpose decided what kind of conclusions this thesis wanted to arrive at, the research methodology stated how the assignment was conducted technically to fulfill the purpose. According to Lekvall and Wahlbin (2001) the three main aspects to consider when defining the research methodology is the scope of the inquiry objects, the type of analysis method and the type of data used. These three aspects will be discussed for our specific inquiry.

Since our task was to create a portfolio model for Casco’s purchased raw materials, mainly issues within Casco was addressed. The scope of the inquiry was consequently just Casco which made the thesis a case study. The second aspect concerning analysis methods was not easy to clearly distinguish as either quantitative or qualitative. Even though most of the collected data was qualitative and gathered via interviews, some existing quantitative data was also used when analysing. Finally, the data used in this thesis consisted of both primary and secondary data. The secondary data was the already existing information used and gathered before while the primary data was information retrieved for this thesis only.

### 5.3 Organisation of the work

The organisation of the work for this thesis was divided into four phases. The first phase called planning included all activities concerning preparation and composition of the task to be solved. This phase started with the problem introduction, navigated us through the company description, presented the frame of reference, defined the problem and ended clarifying the methods of research. During the next phase, classification tool phase, the theoretical as well as the empirical investigation took place and hence data from both literature and interviews was collected. Further analysis was done where the results from the investigation were evaluated and analysed. Since the purpose of the thesis was divided into two parts that were dependent, see Chapter 4.3, the following phase was equal to the second part of the purpose and thus called the strategy template phase. Investigations and analyses were performed in terms of collecting and discussing data from literature and discussions. Conclusion was the final phase and it contained the conclusions for the thesis. A schematic figure of the organisation of work is presented in Figure 5.1. The work in respective phase will be described more thoroughly.
5.3.1 Planning phase

The focus of the planning phase was first of all to create a general understanding of the problem addressed in this thesis. To be able to do this, it was necessary to understand Casco’s activities with special emphasis on the purchasing component, R&D and to some extent also the production. Therefore interviews with several people on different strategic positions within purchasing and R&D were conducted. To further get a better understanding of the company, information was also gathered from Casco’s website and a study trip to the manufacturing site was made. With enhanced knowledge about the company and the background leading to the studied problem area, the purpose was carefully discussed and decided, and later also approved by our tutor at Casco. All parts involved had reached a mutual starting point for the thesis and also set some important terms of reference.

From the thorough information collection a company description was put together, describing the most vital parts of Casco and its surroundings. Parallel with the company description a literature study was conducted. The search for relevant theories was mainly focused on purchasing theories somewhat related to purchasing portfolio approaches, since this was a term of reference from the company. The literature studied was mainly scientific articles and books but some other sources such as conference proceedings on the subject were also read. The selected applicable theories then came together into a frame of reference.

The theories from the frame of reference made it possible to decompose the purpose of the thesis, and make the problem more defined. By designing more precise research questions, the task was delimited into a manageable size and the different steps towards finding a solution were made clearer.
After defining the problem there was still uncertainty about the actual methods of the research. First the scientific perspective and the research methodology were discussed and decided. Thereafter the organisation of the work was divided into four parts which were each thoroughly discussed, with regards to the precise research questions and usable theories but also limitations in time and resources. As a result of this, a method for fulfilling the purpose was carried out.

5.3.2 Classification tool phase
As mentioned earlier the purpose of this thesis was divided into two dependent steps. The first step was to create a classification tool where purchased raw materials can be positioned into a portfolio matrix.

Investigation
During this phase data was collected. In order to select and bring in the information needed, specified for Casco, the investigation phase consisted of a substantial amount of interviews. First it was necessary to make sure that nothing had been left out when lists of possible factors had been developed and that the factors were relevant for Casco. Further the respondents’ opinions of which factors that were the most important considering first and moreover the supply risk dimension were collected. The aim was to cover all aspects of interest and therefore interviews took place with persons working with purchasing, R&D and production. The questions were based on the lists but the intention was also to let the respondent think independently. Thus our intentions were to carry out the interviews in an open but still flexible form. Björklund and Paulsson (2003) call an interview where the subject areas are decided in advance and the questions asked at a most suitable time for a semi-structured interview.

A complementary course of action was to plot factor answers. Factors to plot were those of a quantitative character, as for example the raw material’s value of the total purchases value. Our tutor at Casco provided us the necessary data, partly found in their business system. Continuously the factors were studied alone and in pairs. one factor. All the raw materials were considered and the purpose was to find out whether there was a spread in the material or not. If correlation was found the use of both factors was not necessary. In addition this gave guidance to how many factors that should be used on each axis.

Furthermore there was a need to decide the different answer alternatives and their contribution to the importance of the purchase/supply risk, compare the importance of the selected factors and decide a critical border. In order to do so discussions took place with
the purchasing and R&D functions. This was done in order to secure the following analysis.

To finally gain approval for the classification tool a meeting took place. A number of the respondents interviewed earlier were invited to discuss the tool. Emphasis lay on comprehension for the tool, the selected factors, their weights and the placement of the critical border.

**Analysis**

The analysis was partly based on the information obtained in the investigation phase but also came from studied theories. The goal of the work was to create a tool easy to use when classifying the purchased raw materials but still reliable as a starting point for the continuous work.

To be able to decide the appearance of the matrix, in terms of the subject matters used for each dimension, and to bring forth a first list of factors for each subject matter a synthesis of the different studied theories was done. The fact that the studied items were raw materials and that there was an awareness of the original purchasing portfolio model at Casco, was also considered at this stage.

Continuously the factors derived from the interviews in the investigation phase needed to be further studied. A compilation was done right after each interview to make sure that mutual understandings of what was stated were achieved. The results from the plotting part was also evaluated, based on for example how user-friendly the factors are. The derived results was then combined, with consideration taken to the fact that Casco wished to retain the classification tool as easy as possible, and gave an answer to which the most important factor/factors for each dimension were. The work had its basis in quantitative as well as qualitative methods. The results from the interviews were qualitatively influenced by opinions which can be a source of error regarding the results. By interviewing people from the different functions a comprehensive picture was achieved that helped to cover all aspects of interest. By constantly remember that the functions have different goals, during and after the interviews, the source of error when interpreting the interviews was minimised. Moreover, it was believed that a combination of qualitative and quantitative data was helpful when trying to get an objective tool.

Continuously the answers of the factors needed to be generated and measured. The different answers and their contribution to the importance of the purchase/supply risk were discussed and an analysis was made. The analysis led to a quantitative value for
each answer. The intention was to work with as quantitative answers as possible to make the judgment part as objective as possible.

Thereafter the outcome of the discussions with the purchasing and R&D functions considering the importance of the factors was analysed and the importance of the factors finally decided. Continuously the factors were given weights which were decided by using the calculation methodology described in Chapter 3.3.2. To easier understand the methodology used an example is given, see Appendix 7.2.

When deciding where the critical border between the quadrants should be, one thing was to settle maximum/minimum value of the scales. From the discussions in investigation a value for the critical was analysed and settled.

To be able to hold the meeting discussed in the investigation phase suggestions had to be derived. This meeting helped us to choose a tool that could be accepted and used in the daily line of business. It was also a way to assure that the interviews were correctly interpreted. In addition the people working at Casco were made aware of our efforts and given a chance to early participate in a work they are meant to perform later on.

Finally the point was reached where a result in form of a ready portfolio model could be presented.

5.3.3 Strategy template phase

The second step of the purpose, stated in Chapter 1.2, was dependent on what the classification tool gave. The aim of the second step was to collect all information necessary to develop suitable strategies for raw materials.

Investigation

The investigation for the strategy template phase took off where the classification tool phase ended. To start with it had to be elucidated which information that was necessary to make the position of respective raw material in the classification tool understandable. Further information about the Importance of Purchase and the Supply Risk, with respect to the main tasks also had to be collected. Likewise a synthesis of supplementary information suggested by the purchasing portfolio literature and further information connected to the line of business had to be gathered. To cover all important aspects for the line of business and make sure that the essential information was selected discussions were repeatedly conducted with the purchase manager and our tutor at Casco. The respondents were asked for information specific for Casco and if the information was enough to understand the classification or if something were missing. They were also
asked to evaluate if the information, put together by us, was the information necessary to get a good view of both the external and internal situation.

After having finished the discussions and the analysis questions for the strategy template were completed. But to anchor the template and at the same time make sure that no major area of information was missing two examples were made. Together with the purchasing manager and our tutor the template were worked through for two raw materials classified in different quadrants. The aim was to find out if something was missing or if the template was too extensive and something needed to be left out. This was also a good way of securing the usage of the portfolio model in the organisation.

**Analysis**

The basis of the analysis phase was data collected during the investigation phase. The analysis itself was supported by theories from Chapter 3.3 and therefore mainly of qualitative character.

To analyse what information necessary to collect to make the classification understandable, the input from the interviews and the end result in the classification tool phase was of high importance. It was essential to take the factors of each dimension of the classification tool and translate these into facts and figures. The information needed was summarised and put into the first and incomplete version of the strategy template.

The next step was to analyse what further information about the importance of the purchase and the supply risk, with respect to the main tasks, that was necessary to collect. A lot of emphasis was put on the interviews conducted in the classification tool phase. It was very important that all necessary information concerning the situation of Casco, with regards to the raw material, was displayed in the strategy template. Some information was derived from the list of all factors influencing each dimension in the classification tool. The factors had, for different reasons, already been dismissed but could well still be of great significance for the selection of a specific strategy. Information to better explain the factors of the classification tool was also brought in. The main tasks are the goal for the strategy and therefore closely linked to the factors and have thus always been kept in mind when gathering information. The main tasks were a significant part of the analysis as well, since they constituted the aim for each strategy. Finally, the information needed was converted into template questions/statements, and added to the growing strategy template document.
The supplementary information gathered from literature was the next thing to analyse. The emphasis on this information lay on complementing the already collected information in order to make the template comprehensive. The common denominator for the supplementary information is relationships. The actual need for information regarding relations was different depending on the tasks of the quadrants and for analysing what information needed the main tasks were once again considered as well as the theories in Chapter 3.3 and 3.4.

Finally the strategy template was completed by analysing if any additional information was needed to facilitate the development of a purchasing strategy. Key issues were here to look at the information gathered and make the development of a strategy based on this information as obvious and simple as possible.

Last but not least, after the two examples were worked through the template was analysed ones more. Some questions in the strategy template showed to be better if they were asked in a slightly different way and a couple of questions had no function. The template had to cover all necessary information but needed not to be too extensive. Our aim was to create a portfolio model that was appreciated and used by all persons involved in strategic purchasing. The template was therefore modified where necessary.

The point was reached where a complete strategy template could be presented.

5.3.4 Conclusion phase

In this phase the results from both the classification tool phase and the strategy template phase was summarised and reflected on. The classification tool and the strategy template was brought together and viewed upon as a complete portfolio model for developing purchasing strategies. The classification was further conducted on the raw materials at Casco and for some chosen raw materials the strategy template was completed. The results from this were then commented. Finally, some thoughts about the degree of generalisation possibilities of the investigations and analysis were also shared.

5.4 Criticism of Methods

An important aspect to consider when selecting methods of research was the potential sources of errors that may inflict the result. According to Lekvall and Wahlbin (2001) the quality of a study can be valued by considering the following questions:

- Are the results attained relevant for the situation?
- Have all important issues been overlooked?
- Is the certainty of the results well known or can they be roughly estimated?
Do the decision makers understand the results and their reliability?

The first two questions are closely connected to the situation discussed, the purpose of the thesis, the definition of the studied system, the problem discussion and finally the analysis and conclusions. The third question however is more linked to the selected methods of research, the gathering of data and the analysis. The fourth and final question has to do with the report and how the results are communicated. (Lekvall & Wahlbin, 2001) Throughout this thesis above aspects have been tried to keep in mind in order to eliminate some and reduce other sources of errors.

Further it is important to reflect on and criticise the applied methods in a study. To ensure the accuracy of a study it is of great value to ascertain the credibility of the study. This can be done by measuring the criteria validity and reliability. (Lekvall & Wahlbin, 2001) A discussion around these two criteria will follow in order to enlighten the weaknesses in method chosen.

5.4.1 Validity

According to Lekvall and Wahlbin (2001) validity deal with whether the chosen method really measure the intended object of exploration. The validity regarding the exploration object was high since this mainly was a case study. In addition the components of the system were the one primarily involved and affected by a purchase. Nevertheless there was always a risk of missing units of importance. But by having constant communication with different contact persons the hope was to ensure that the right units were involved in the investigation phase. The thesis found, to a great extend, support in available acknowledged theories used in their true context, why the validity should be quite high. Though, there is always a risk that some relevant theories have been overlooked or that theories have been misunderstood. Since a lot of the investigation was based on interviews there is a risk for bad validity. Purchase is interpreted differently from person to person but possible errors was counteracted by collecting information from, where possible, more than one source. The validity of the plotting in the investigation should be fairly high since the figures used were collected from the business in line.

5.4.2 Reliability

Lekvall and Wahlbin (2001) define reliability as the probability of receiving the same outcome if the measuring is repeated. The reliability of this study should be fairly high since a lot of the basic ideas were taken from available theories. Other theories could have been used which of course would have affected the choice of method but it is our conviction that the basic characters would be very similar and that a similar method
therefore would be used again. The reliability in achieving the same results from interviews is naturally less high since they reflect individual respondents’ opinions. Interviewing other respondents might have lead to different results. To achieve the same results when plotting is hold as fairly probable but of course it depends a lot on which data that is available to collect. To determine the reliability in the analysis is hard since this work was influenced by our own interpretations and opinions. Our aim is that, as much as possible, the reliability is secured through support in theory and constant feedback from people involved.
6 Classification tool

In this chapter four steps will be worked through in order to build the classification tool. The subject matters will be dealt with separately through all steps and finally be joined together in order to complete the tool.

6.1 The most important factors

The subject matters in the classification matrix were decided in Chapter 4.1.1 why the first step of creating the classification tool focused on finding the most important factors for the subject matters, as stated in Chapter 4.1.2.

6.1.1 Importance of Purchase

To develop the base for investigation factors important for each area was found. By gathering the suggested factors in Chapter 3.3.1 and 3.3.2 and adapting them to Casco lists to use in the continuous work were obtained. The factor groups competence, economic and image that are used to divide the factors were kept, see Figure 3.6, since they were considered to be a good starting point in order to get as comprehensive lists as possible. For competence factors the influence mostly came from Chapter 3.3.2. The core competence and improvement of knowledge aspects were kept and reformulated to suit purchasing of raw material at Casco. The inspiration for the economic factors came from both Chapter 3.3.1 and 3.3.2 where most of the factors were used but adapted to Casco, suitable was also the image factor used. The list of factors describing the Importance of Purchase can be seen in Figure 6.1.
Factors describing the Importance of Purchase

<table>
<thead>
<tr>
<th>Competence factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Extent to which the raw material concerns necessary knowledge/competence areas</td>
</tr>
<tr>
<td>2. Extent to which the raw material is a key ingredient</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Economic factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>3. The raw material’s part of the total purchase value</td>
</tr>
<tr>
<td>4. The raw material’s part of the total purchase volume</td>
</tr>
<tr>
<td>5. The raw material’s part of the end product’s total cost</td>
</tr>
<tr>
<td>6. Profitability of end products containing the raw material</td>
</tr>
<tr>
<td>7. Impact of the raw material’s quality on the quality of the end product</td>
</tr>
<tr>
<td>8. Extent to which the raw material is a key ingredient in a strategically important end product</td>
</tr>
<tr>
<td>9. Extent to which the raw material can make a contribution to enhanced discounts from an attractive supplier</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Image factors</th>
</tr>
</thead>
<tbody>
<tr>
<td>10. Extent to which the raw material raise environmental/safety concerns</td>
</tr>
</tbody>
</table>

The investigation for the classification tool was founded in this extensive list of criteria.

Interviews

Each of the three functions’ interaction with the purchase of raw materials was studied through interviews and the vital findings for the Importance of Purchase are presented below.

The purchasing function has a lot of knowledge in this area and could thus give information and opinions about the factors provided. Despite this no extra factors were added to the extensive list. Factors identified as the most important for the dimension Importance of Purchase were;

The raw material’s part of the total purchase value (3)

Since purchasing in the end always is a financial issue the purchased raw material’s part of the total value will be of importance. From this point of view an important raw material is a raw material with a high total cost. (Klintberg, 2004; Lipkin, 2004)
The raw material's part of the end product's total cost/ Profitability of end products containing the raw material / Extent to which the raw material is key ingredient in a strategically important end product (5,6 and 8)

To have knowledge about the end product, in which the raw material is an ingredient, is of importance to the purchase. Purchases where the raw material is ingredient in an end product with high impact on Casco’s profitability, the end product is of great strategic importance or the raw material’s cost is a large part of the end product’s total cost will be important. (Klintberg, 2004; Lipkin, 2004)

R&D is the function most educated in the characteristics of the raw materials and the competence of the suppliers used. R&D did not add any factors to the list, moreover the following factor was of greatest importance with regard to the Importance of Purchase;

**Extent to which the raw material concerns necessary knowledge/competence areas (1)**

R&D defines that a vital part of the importance of purchase is not only the total value but the actual knowledge from specific raw material suppliers. In some key areas, often concerning more refined and complex raw material, the raw material purchase also includes purchasing of knowledge/competence. A specific character for the adhesive, developed and cared for by the supplier, is then purchased. The purchase of these raw materials is far more important than purchases of other more regular raw materials since the competence and knowledge of the supplier is necessary for the adhesive. These more complex raw materials are often expensive per kilo, but the total cost of purchasing them are small in comparison to more regular raw material less refined but bought in a large quantity. This, however, does not make the more complex raw material less important to be treated more strategically. If the relations with these suppliers are dealt with in an effective way a lot can be gained in further development none the least. (Lagerström, 2004; Persson, 2004)

The production function did not have knowledge about the factors for this dimension since their work does not involve these kinds of issues.

**Plotting**

To succeed in classifying the raw material it is essential that the factors discern the material so that distinct groups can be made. Therefore a complementing way of action was to plot factors of quantitative character and study them in pairs in order to search for spread in the material as well as securing that the factors did not capture the same importance of the raw material. Factors of a quantitative character, and hence plotted, were;

- The raw material’s part of the total purchase value
The raw material’s part of the total purchase volume
The raw material’s part of the end product’s total cost
Profitability of end products containing the raw material

The spreading was stated to be good for all factors. Furthermore correlation between the factors was studied but only found for the value and volume. The data is classified why the plotting figures not can be shown here.

Analysis
From the original ten factors in Figure 6.1 seven were distinguished to be studied further and can be seen compiled in Figure 6.2.

<table>
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<tr>
<td>8. Extent to which the raw material is key ingredient in a strategically important end product</td>
</tr>
</tbody>
</table>

Figure 6.2: The factors necessary for describing the Importance of Purchase

For the factors describing the competence the *extent to which the raw material concerns necessary knowledge/competence areas* was considered vital for the Importance of Purchase by R&D. The raw materials that bring in competence/knowledge to the final product is important. To treat relationships with suppliers that have necessary knowledge about a raw material can well give great advantages in the work of R&D and therefore makes the purchase important. To use this factor is therefore relevant despite the fact that it is rather hard to quantify.

For the economic factors *the raw material’s part of the total purchase value* was chosen. This factor is considered fundamental to the importance of purchase since purchasing to a great deal is a question about money. In addition it is very easy to quantify and thus simple to use. Furthermore plotting showed a satisfying spread and no signs of regimentation. Another factor easy to quantify is *the raw material’s part of the total purchase volume*. Despite that, it was excluded since value and volume, in plotting, to a
great extend were very similar and thus would give the same contribution to the classification. The respondents within the purchasing function found information about the end product relevant, a topic possible to study in different ways. The approach chosen was to study the profitability of end products containing the raw material and the raw material’s part of the end product’s total cost. A spread in the material was found for both factors and they did not illustrate the same patterns in the way value and volume did. Profitability of an end product gives better information about what end products the company should focus on than cost does since it can be indicated from profitability for what end products the costs should be studied further. In combination with the fact that it is very important for Casco to keep the classification tool simple, the cost factor was not considered to contribute enough to make it worth the complexity a use of a further factor would mean and the raw material’s part of the end product’s total cost was therefore excluded. If the raw material is key ingredient in a strategically important end product is not measured by the profitability, but the profitability will contribute with important information of what is strategically important. The strategic factor was excluded since strategic importance is hard to quantify and the fact that the profitability is included.

Result

The same conclusions were made for the factor describing the image as for the last described economic factor. The three selected factors to represent the Importance of Purchase can be seen in Figure 6.3.

<table>
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<td>6. Profitability of end products containing the raw material</td>
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</tbody>
</table>

Figure 6.3: The most important factors describing Importance of Purchase

6.1.2 Supply Risk

To develop the base for investigation of the Supply Risk a similar procedure as for the Importance of Purchase was used. The groups in which the factors were sorted were chosen to be the same as those presented in Chapter 3.3.2. This was because they were found to describe the Supply Risk rather well. The actual factors in these three groups
were then gathered from Chapter 3.3.1 as well as 3.3.2 and modified to Casco’s line of business.

For the raw material characteristics group theories in both Chapter 3.3.1 and 3.3.2 present suitable and important factors like complexity, substitution possibilities, novelty, competitive demand, availability etc. From these our nine factors presented in Figure 6.4 have been developed. The second group containing supply market characteristics are instead inspired by factors like number of suppliers, supplier competence, logistic aspects etc. also presented in Chapter 3.3.1 and 3.3.2. For the group concerning environmental characteristics the base for the factors comes only from Chapter 3.3.2 and the factors’ risk and uncertainty.

This consequently leads up to the extensive list of factors presented in Figure 6.4.
### Factors describing the Supply Risk

**Product characteristics**
1. The durability of the raw material
2. The demand of quality on the purchased raw material
3. The number of end products the purchased raw material is an ingredient in
4. The complexity of the purchased raw material
5. The novelty of the purchased raw material
6. The purchased raw material’s leadtime
7. The speed of the technological development for the purchased raw material
8. The possibility to substitute the purchased raw material with reformulation
9. Time when the purchased raw material is added in the production process

**Supply market characteristics**
10. Number of possible suppliers for a raw material
11. Number of used suppliers for a raw material
12. Existence of high entry barriers or patent for the supply market
13. Location of the suppliers’ for a raw material
14. The suppliers´ ability to deliver right quantity at the right time
15. The suppliers´ investment in R&D for a raw material
16. Difficulty of changing supplier for a raw material
17. The suppliers´ long-term availability

**Environmental characteristics**
18. The environmental awareness of the supplier
19. Environmental legislation
20. The raw material’s environmental status
21. The end customer requirements on a raw material
22. The logistic’s environmental complexity

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The investigation for the classification tool was founded in the above presented list of criteria for the subject matter Supply Risk.

**Interviews**

To investigate which additional factors that may be of interest for the settled dimension, and thereafter single out the most important of all factors describing the Supply Risk, interviews were conducted. All three functions were involved and the findings are presented below.
The purchasing function singled out the following factors when describing the Supply Risk;

**Number of end products that the raw material is an ingredient in (3)**

To be short of raw materials that are ingredients in a lot of end products can be devastating for the production. Lack of an often used material will make it impossible to produce a lot of products which can stop the production. This is a fact well-known and by paying extra attention to these raw materials the supply risk can be reduced. (Klintberg, 2004; Lipkin, 2004; Odda, 2004)

**Lead-time of the raw material (6)**

The production process for an adhesive is rather short, as described in Chapter 2.5. Together with trying to keep low stock levels the demands on short lead-times are high and therefore vital to pay extra attention in order to lessen the supply risk. (Klintberg, 2004; Lipkin, 2004; Odda, 2004)

**Possibility to substitute the raw material (10)**

To create a substitute by reformulating the specification of a raw material makes the purchaser’s situation easier since dependence on one supplier may be avoided. Having substitutes for raw materials leads to lower supply risk. (Klintberg, 2004; Lipkin, 2004; Odda, 2004)

**Number of approved suppliers and possibility to find additional suppliers for the raw material (11)**

Having the possibility to use a number of suppliers can help minimising the supply risk. If one supplier is short of a raw material there is always a possibility to use another and avoid shortage. Furthermore, as mentioned above, the risk of being dependent is also taken care of. It is however important to differentiate between number of approved suppliers, which are the ones that Casco uses today, and the possible suppliers. (Klintberg, 2004; Lipkin, 2004; Odda, 2004)

The factors presented for describing the Supply Risk were also accompanied by the following factors added by the respondents of the purchasing function;

**Condition of supply market for the raw material (23)**

A very important factor concerning the supply risk is the stability and health of the supply market. Since an increasing amount of suppliers are located in places where labor is cheap and markets are rather new and unstable it is important to consider the stability of the market in terms of politics, economy, social issues, technical aspects etc. Also well known markets may have issues of these kinds and lead to a higher risk. The risk for an unstable market is high even if the approved number of suppliers is many. (Odda, 2004)
**Necessity of approval from institutes for the end product (24)**
For some of the end products approval from certain institutes or testing-authorities is needed before selling the product. This concerns mainly adhesives used for load-bearing constructions etc. see Appendix A. When contracting new suppliers or beginning to use a substitute to a raw material, the approval may have to be renewed. This process is very time consuming which is why it may be of risk for the supply. (Odda, 2004)

R&D had a slightly different view of what makes the supply risk high for a raw material. The factors found most important were the following;

**Degree of refinement of the raw material (4)**
A raw material more refined often brings a specific characteristic to the adhesive and consequently has stricter requirements concerning contents and quality. It is further common that the recipes for these raw materials are kept confidential by the supplier which means that the ability to change supplier is really small and the risk thus higher. More complex raw materials are generally more expensive than less refined ones and they are further also used in less quantity. (Lagerström, 2004; Persson, 2004)

**Number of approved suppliers for the raw material (11)**
The number of approved suppliers for a certain raw material is of great importance also for R&D. Being dependent on one supplier often results in higher costs, less commitment from the supplier and a higher risk for quality and supply. (Lagerström, 2004; Persson, 2004)

**Suppliers investment in R&D for the raw material (15)**
The suppliers’ investment in R&D for the raw material is important. The more adapted the supplier is to Casco’s line of business the lower the supply risk. The supplier then understands requirements set on the raw material and specific problems of the adhesive process. A supplier that has invested a lot in R&D for a specific material often present innovations, relevant research samples and alternative solutions that are of importance for the development of future adhesives at Casco. (Lagerström, 2004; Persson, 2004)

Production, and then foremost the process engineer, is involved in the raw material mainly for the factors describing the Supply Risk. The factors that was thinned out as the most important was the following;

**Number of end products the raw material is ingredient in (3)**
Not receiving a raw material that is part of multiple end products means not being able to produce any of these adhesives, due to the fact that the production process solely takes place in reactor tanks. All raw materials have to be added in the same process and lack of
an often used material will stop production. Therefore it is important to consider this factor when discussing supply risk. (Gustafsson, 2004; Sundström, 2004)

Supplier’s ability to deliver right quality of the raw material at the right time (14)
To get the ordered raw material on time is considered to be of great importance for production. This is due to the fact that little time often is given to plan incoming orders which makes the production schedule full and the time for late deliveries minimal. As stated in Chapter 2.5 the actual production process is relatively quick which makes a delay rather noticeable for the customer lead-time and since low stock levels are prerequisites at Casco the risk is even greater. Above mentioned reason made the quality of the raw material as well as the quantity essential. (Gustafsson, 2004; Sundström, 2004)

Lead-time of the raw material (6)
As mentioned for the criteria above, the rather short production process time, late orders and low stock levels makes it important to have short lead-times from the suppliers. The supply risk will most likely enhance with a longer lead-time. (Gustafsson, 2004; Sundström, 2004)

Number of approved suppliers for the raw material (11)
Also the production found it important to have at least two suppliers per raw material to reduce the supply risk. This makes it easier to satisfy the production needs on packaging, safety, work environment etc. and does not lead to any noticeable changes or difficulties. (Gustafsson, 2004; Sundström, 2004)

Plotting
As for the dimension Importance of Purchase factors of more quantitative form were plotted into graphs in order to find out if there was an actual spreading in the material and to make sure that no two factors were describing the same risk. Factors of a quantitative character and hence plotted were;

- The number of end products the raw material is ingredient in
- The number of approved suppliers for the raw material

Although the lead-time of the raw material is a quantitative factor it was not plotted. The necessary data could not be gathered from the business system and were therefore not collected out of time limitation.

The number of end products the raw material is ingredient in and the number of approved suppliers were however plotted together. This illustrated a satisfying spread of both factors and no correlation between them could be found. Out of secrecy reasons this plotting figure can not be presented in this thesis.
**Analysis**

The supply risk was thoroughly looked into during the investigation. From the original twenty-two factors, see Figure 6.4, ten was distinguished as important concerning the Supply Risk. These factors, presented in Table 6.5, are the basis of this analysis.

<table>
<thead>
<tr>
<th>Factors describing the Supply Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw material characteristics</strong></td>
</tr>
<tr>
<td>3. Number of end products the raw material is an ingredient in</td>
</tr>
<tr>
<td>4. Degree of refinement of the raw material</td>
</tr>
<tr>
<td>6. Lead-time of the raw material</td>
</tr>
<tr>
<td>8. Possibility to substitute the raw material</td>
</tr>
<tr>
<td><strong>Supply market characteristics</strong></td>
</tr>
<tr>
<td>10. Possibility to find additional suppliers for the raw material</td>
</tr>
<tr>
<td>11. Number of approved suppliers for the raw material</td>
</tr>
<tr>
<td>14. Suppliers’ ability to deliver right quantity of the raw material at the right time</td>
</tr>
<tr>
<td>15. Suppliers’ investment in R&amp;D for the raw material</td>
</tr>
<tr>
<td>23. Condition of supply market for the raw material</td>
</tr>
<tr>
<td><strong>Environmental characteristics</strong></td>
</tr>
<tr>
<td>24. Necessity of approval from institutes for the end product</td>
</tr>
</tbody>
</table>

Figure 6.5: The factors necessary for describing Supply Risk.

By evaluating above presented factors and their respective contribution to the classification tool, the factors describing the Supply Risk is extracted.

For the four factors describing the characteristics of the raw material, the *number of end products that the raw material is an ingredient in* is not considered to be a significant factor. Even though the number of end products reflects the restrictions that the processing industry brings, it is rather the consequences that are measured than the actual risk itself. The spreading of the material was good but the factor does not describe the supply risk in a good way. The *degree of refinement of the raw material* describes the supply risk in terms of key characteristics and supplier power. This factor will not be used in the classification tool, since all raw materials are key ingredients when it comes to supply risk and the fact that the power of the supplier is really better illustrated by the factor describing number of suppliers. The next factor is the *lead-time of the raw material* which measures the risk of time. Even though lead-time can be essential in cases of late orders this factor is not considered to be a suitable measurement for supply risk. This is because late orders of end products can be turned down and longer transportation times
automatically have a bigger built-in uncertainty. The possibility to substitute the raw material mirrors the dependency of the suppliers. This factor is believed to be of great importance when determining the supply risk and will consequently be part of the classification tool. In conjunction with a factor like possibility to find additional suppliers, possibility to substitute can be crucial.

For the five factors describing the characteristics of the supply market the possibility to find additional suppliers for the raw material as well as the number of approved suppliers for the raw material turned out to be of grand importance. Using only one supplier enhances the supply risk and if this supplier has a monopoly market the risk increases substantially. The possible number of suppliers is suitable to look into before investigating the possibility to find a substitute, which is why these two factors should be dealt with together and looked upon as one factor. The two factors concerning the number of suppliers will hence be part of the classification tool. The factor concerning supplier ability to deliver right quality of the raw material at the right time was considered important due to scarce time for planning incoming orders. Measuring this factor will however be difficult since different suppliers of the same raw material have to be treated as a group. Furthermore the supply risk that this factor represents is on a different level compared to the rest of the factors and is therefore not included. Specific delivery correctness data is better suited in a supplier evaluation than in a classification tool. The next factor concerns suppliers’ investment in R&D for the raw material. This factor reflects the power dependency and supplier customisation. But even though a dedicated supplier may lower the supply risk a bit this factor is really difficult to measure and for that reason it is excluded. The last factor, condition of supply market for the raw material, is considered to be very important because of new markets and the obvious risks related to them but also older markets with instability concerning politics, economics etc. and the risk that they bring. It is important that this is captured in the Supply Risk dimension and therefore this factor was kept.

The only factor describing the environmental characteristics, to be exact necessity of approval from institutes for the end product, enlightens the risk associated with changing supplier or using a substitute. The main supply risk is actually this being time consuming. But since this is only a risk factor for raw material supplied by one contractor this factor will be left for the strategy template instead.
Result
The factors selected to represent the Supply Risk are then set, see Figure 6.6.

<table>
<thead>
<tr>
<th>Factors describing the Supply Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Raw material characteristics</strong></td>
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<tr>
<td>8. Possibility to substitute the raw material</td>
</tr>
<tr>
<td><strong>Supply market characteristics</strong></td>
</tr>
<tr>
<td>10. Possibility to find additional suppliers for the raw material</td>
</tr>
<tr>
<td>11. Number of approved suppliers for the raw material</td>
</tr>
<tr>
<td>23. Condition of supply market for the raw material</td>
</tr>
</tbody>
</table>

Figure 6.6: The most important factors describing Supply Risk

6.2 Factor answers
The answers for the factors are of two different kinds, either of quantitative or qualitative character. To be able to combine multiple factors of both kinds on the same axis, it is necessary to have intervals for the different answers with approximately the same importance/risk and rate them. In this part all possible factor answers were sorted into distinct reply intervals describing the importance/risk and these groups were then rated.

As stated in Chapter 4.1 the aim is to make the classification tool simple to use and understand. The model used for handling multiple factors described in Chapter 3.3.2 does not determine a scale for rating. A larger scale may spread the material more but it also makes the actual intervals more complicated to put together. In consultation with our tutor and the purchasing manager, a scale for rating the intervals from one to four was decided for all six factors on the two axis. Four is then very high importance/risk and one is very low importance/risk. This limits the number of intervals to maximum four but since every axis has multiple factors, which later will be given different weights, the material was expected to spread in a satisfying way nonetheless.

6.2.1 Importance of Purchase

Interviews
*The raw material’s part of the total purchase value* as well as the *profitability of end products containing the raw material* have far more predetermined answers than the first factor concerning knowledge/competence. To be able to settle the intervals and ratings for the factor answers an investigation involving the purchasing function as well as R&D was conducted. The following information concerning the factor answers were collected;
**Extent to which the raw material concerns necessary knowledge /competence areas**

The raw materials that fulfill this factor to a great extent were considered to be rather few, but instead very important. The mere part of the answers for the raw materials was thus expected to concern areas with a lower degree of knowledge/competence. (Odda, 2004; Lagerström, 2004; Persson, 2004) An important purchase had earlier been considered to be discerned only by the value, so bringing in knowledge and competence was thought of as intriguing and innovative (Odda, 2004).

**Raw material’s part of the total purchase value**

The part of the total purchase value is a very important issue to consider when discussing the importance of the purchase. Approximately twenty percent of the raw materials represent more than eighty percent of the total purchase value. These raw materials are of course very important. (Odda, 2004)

**Profitability of end products containing the raw material**

This factor is very dependent on the number of end products the raw material is ingredient in. There are a small number of raw materials that are ingredient in more or less all end products. These will be considered more important. This factor had not been considered earlier in this context but was found useful. (Odda, 2004)

**Analysis and result**

When having studied the possible answers and discussed the individual importance of each factor thoroughly intervals and ratings were set;

**Extent to which the raw material concerns necessary knowledge /competence areas**

When setting the interval for this factor it was necessary to concurrently decide the alternatives possible, since these were not of quantitative character. From the interviews it was made clear that there were raw materials concerning necessary knowledge/competence areas to a very big extent as well as close to a nonexistent. It was therefore decided that four intervals, with very big and nonexistent at each end, was suitable for describing the factor. Four intervals with a rating scale from one to four ended in the following regarding the extent to which the raw material concerns knowledge/competence areas:

- Very big – rating 4
- Considerable – rating 3
- Smaller – rating 2
- Nonexistent – rating 1
**Raw material’s part of the total purchase value**

The importance of purchase increases continuously with the value of the purchase but in order to make a tool consisting of multiple factors these answers have to be made discrete. The answer intervals for the raw materials part of the total purchased value and the rating were decided to be;

- > 3,0 percent – rating 4
- 0,3 – 3,0 percent – rating 3
- 0,05 – 0,3 percent – rating 2
- < 0,05 percent – rating 1

All purchases representing more than 3,0 percent are considered to be the most important ones, rated 4. The value of these raw materials represents the eighty percent the purchasing manager gave as a guideline. Raw materials with values between 0,3–3,0 percent correspond to approximately fifteen percent of the total value and are as well considered to be rather important with rating 3. For the two last intervals the first one, rated 2, representing close to five percent of the value and the last, rated 1, less than one the importance is much lower.

**Profitability of end products containing the raw material**

For the profitability the intervals were hard to discern since this factor had not been dealt with before. The higher the profitability the higher the importance, therefore the raw material involved in end products with an accumulated profitability over ten millions was considered to be really important and rated with 4. The next interval, rated 3, starts at one million and the third, rated 2 at one hundred thousand. These intervals are compatible with the situation today but must be modified if the prerequisites change. The four groups describing the possible answers for the profitability of end products containing the raw material are;

- > 10 000 000 – rating 4
- 1 000 000 – 10 000 000 – rating 3
- 100 000 – 1 000 000 – rating 2
- < 100 000 – rating 1

### 6.2.2 Supply Risk

**Interviews**

To be capable of settling intervals and ratings for all three factor answers an investigation involving the purchasing function as well as R&D was conducted.

The subsequent information was gathered during the investigation;
**Number of approved suppliers for the raw material**

The number of suppliers approved is directly related to the dependency of the supplier. Having only one supplier is very risky while having two or three decreases the risk substantially. Casco has a substantial amount of single sourcing relationships. (Odda, 2004)

**Possibility to find additional suppliers/possibility to substitute the raw material**

This factor, as described in Chapter 6.1.2, combines the possibility to bring in more approved suppliers with the likelihood of finding a substitute. If there are many possible suppliers the necessity of finding a substitute will not be of great importance and if it is easy to substitute the raw material the need for many possible suppliers for the raw material will not be central why they have to be studied together and reviewed as one. It is considered to be a higher risk not being able to find a substitute than not being able to find additional suppliers since the first situation makes Casco more dependent on that actual raw material. It is very important to distinguish between these two since the risk related to them is different. (Lagerström, 2004; Odda, 2004)

**Condition of the supply market for the raw material**

The supply market was described as being stable at its best and instable to very instable at its worst. There is a considerable risk with buying raw material from an unsteady market compared to a rather stable one. (Odda, 2004)

**Analysis and result**

After studying the possible answers and their individual risks intervals and ratings were set.

**Number of approved suppliers for the raw material**

The intervals for the number of approved suppliers need only be three since the difference in risk associated with three or four suppliers is considered to be insignificant. Having three or more approved suppliers was rated as 1. The risk of having only one approved supplier is further considered to be much greater than having two which is why the rating for one approved is 4 and for two approved is 2. The intervals and ratings for this factor are to sum up:

- 1 – rating 4
- 2 – rating 2
- > 2 – rating 1

**Possibility to find additional suppliers/possibility to substitute the raw material**

As was discussed during the interviews, to find additional suppliers is associated with lower risk than to substitute the raw material. A small possibility to find additional
suppliers and a big possibility to substitute the raw material is therefore of lesser risk and rate than the opposite. This leaves the four alternatives below and their ratings:

- Small/Small – rating 4
- Big/Small – rating 3
- Small/Big – rating 2
- Big/Big – rating 1

**Condition of the supply market for the raw material**

The condition of the supply market will be divided into three intervals. This is because an unstable market is a threat at any degree and the risk associated is considered the same and rated as 4. A rather stable market was rated slightly higher than a very stable market since there are some supplier markets which have been stable for many years while some others are starting to consolidate or move to countries with cheaper labour. The ratings and intervals character of the supply market for the raw material is;

- Very unstable/unstable – rating 4
- Stable with some movement – rating 2
- Very stable – rating 1

**6.3 Relative weights**

The factors within each dimension may be of different importance. In order to get an accurate positioning of the raw materials the selected factors’ relative weights were discussed with the purchasing function as well as R&D and then further evaluated.

**6.3.1 Importance of purchase**

**Interviews**

From Chapter 2.3.1 it is familiar that the purchasing function has a vague classification of the current raw materials in mind where the purchased value is the one issue considered. *The raw material’s part of the total purchase value* is still considered to be of significant importance and should be weighted high (Odda, 2004). Another important factor is the *extent to which the raw material concerns necessary knowledge/competence areas*. Relations with suppliers that sells competence together with the raw material are more important and a lot can be achieved if these relations are treated effectively (Lagerström, 2004). The final factor *profitability of end products containing the raw material* is not as important as the other two but could be of great use when trying to rank raw material that are similar considering the other aspects (Odda, 2004).
Analysis
The factors the raw material’s part of the total purchase value and the extent to which the raw material concerns necessary knowledge/competence areas are both of high importance. That a purchase with high value is important to the company is easy to understand. To realise and treat a purchase concerning a raw material with necessary knowledge the same way might be harder. When purchasing a raw material containing necessary knowledge/competence from a supplier a piece of the total knowledge/competence for the adhesive is brought in from outside the company. The raw material purchased is often complex and contains specific characteristics developed by the supplier. Buying knowledge/competence may be wise out of monetary reasons, skills of the supplier etc. but these purchases need to be paid extra attention to. Areas of knowledge/competence that are bought from outside are therefore very important purchases and a lot can be gained through these purchases from both the purchased raw material and also from better communication with the supplier. The idea for the final factor profitability of end products containing the raw material is to place the raw materials in order of precedence and in that way make a purchase more important. To accomplish that the factor is given a weight that is ¼ of the other factors’ weights, since the answer intervals are four this weight will be suitable.

Result
From the discussion above the relative weights were decided by using the calculation methodology described in Chapter 3.3.2, see Appendix B. The factors and their weights are as follow:
- The raw material’s part of the total purchase value - weight 0,44
- Extent to which the raw material concerns necessary knowledge/competence areas - weight 0,44
- Profitability of end products containing the raw material - weight 0,11

6.3.2 Supply Risk

Interviews
Within the Supply Risk there were three factors to discuss and compare. As for the factor treating the value of the raw material, the factor number of approved suppliers for the raw material is also considered in the classification that exists at Casco today, see Chapter 2.3. When comparing a situation with only having one supplier to an unstable supply market the fact of only having one supplier is considered more risky. Therefore the work will first and moreover be focused on finding more suppliers why this factor is
considered more important (Odda, 2004). *Possibility to find additional suppliers/possibility to substitute the raw material* is dependent on how many approved suppliers there are today and can not alone be argument for a high risk why this factor is considered to be less important. The same goes for the *condition of the supply market*, as long as it is stable there is no need for finding substitutes or new suppliers which makes the risk dependent and the factor considered less important. (Lagerström, Odda, Sjögren, 2004)

**Analysis**
From the examination it is stated that *number of approved suppliers for the raw material* must be of highest weight and since *the possibility to find additional suppliers for the raw material/possibility to substitute the raw material* is dependent on this factor it must have a lesser weight. When the *number of approved suppliers* is three or more, rating 1, the *possibility to find additional suppliers for the raw material/possibility to substitute the raw material* should not make a too big contribution to the supply risk and is therefore only given half the weight. In between these factors is the *condition of supply market for the raw material*. The weight of this factor lies exactly in the middle of the other two since the risk connected to it is considered to contribute to the supply risk in that way.

**Result**
From the discussion above the following relationship between the factors were settled and the relative weights were decided by using the calculation methodology described in Chapter 3.3.2. The factors and their weights are as follow:

- Number of approved suppliers for the raw material – 0,46
- Condition of supply market for the raw material – 0,31
- Possibility to find additional suppliers/possibility to substitute the raw material – 0,23

**6.4 Critical border**

**6.4.1 Importance of Purchase**
In Chapter 6.3.1 it was stated that both *the raw material’s part of the total purchase value and the extent to which the raw material concerns necessary knowledge/competence areas* were of great importance as these two factors had the highest weights. An answer rated 4 for these factors is by the purchasing function considered enough to raise the Importance of Purchase to the upper part of the classification matrix which means that the raw material should be treated as a leverage- or strategic item, see Chapter 3.3.1. Since
the two above mentioned factors have the same weight, this also means that all combinations of these two with total ratings scores of at least five will be placed in the upper part of the matrix, see Appendix B. This is not the fact with the last factor \textit{profitability of end products containing the raw material}, which has a lower weight. An answer rated high only for this factor will still keep the raw materials in the lower part of the matrix, treated as non-critical- or bottleneck items. The idea for this factor is to place the raw materials in order of precedence. A raw material with great value and a high profitability will then be ranked higher than a raw material with great value and low profitability.

Above discussion worked as a direction for setting the critical border for the Importance of Purchase. When the answer of either the \textit{raw material’s part of the total purchase value} or the \textit{extent to which the raw material concerns necessary knowledge/competence areas} is equal to the highest risk, i.e. 4, and the other two factors have answers showing the lowest risk, i.e. 1, the raw material should be placed just above the critical border. The result of this is a critical border at the value of 2,32, see Appendix B.

\textbf{6.4.2 Supply Risk}

For the Supply Risk it is the statements in Chapter 6.3.2 that works as directions for the value of the critical border. When the risk-rating for \textit{number of approved suppliers for the raw material} is 4, the raw material is to be placed in the right part of the classification matrix, treated as a bottleneck- or strategic item. This is by the purchasing function considered the most important factor and consequently the factor that sets the border.

The result of this gives a critical border at the value of 2,37, see Appendix B. In order to cross the border for the Supply Risk the \textit{number of approved suppliers} must be two or less or the \textit{condition of the supply market} must be very unstable in combination with great \textit{difficulties in finding additional suppliers/substitutes}, see Appendix B. The highest rating of the last factor needs to be combined with at least a \textit{condition of the supplier market} rated 2 together with a rating 2 on \textit{the number of approved suppliers}, or a rating 4 on either of them, to be able to cross the border which is the effect sought after.

\textbf{6.5 The finished classification tool}

When developing the classification tool the two dimensions Importance of Purchase and Supply Risk have been dealt with separately. The fact that they belong to the same tool was however always present. After having gone through all four steps of selecting
factors, sorting out answers, deciding relative weights and settling the critical border it was time to bring the classification tool together, see Figure 6.7 and 6.8.

When using the classification tool to classify raw material information concerning the six factors need to be collected. The information for each factor is given a rating from 1 - 4 depending on the importance/risk associated with it, see Figure 6.7.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Relative weight</th>
<th>Possible answers</th>
<th>Rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>The raw materials part of total purchase value</td>
<td>0.44</td>
<td>&gt; 3,0 percent</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.3 - 3.0 percent</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>0.05 - 0.3 percent</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 0.05 percent</td>
<td>1</td>
</tr>
<tr>
<td>Extent to which the raw material concerns necessary knowledge/competence areas</td>
<td>0.44</td>
<td>Very big</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Considerable</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Smaller</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nonexistent</td>
<td>1</td>
</tr>
<tr>
<td>Profitability of the end products containing the raw material</td>
<td>0.11</td>
<td>&gt; 10 000 000</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1 000 000 - 10 000 000</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>100 000 - 1 000 000</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&lt; 100 000</td>
<td>1</td>
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<tr>
<td>Number of approved suppliers for the raw material</td>
<td>0.46</td>
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<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>&gt; 2</td>
<td>1</td>
</tr>
<tr>
<td>Condition of the supply market</td>
<td>0.31</td>
<td>Very unstable/unstable</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Stable with movements</td>
<td>2</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Very stable</td>
<td>1</td>
</tr>
<tr>
<td>Possibility to find additional suppliers/possibility to substitute the raw material</td>
<td>0.23</td>
<td>Small/Small</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Big/Small</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Small/Big</td>
<td>2</td>
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<td></td>
<td></td>
<td>Big/Big</td>
<td>1</td>
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These ratings are multiplied with the weight of the respective factor and the raw material receives a total score for the Importance of Purchase as well as Supply Risk.

The raw material can then be plotted into the matrix and the critical borders of each dimension will settle the classification quadrant of it. In Figure 6.8 the classification with the critical borders is presented. It further shows the proportions of the respective factors of each subject matter and what contribution an answer will give to the final score. Worth noticing is that the minimum score of both quadrants is 1 since the lowest rating is 1. This
score will be received for raw material with the lowest rating for each factor. In figure 6.8 this means the first part of each factor which together adds up to the distance of 1.

![Figure 6.8. The finished classification tool.](image)

The classification tool will divide the raw material into four distinct quadrants, each with a specific main task. In each of the quadrants the raw material is prioritised. The upper right corner of every quadrant thus reflects the highest importance and risk.
7 Strategy Template

In this chapter the strategy template will be made in order to complete the portfolio model. The necessary information and reasons for choosing it will further be presented. In the end working stages for each quadrant will be recapitulated.

After having finished the classification tool the second part of the purchasing portfolio model is creating a strategy template. An overview of the template is presented in Figure 7.1 while the full template is represented in Appendix C. The template contains information supporting the work of defining a strategy and is meant to be established for every purchased raw material. The required information does differ depending on the classification quadrant. The template was however not done in four versions because having the same base template with gaps where information is not necessary was considered to be the most appropriate solution (Odda, 2005) It is further suitable since there is a possibility for the classified item to be moving to another position which then requires different information.

In this chapter the development of the strategy template and its containing information will be presented. The information is dealt with in the same order as the research questions in Chapter 4.2 but since different information is requested for each quadrant this division is also performed. To get a good understanding of what analyses that are requested they are finally summarised for each quadrant separately and recommendations on how to work with the strategy template are given. It is crucial to do the classification before using the strategy template since the classification is the starting point for the strategy template, as stated in Chapter 4.2. Requested information is clearly dependent on the classification.

In order to make an understandable and user-friendly template the raw material is identified and specified in terms of name, number, specifications and responsible persons from the purchasing function as well as R&D. What further information that is requested and where it has its origin will follow.
7.1 Information from the classification tool

As stated in Chapter 4.2 there is a need to add information after the classification. However since the strategy template is dependent on information from the classification tool it is also vital to include.
To begin with the classification quadrant for the raw material is placed clearly visible in the template. In this manner a hint is given to what type of information that is necessary to focus on and what strategic directions that can be of interest. Furthermore the concrete values of the factors in the classification tool are relevant to be aware of when developing a strategy. These values are included and the structure of the template follows the factors, hence a headline is created from each and every factor. For the factors value, competence, profitability and market the headlines are almost identical to the factors. Approved suppliers and possible suppliers are sorted under supplier analysis since the information for these factors are related. The possibility of finding a substitute is sorted under raw material analysis since a lot of information about the raw material is necessary in order to decide the possibility of finding a substitute.

7.2 Further information connected to the main tasks

Information concerning the four quadrants but not given directly from the classification tool will be needed to be able to develop a suitable strategy for the raw material in mind. Some examples of this kind of additional information are presented in Figure 3.4. With the main task for the quadrants and the classification data as starting point, information to build a better view for developing a strategy need to be collected. The added information will here be presented under the name of the quadrant that addresses a need for this information. This means that the headlines presented in Chapter 7.1 will be filled with further information and two additional ones, i.e. demand analysis and logistical analysis, will also be added. The information gathered under each headline will be discussed more carefully.

7.2.1 Strategic items

Investigation
For strategic items the main task is long-term supply relationships with an aim at either partnership or collaboration, see Chapter 3.3.1. Working together this way requires a lot of information about the supplier. A comprehensive supplier and market analysis along with a good view of the demand and value was considered most important for strategic items in this line of business (Odda, 2004; Sjögren 2004).

Analysis
Value Analysis
Strategic items are items of great importance to the company concerning either value, competence or in some cases both. It is therefore essential to bring in further information
concerning the cost as well as the price for the raw material. For cost, purchased value for the last period as well as estimated purchase value for the period ahead will provide necessary indications. To further name the major cost elements for the supplier in addition to the cost drivers in the raw material and its connection to other lines of business a good view of the situation regarding cost is provided. For price it may be difficult to put down the actual price itself, therefore the price level and the latest price change/adjustments is preferred. Pricing conditions and length of contract is relevant data as well. To finally compare cost and price, evaluate changes/adjustments in comparison to changes in cost drivers, compare our price to published prices/other customers’ prices etc. will provide a good view of the cost and price dimension. When building a relationship, price may not be the number one issue, but it is still a cornerstone of the total weighting.

**Competence Analysis**
Buying competence along with the actual raw material makes the purchase more important according to the classification made. A closer relationship with a supplier often aims at bringing in competence and knowledge to the company. For strategic items it is therefore important to gather information about the competence requested/bought from the supplier, expected changes in the competence and also assess its impact on purchasing.

**Profitability analysis**
Knowing what end products the raw material is ingredient in is important for strategic items in order get an understanding about the range of end products affected. The profitability and strategic importance of these products will further raise the awareness of the end market.

**Raw material analysis**
Strategic items have a high supply risk and therefore it is important to investigate the possibilities of finding a substitute in order to diminish this risk.

**Supplier analysis**
It is essential to know the supplier basis for strategic items. The suppliers approved are the ones that can be considered in case of a partnership or closer co-operation. Information such as price-level, capacity, location, financial situation, ownership and how well other requirements are met for these are therefore essential. Since the supply risk is high it is further important to stay in touch with the market of possible suppliers and map information about them and at the same time keep resources needed to change or find a new supplier and also the risks in mind.
**Market analysis**

The supply market as a whole is important for all quadrants. For strategic items detailed market data with trends, competition climate, political stability, supply situation etc. plays a central role. By knowing and using the state of the market these purchases will be safer and more successful. By being able to read implications from the market changes can be predicted early on and suitable strategies can be developed.

**Demand analysis**

It is always important to analyse demand, but for items of strategic character where the supply risk is high it is vital. Due to scarce supply expected purchase volume and reasons for changes compared to earlier volumes is important information. Keeping track of demand trends and expectations for the end products the raw material is ingredient in will better prepare the purchaser for changes.

**Logistical analysis**

Logistical costs are important for strategic items. When considering a long-term relationship with a selected supplier a higher price per kilo for the raw material may be alright if the costs for transportation, inventory, administration etc. decreases and gives a lower total cost. All things adding value must be taken into consideration when making a commitment of strategic kind.

**7.2.2 Bottleneck items**

**Investigation**

For bottleneck items the main tasks are insuring volume and securing continuity of supply, as mentioned in Chapter 3.3.1. For bottleneck items in this line of business the emphasis should lie on the raw material analysis as well as the supplier analysis, since substitutes and additional suppliers are the most important ways of decreasing a dependency (Odda, 2004; Klintberg, 2004).

**Analysis**

**Profitability Analysis**

Bottleneck items are of low importance and as little time as possible should be spent on these since nothing big can be earned by doing otherwise. But for increasing the understanding of the end products affected by a shortage in supply for the raw material information about the end products the raw material is ingredient in is necessary. The profit of the end products and/or the strategic importance of them will further make it possible to compare the raw material’s influence on the end products to other raw materials in the same quadrant. A raw material that is part of end products with high
profitability should be paid attention to since the consequences of a shortage will be extensive.

**Raw material analysis**
In order to better secure the supply and reduce dependency one solution is finding an alternative to the raw material. Information about the **possibility of finding a substitute**, the **characteristics/major differences of the substitute**, **resources and costs demanded** are then important. When changing certain raw material **approval from institutes** are necessary which can prolong the process and information about this is useful to have in advance.

**Supplier analysis**
In a situation of dependency finding alternatives to the supplier base is essential. Therefore it is not enough to thoroughly know the already **approved suppliers**, it is crucial to keep an eye out for **possible suppliers** as well. The **costs for adding/changing supplier** as well as **resources demanded for finding new suppliers** are important to know when working with this.

**Market analysis**
For bottleneck items changes in the supply market may lead to difficulties or opportunities concerning supply. It is therefore of great interest to study the market in terms of **trends, competition climate, political issues, key suppliers and their influence** etc. in order to foresee these alterations.

**Demand analysis**
Information about the **estimated purchase volume demand** as well as the **purchased volume for the last period** will contribute to a good view of the supply needed and the options possible. To further analyse the **reasons for changes in demand** and discussing **trends** will make the chosen strategy safer.

**Logistical analysis**
When securing supply it is important to take the logistical aspects into consideration. To be aware of **capacity constraints, stock levels and costs regarding inventory** as well as **transportation and administration** is important. Even though the main task for bottleneck items is not cost related, keeping track of all costs involved for purchases and alternatives is essential, which is why logistical information is also represented in the template.
7.2.3 Leverage items

Investigation
The main tasks for items of leverage character are, as stated in Chapter 3.3.1, to exploit full purchasing power and use competitive bidding from selected suppliers. To be able to do this additional information concerning these areas is required. An all embracing market analysis was considered to be of most importance for leverage items at Casco (Odda, 2004). This information was however accompanied with areas like value analysis, competence analysis etc.

Analysis

Value analysis
To know the value and price of the articles purchased is of utter importance when using the purchasing power and bidding competitively. Therefore all information earlier presented under this headline for the strategic items will be of importance, see Appendix C. To further discern what you pay for by collecting information connected to the cost for the supplier etc. price changes can be understood and predicted in a better way. The price level and changes/adjustments for some time back together with reasons for changes is necessary for recognition of good deals. Price-comparisons between different suppliers will tell a lot about the range and fluctuations of the prices and what to expect. If possible some kind of comparison with other customers of the supplier or published prices can be of further help.

Competence analysis
Information about the competence bought together with the raw material is very important to keep track of when dealing with leverage items. By analysing expected/needed change in competence and how this will affect purchasing the choice of supplier will be affected also by competence and not just value. The balance between outsourcing knowledge and keeping it in-house is narrow and must be closely watched.

Profitability analysis
As for strategic items the main idea for this information is mainly to give an understanding about the end products and their profitability. Changing suppliers when striving for the best price is common for this quadrant. The profitability analysis will help the purchaser foresee the effects and risks changes will have on the profitability of Casco.

Supplier analysis
To be able to select amongst vendors it is important to have a base of approved suppliers. Detailed information about these will be essential in order to select successfully, see
Appendix C. But since the main task for this quadrant is competitive bidding possible suppliers not yet approved must also be under surveillance. The supply risk is not the focus but instead the possibility of getting a better deal from a new supplier. Hence, thorough information about possible suppliers may well be of interest when developing the strategy along with costs for changing supplier and reasons for not having approved these suppliers.

**Market analysis**
*Trends, competition climate, key suppliers and their influence, political stability, location* etc. of the supply market is of interest when exploiting purchasing power. Changes in the market changes the rules of the game and it is therefore vital to be up to date with the market when making plans for the future.

**Logistical analysis**
Even though the price of one supplier is lower the entire cost of that purchase may still be higher. It is therefore interesting to look at all costs involved when exploiting full purchasing power, such as costs for transportation, inventory, administration etc.

**7.2.4 Non-critical items**

**Investigation**
The non-critical items have a main task mainly consisting of efficient processing by reducing complexity and cost, see Chapter 3.3.1. To reach this goal costs for administration, inventory etc. will be necessary. At Casco, non-critical items have mainly been left be and therefore no specific information for developing strategies were required (Odda, 2004).

**Analysis**

**Raw material analysis**
A more efficient process can be reached through simpler products. The possibility to in some way standardising the non-critical raw material is therefore important information. Another way may be to *buy several raw materials together as a kit* and thereby decrease administration. The raw material analysis aims at finding ways of making the raw material less time consuming.

**Logistical analysis**
Reducing complexity and costs in logistics is the second area to focus on for non-critical items. The way of administrating the raw material such as order handling, order quantities and costs connected to this is important information since changes can be made
and complexity reduced in these areas. The same goes for way of keeping inventory and the costs for that.

### 7.3 Supplementary information connected to portfolio literature

Even more information is needed in order to build a stable strategy and several authors suggest studying the relationship with suppliers more thoroughly. A lot of inspiration, for what topics to include in the strategy template, has also been taken from theories described in Chapter 3.3 and 3.4. The supplementary theories are summarised in Figure 4.5 and the main tasks to work with for each quadrant are the same as in Chapter 7.2.

Adding further information connected to the portfolio literature means that two more headlines are added to the strategy template namely supplier relationship analysis and network analysis. The contents of these headlines and their importance to the different quadrants will be examined and evaluated next.

#### 7.3.1 Strategic items

**Investigation**

In Chapter 3.3.1 it is considered necessary with further investigations for most and moreover the strategic quadrant and issues to study is suggested to be the company’s and supplier’s strength, the balance between the actors etc. In Chapter 3.3.2 the supplier relationship is considered relevant to study for all quadrants and the focus is attractiveness of the supplier and strength of a relationship. All these studies are useful when evaluating whether a long-term supply relationship should be established or not and is relevant for strategic items at Casco (Odda, 2005; Sjögren, 2005).

The fact that Casco is a company of the Akzo Nobel group means different negotiation conditions due to an accumulated need or which company that is lead-buyer. This result in a need to map the situation to better understand the aspects brought up by a supplier. In order to do so the existing network can be good to evaluate. (Odda, 2005; Sjögren, 2005).

**Analysis**

*Supplier relationship analysis*

To describe what kind of relationship Casco has with suppliers offering raw material the company strength should be taken into consideration. Subjects of interest are such as possibility of producing the raw material in-house or finding a substitute, supplier related investments, purchased volume in the sentence of how important Casco is to the supplier
etc. The questions will distinguish how dependent Casco is on its supplier and thus the strength of the company. Furthermore the strength of the supplier should be studied and things like competitive structure, uniqueness of product, entry barriers, market share etc. be considered in order to tell where the supplier stands on the market.

Combined the company strength and the supplier strength creates a picture of the power-dependence between company-supplier. The attractiveness of the supplier depends on what the supplier can present and the better the supplier manage these issues the more attractive it is to cooperate with. For strategic items this will be particularly interesting since more long term supply relationship can be of interest. One issue to consider when studying the attractiveness of a supplier is quality. For strategic items where there is only one approved supplier this is probably not the first thing to focus on, but the quality should never be neglected. The same discussion is applicable for the risk and uncertainty of dealing with a supplier.

To further describe relationships, information concerning social climate, personal relationships, information sharing and so on is added. Mentioned information gives quite a detailed description of a relationship and ideas of what is desired from a relationship and how well those wishes are fulfilled.

Network analysis
Valuable information is also to evaluate what network the supplier/company is in and whether other products are purchased from the same supplier or if purchases from other units make Akzo Nobel and thus also Casco a valuable customer. Relations other than seller-buyer with the suppliers can also be advantageous to have knowledge about. To study all this information will be particularly interesting for strategic items where a relationship will or can be more developed.

7.3.2 Bottleneck items
Investigation
As stated earlier the supplier relationships are good to study for all quadrants, consequently also for bottleneck items. Especially interesting to examine is how dependent Casco is on the supplier since securing supply is a main task. Even though bottleneck raw materials often have few suppliers the dependence might not be of high risk. Casco or Akzo Nobel could be the most important customer to the supplier which makes the conditions of treatment different. In order to understand the situation it is important to map the existing relationships and network. (Odda, 2005; Sjögren, 2005)
Analysis

Supplier relationship analysis
To evaluate the supplier relationship for bottleneck items is not of same relevance as for strategic items. To be aware of the power-dependence balance between both actors can however be helpful. Even though the purchased raw material is not the most important for Casco the supply risk is rather high. Conditions can change and if the supplier is very strong the relationship should be treated carefully. To consider the attractiveness of a supplier’s performance, quality is always important since good quality always should be aimed and not overlooked.

Network analysis
A high supply risk is most often associated with a great need of securing supply. There might not be a need for this since it can exist other relations than seller-buyer with the suppliers that make the supply risk less high, as if other products are purchased from the supplier or purchases are accumulated together with other lead-buyer. To evaluate the network are thus of interest for bottleneck items as well.

7.3.3 Leverage items

Investigation
Leverage items have more than one supplier and are from the classification tool not considered to be of high supply risk. However the purchase is important why this kind of thinking can be dangerous since the suppliers may not value Casco as a customer. For Casco to fulfil the main task of competitive bidding for leverage items can hence be completely wrong. Even if this not is the case it is important to know where the supplier is at and the kind of relationship that is valid in order to work correctly and achieve good results. (Odda, 2005; Sjögren, 2005)

Analysis

Supplier relationship analysis
Since leverage items have more than one supplier relationship first priority should not be to describe all relationships as detailed as for strategic items, that would be too time-demanding. To evolve one or more of the existing relationships or to better know what to focus on when dealing with a supplier can however be of concern since the raw material is considered important. Most of the information in the strategy template about the supplier relationships, see Appendix C, is therefore interesting.
Network analysis
To know for which suppliers competitive bidding is possible an *evaluation of the network* should be done. The information seen in Appendix C can all be advantageous to have knowledge about.

7.3.4 Non-critical items

Investigation
The importance of purchase for non-critical items is low, as well as the supply risk, which makes an evaluation of supplier relationships less vital. However the treatment of these raw materials should be as smooth as possible and thus also the relationships involved. In order to understand the status an uncomplicated analysis can be made. (Odda, Sjögren 2005).

Analysis
Supplier relationship analysis
Information that is of concern to study for non-critical items is hard to generally distinguish. Nevertheless one supplementary issue coming from portfolio literature that is of relevance is *information sharing*. One way of making processes more efficient can be to commonly develop the sharing of information.

7.4 Additional information to cover all aspects

When investigating what information necessary to collect in order to develop strategies for raw material a purchasing portfolio approach was used, as stated in the directives in Chapter 1.3. Purchasing portfolio literature therefore, alongside with interviews, decided the appearance of the strategy template. To get a practical and well-functioning strategic template the information gathered needed to be accompanied by some further information. This information will summarise important aspects of the raw material and its situation and make it easier for the purchaser to develop a suitable purchasing strategy.

For the strategy template this meant three more headlines which are subsequently discussed more thoroughly.

Purchasing history
To keep track of issues dealt with in the past and avoid making the same mistakes again keeping a purchasing history is important. Information about the key drivers of sourcing together with other important parts like for instance ill-fated strategy moves, troublesome suppliers etc. is very valuable information when looking ahead.
**SWOT-analysis**

The information gathered in the strategy template will give indications of where the opportunities lies, where the greatest risks are at and also strength and vulnerabilities of the company concerning the purchase of the specific raw material. There is consequently a need to bring all these aspects together and analyse how they should be dealt with. This can be done by using, as a suggestion, the SWOT-analysis where strength, weaknesses, opportunities and threats are emphasised and combined.

**Total cost analysis**

Finally it was found necessary to analyse the total cost as well. As stated in Chapter 3.1.2 it is important to have a total cost concept where different variables are considered. No strategy should be changed without having studied total cost. To create different options and compare them with the total cost as the situation is today must therefore be performed.

**7.5 The finished strategy template**

When developing the strategy template aspects of both theoretical and practical character were considered. After having answered the four research questions all necessary information was collected and the strategy template was completed, see Appendix C.

When using the strategy template access to the classification of the raw material is necessary. For filling out the template an extensive amount of information needs to be collected. Depending on the classification quadrant of the raw material different parts of the template will however be important to focus on. From 7.1 it is understood that all concrete values from the classification tool is important and therefore always placed clearly in the template. The analyses that are relevant to do for each quadrant differ and type of information needed to be studied more thoroughly is explained in Chapter 7.2 and 7.3. The additional information collected in Chapter 7.4 must be done for all raw materials independent of quadrant. To discern an order of precedence for the analyses is also of use to further clarify and recommend how to work with the strategy template. In Figure 7.2 the current analyses for each quadrant are compiled and a recommendation at what stage an analysis should take place is suggested.
To settle for what reasons a long-term relationship should take place and knowing what to focus in such a relationship the value and competence must be analysed. In the first stage it is also important to map the relationship more thoroughly. Market, supplier and demand analysis should be performed in the second stage in order to keep an eye on the supply risk. Will the market change, are there other possible suppliers and will demand be possible to meet are central issues worth considering. The third stage includes analyses that not have to be done thoroughly, however they are important to keep in mind since information can change conditions totally.

In line with the main task for bottleneck items the most important information to collect is the one that enlightens possibilities for reducing the supply risk, see Figure 7.2. Secondly, things that changes conditions of supply, for example on the market, need to be studied. Stage three can not be overlooked since information changing the situation etc. can occur in these analyses as well.

For leverage items the value and then mainly issues concerning price and cost will be of great importance for finding ways too achieve the main task. The same goes for competence analysis. This stage also includes the supplier analysis since information about the supplier base is a prerequisite for competitive bidding. The next stage for leverage items is to look at network and profitability analysis in order to get a better view at how exploiting full purchasing power/competitive bidding will affect the surrounding and especially the end products. The last stage for dealing with leverage items is to look at the market since changes in it will affect leverage items also. Logistical analysis is

<table>
<thead>
<tr>
<th>Stage 1</th>
<th>Value analysis</th>
<th>Competence analysis</th>
<th>Relationship analysis</th>
<th>Raw material analysis</th>
<th>Supplier analysis</th>
<th>Value analysis</th>
<th>Competence analysis</th>
<th>Supplier analysis</th>
<th>Raw material analysis</th>
<th>Logistical analysis</th>
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<tr>
<td>Stage 2</td>
<td>Market analysis</td>
<td>Supplier analysis</td>
<td>Demand analysis</td>
<td>Profitability analysis</td>
<td>Network analysis</td>
<td>Profitability analysis</td>
<td>Network analysis</td>
<td>Relationship analysis</td>
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<tr>
<td>Stage 3</td>
<td>Profitability analysis</td>
<td>Network analysis</td>
<td>Relationship analysis</td>
<td>Logistical analysis</td>
<td>Network analysis</td>
<td>Market analysis</td>
<td>Logistical analysis</td>
<td>Relationship analysis</td>
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Figure 7.2: Recommended stages for the strategy template
looked at to enlighten the costs involved and the supplier relationship analysis to further inform about the supplier.

For non-critical items a lot of time for planning and administrating should be avoided. Thus little information needs to be collected in the template. The first stage concerns a raw material analysis along with a logistical analysis. These are conducted with the aim at making processes more efficient. As a complement the second stage evaluates the relationship with emphasis on information sharing for further efficiency gains.

When having completed the strategy template enough information will have been provided to make the strategy or at least the options for the strategy obvious.
8 Conclusion

In this chapter the fulfilment of the purpose will be discussed. Furthermore the completed purchasing portfolio model will be reflected on and the application of the model at Casco Adhesives discussed. Generalization possibilities for how to use the model in the future will also be conferred.

8.1 Fulfilment of purpose

In the purpose of the thesis it was stated that a model for supporting development of purchasing strategies for raw material at Casco Adhesives was to be created, see Chapter 1.2. It is our full conviction that this purpose is fulfilled seeing as the purpose has been born in mind all the way through the work of the thesis.

For succeeding in fulfilling the purpose it was in Chapter 1.2 decomposed into two distinct steps; classification tool and strategy template. Both these steps were provided a supportive basis of theory in the frame of reference, see Chapter 3. By compiling suitable theories, key areas to focus on for each part were identified. Accompanied by a thorough discussion this led to detailed research questions in the problem definition, see Chapter 4. The organisation of the work to be done, with in depth descriptions on how to build the two purpose components and adapt them to the raw material at Casco Adhesives, were then conferred in the methods of research, see Chapter 5. In the following two chapters, Chapter 6 and 7, the investigation data and analysis discussion for the two parts were presented. The finished portfolio model, in the shape of a complete classification tool together with a comprehensive strategy template, for supporting the raw material purchasing strategy development was then accessible. Finally, in the conclusions, see Chapter 8, the fulfilment of the purpose is established and the result is reflected on.

8.2 Reflections on the result

Since the purpose is fulfilled the created model supports development of purchasing strategies for raw material at Casco Adhesives. To gain even better approval for such a statement, the model has also been applied for raw materials at Casco Adhesives. The application procedure consisted of the two steps that build our model.

To begin with a classification of the raw materials was done by using the classification tool. Since the intervals and ratings already were decided and most of the data collected when plotting different factors during the investigation phase in Chapter 6, this step was very straightforward. For the factors that demanded further collecting of data we received
help from the purchasing function and R&D. Thereafter the score for each factor was calculated and the raw material hence given a coordinate in our classification matrix. From our point of view this step was not too complicated to do for Casco Adhesives more than 100 raw materials. The classification gave four distinct quadrant groups with a majority of the raw materials in the lower right corner, see Figure 8.1. This was an expected result that brings extra attention to bottleneck items and their strategies.

![Figure 8.1: Number of classified raw material in each quadrant](image)

In the future there will be a need to update the classification, a procedure not considered to be too difficult since it only requires someone to go through the data, which is gathered in the classification tool, and update it where necessary.

It is our conviction that the wish from Casco Adhesives, to keep the tool as simple and user-friendly as possible has been reached and that we have succeeded in combining qualitative and quantitative data in an understandable way. To anchor the tool a meeting with affected functions was held. When presenting the classification tool the participants in that meeting understood the way of using the classification tool immediately. After discussing the placement the tool would give for a few raw materials the classification tool was approved and focus could be moved to strategy issues.

The next step was to ensure that the strategy template was a support when developing purchasing strategies at Casco Adhesives. The template was worked through thoroughly with the purchasing manager and our tutor for a few raw materials of the ones classified above and could be stated to work well. All aspects relevant to consider were brought up and found enough for defining a purchasing strategy. To complete the template with
information showed to be rather demanding both in terms of knowledge and time. This effort is however mainly initial since the updating of the templates will be considerably less time consuming when having been filled out once.

The classification and strategy template will be used continuously and updated once a year unless drastic changes makes it necessary to do so sooner. Responsible for these updates is the purchasing manager in combination with the raw material responsible.

To use the portfolio model requires a lot of knowledge from different functions within Casco Adhesives, this is advantageous since it encourages cooperation between functions but also a risk if people do not take a sufficient active interest. Another advantage with the portfolio model requiring a lot of knowledge is that once worked through and written down the stored knowledge is invaluable to have, not least for new employees.

8.3 General method
From available literature it can be understood that a lot of attempts in developing well-working portfolio models have been done. To apply the completed portfolio model created in this thesis to any line of business will not be successful since the model is developed for Casco Adhesives specifically and at an early stage adapted to this line of business. However, the theories discussed are usable as well as the way they were combined. Also, we do not believe that the method used when creating this model is case specific for Casco Adhesives or even raw materials. Instead it is considered to be generic and possible to use successfully in other businesses as well.
List of references


Appendix A: Products

In order to be a complete supplier to the woodworking industry, Casco delivers not only adhesives but also machine and application equipment as well as technical advice. For many years Casco has cooperated with the woodworking industry and acted as an adhesive expert for it. This has led to great knowledge about the customers needs and improved both adhesives and adhesives systems. (Casco Adhesives, 2004)

Technical Advice

Casco offers the customer technical advice and support when selecting an adhesive, a gluing method or machine equipment. The technical staff always assists when installing an adhesive system both during the introduction phase and on a continuous basis throughout production. Technical advice also contains issues of environmental character like waste treatment and work-related health. (Casco Adhesives, 2004)

Machine and application equipment

In addition to adhesives, Casco also develops and manufactures machines and equipment for metering, mixing, cooling and spreading hardeners and adhesives. Many of these devices are patented and using them warrants the best results since they are developed alongside the adhesive product. (Casco Adhesives, 2004)

Adhesives

Today adhesive products have many tough requirements to fulfill in areas such as rational handling, environmental concern and overall economy. The customers often demand different things for their adhesive. It is therefore important for Casco to maintain a broad collection to satisfy the different needs of the woodworking industry. (Casco Adhesives, 2004)

The adhesive products are divided into groups based on the constituents and include the following:

- UF – Urea Formaldehyde
  Continuous development of the UF has led to a cost efficient and versatile wood adhesive with qualities like quick and strong bonding, very good fill properties and prolonged pot life. UF is mostly used indoors on parquet floors, veneer etc.

- PRF – Phenol Resorcinol Formaldehyde
PRF is the most weatherproof wood adhesive in Casco’s collection and is therefore used for structural gluing such as finger joint timber, roof truss, exterior doors etc.

- **MUF/MF – Melamine Urea Formaldehyde**
  Like PRF, MUF/MF is used in field of applications such as finger joints and solid wood lamination. The difference is that MUF/MF leaves consistent light glue joints and that the pressing time is shorter.

- **PVAc – Poly Vinyl Acetate**
  PVAc is the base of Casco’s dispersion adhesives which have various application areas for the woodworking industry e.g. assembly gluing, rod gluing, foliating. This adhesive can be used at room temperature and is very fast setting.

- **EPI – Emulsion Polymer Isocyanate**
  This water based dispersion adhesive have very high resistance against moisture, heat and solvents and is often used on window frames, exterior doors and recommended for gluing wood to aluminum.

- **Hotmelt**
  Hotmelt is used for cost- and time saving edge banding, profile wrapping and soft forming. It enables higher machinery speed but also improved heat and cold resistance and is available in different colors for different kind of wood.

- **Contact adhesives**
  These adhesives represent a range of solvent- and water based sprayable contact adhesives that are used in automated productions like for instance furniture production where polyurethane foam is glued to wood, metal or plastic.

- **PUR – Poly Urethane**
  PUR is an assortment of water resistant polyurethane adhesives for gluing of wood with high moisture content and metal or hard plastic to wood.

- **PUR fillers**
  This last adhesive is used for filling knotholes and cracks in structural timber, parquet flooring and plywood. (Casco Adhesives, 2004; Arthursson, 2004)

The majority of above presented products are used together with different kind of hardeners which gives the end product different character. The different adhesives and hardeners generate a numerous number of end products, also called systems. (Casco Adhesives, 2004)
Appendix B: Classification tool

To create the classification tool relative weights and a critical border need to be calculated. In this appendix the methodology used when calculating relative weights will be explained and Olsen and Ellrams (1997) example on how to count the total score deciding the placement in the classification matrix for a raw material will be given. The relative weights specific for the factors used in our model at Casco, as well as the critical border, are then presented.

### Calculation methodology to compare factors

<table>
<thead>
<tr>
<th>j</th>
<th>i</th>
<th>f₁</th>
<th>f₂</th>
<th>...</th>
<th>fₙ</th>
<th>Z</th>
<th>W</th>
</tr>
</thead>
<tbody>
<tr>
<td>f₁</td>
<td></td>
<td>x₁₁</td>
<td>x₁₂</td>
<td>...</td>
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<td>W₁</td>
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<td>x₁₁</td>
<td>x₂₂</td>
<td>...</td>
<td>x₁ₙ</td>
<td>Z₂</td>
<td>W₂</td>
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<tr>
<td>...</td>
<td></td>
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<td>xₙ₂</td>
<td>...</td>
<td>xₙₙ</td>
<td>Zₙ</td>
<td>Wₙ</td>
</tr>
</tbody>
</table>

| Sum: | S   | 1.0   |

Figure B.1. Calculation method

n: The number of factors
f₁: A factor
xᵢⱼ: The result of an evaluation of factor i’s importance compared to factor j’s importance using a scale from 1 (equally importance) to 9 (absolute importance), see Figure B.1. If factor j is less important than factor i, xᵢⱼ is evaluated instead. The matrix is completed by using the equation xᵢⱼ = 1/ xᵢⱼ

Z: The geometric mean of row number j:

\[ Z_j = \sqrt[n]{x_{j1} \times x_{j2} \times ... \times x_{jn}} \]

S: The sum of the geometric means:

\[ S = \sum_{j=1}^{n} Z_j \]

W: The weight of factor j:

\[ W_j = \frac{Z_j}{S} \]
Hierarchy of weighted factors

Figure B.2. Example of weights and ratings

Source: Olsen and Ellram (1997, p 112)

**Weighted factors**

When settling the weights of the factors the discussions in Chapter 6.3.1 and 6.3.2 worked as directions. In Figure B.3 and Figure B.4 the results after having applied the calculation methodology on the selected factors in our classification model is shown.
**Critical border**

For settling the critical border all possible combinations of answers were looked upon and analysed.

**Importance of Purchase**

For the Importance of Purchase dimension the purchase value of rate 4 worked as a guideline for the border. For calculating the value of the border the rate of the answer for value, i.e. 4, was multiplied with the weight of the criteria, i.e. 0,44. Then the lowest weight for the following two criteria, i.e. 1, was multiplied with their respective weights, i.e. 0,44 and 0,11, and than all added together. This gave $4 \times 0.44 + 1 \times 0.44 + 1 \times 0.11 = 2.33$ and the critical border was set just below at 2,32. The combinations over and below the border are as shown in Figure B.2.

<table>
<thead>
<tr>
<th>Purchase value</th>
<th>Knowledge/ Competence</th>
<th>Profitability of end products</th>
<th>Score</th>
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<tbody>
<tr>
<td>4</td>
<td>4</td>
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Supply Risk
In similar ways as for the Importance of Purchase the critical border of the Supply Risk was calculated. Here it was the number of approved suppliers of rate 4 that sat the guideline for the border. This gave $4 \times 0.46 + 1 \times 0.31 + 1 \times 0.23 = 2.38$ and the critical border was set just below at 2.37. The answer combinations above and under the critical border are presented in Figure B.3.

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Figure B.2. All combinations of scores for the Importance of Purchase
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**CRITICAL BORDER 2.37**

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</table>

Figure B.3. All combinations of scores for the Supply Risk
Appendix C: Strategy template

After having classified all raw materials a strategy template needs to be filled out. The template contains all information necessary to cover the situation. The way of working with the template can be read in Chapter 7.5.

The strategy template is presented in full version on the next page.
### EXECUTIVE SUMMARY

<table>
<thead>
<tr>
<th>Classification</th>
<th>CLASSIFICATION</th>
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<tbody>
<tr>
<td></td>
<td>Classification quadrant</td>
</tr>
<tr>
<td></td>
<td>Value of Importance of Purchase due to a high/low value, profit and/or knowledge.</td>
</tr>
<tr>
<td></td>
<td>Value of Supply Risk due to number of approved suppliers, possibility to find additional suppliers/substitute and/or the character of the supply market.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Purchased Value</th>
<th>PURCHASED VALUE</th>
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<td>SEK</td>
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<table>
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<th>Purchased Volume</th>
<th>PURCHASED VOLUME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>KG</td>
</tr>
<tr>
<td></td>
<td>Share of total market volume</td>
</tr>
</tbody>
</table>

<table>
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<th>Approved Suppliers</th>
<th>APPROVED SUPPLIERS</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Name</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Purchasing Strategy</th>
<th>PURCHASING STRATEGY</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Summary of the strategy</td>
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<table>
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<tr>
<th>Current Status</th>
<th>CURRENT STATUS</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Status showing where the company is at.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Main Issues</th>
<th>MAIN ISSUES</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Main issues to deal with, what is important to focus on.</td>
</tr>
</tbody>
</table>
STRATEGIC PURCHASING PLAN

VALUE ANALYSIS

Cost
- Estimated value of the raw material purchase for the actual period.
- Purchased value of the raw material from the last period.
- Name the elements generating the cost for the supplier. For better knowledge about the price and what we are purchasing.
- Name the cost driver in the raw material and its connection to other line of business. (The raw material and its cost drivers are placed in the middle of the diagram. From every cost driver connections to other line of businesses are drawn.)

A description with words to the diagram

Price
- Price level and latest price change/adjustment of the purchased raw material.
- Quoted prices/price changes/adjustments for some years back.
- Name reasons for changes in price.
- Pricing conditions and length of contract.
- Part bought on contract/spot.
- Name also price differences between suppliers and possible discounts.
Price cost analysis
- Evaluate the price in comparison to the supplier cost.
- Evaluate the price changes/adjustments in comparison to the changes of the cost drivers.
- Name expected changes of cost drivers or cost driver markets.
- Compare and analyse our price and published/other customers prices

COMPETENCE ANALYSIS
- Extend and type of competence requested/bought from supplier
- Expected/needed change in competence and the supplier’s ability to cope with such changes
- Asses its impact on purchasing

PROFITABILITY ANALYSIS
- Number, name and profitability of end products the raw material is an ingredient in

<table>
<thead>
<tr>
<th>No of end product</th>
<th>Name of end product</th>
<th>Profitability</th>
</tr>
</thead>
<tbody>
<tr>
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</tr>
</tbody>
</table>

- Strategic importance of the end products
- Profitability compared to other raw material in the same quadrant

DEMAND ANALYSIS
- Expected purchased volume of the raw material for the actual period.
  Patterns in the purchased volume, how often are the purchases done, is the purchased volume stable or fluctuating?
- Purchased volume for the last period
- Name reasons for changes in volume
- Demand trends and expectations of end products

SUPPLIER ANALYSIS

Approved suppliers
- Number of approved suppliers
- Purchased share from each of the approved suppliers
- Name, location, price-level and capacity of these suppliers
- Ownership
- Information about the supplier’s financial and economical situation; for example financial stability, margins, market share, experience etc.
- Information from the supplier evaluation.
### Possible suppliers

- Number of suppliers possible to approve
- Name, location, price-level, capacity and quality of these suppliers
- The possible suppliers financial and economical situation

<table>
<thead>
<tr>
<th>Name</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Location</td>
<td></td>
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</tr>
<tr>
<td>Price-level</td>
<td>Q₁</td>
<td>Q₂</td>
<td>Q₃</td>
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<tr>
<td>Capacity</td>
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<td></td>
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</tr>
<tr>
<td>Quality</td>
<td></td>
<td></td>
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<tr>
<td>Financial situation</td>
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</tbody>
</table>

- Costs and resources for adding/changing supplier
- Risks with adding/changing supplier
RAW MATERIAL ANALYSIS

- Possibility/need of developing a substitute
- Major differences with the substitute
- The need for approval from an institute.
- Cost for changing raw material
- Resources demanded in the process of developing a substitute

MARKET ANALYSIS

- Location of the supplier market
- Estimation of the profitability of the suppliers on the market
- Key suppliers on the market and their influences
- Trends on the supply market
- Competition climate/Entry barriers
- Political stability
- Supply situation (scarce supply of ingredients etc.)
- Total market volume

SUPPLIER RELATIONSHIP ANALYSIS

- Company strength:
  - Purchased volume/ Importance of the buyer to the supplier.
  - Demand growth.
  - Market share.
  - Profit on end products.
  - Possibility/need of producing the raw material in-house/finding a substitute
  - Cost for in-house production/substitution
  - Supplier related investments. For example buildings, gear, processes and products customised after the supplier.

- Supplier strength
  - Market share
  - Attractiveness
  - Demand growth
  - Competitive structure
  - Uniqueness of product
  - Profit on products
  - Customer related investments. To better meet customer demand for example specialised personnel, location of stock, compatible business systems.
  - Ability to cope with changes
  - Speed of development
  - Patent protections

- Power-dependence balance (evaluate company strength vs. supplier strength)
- Social climate/Personal relationships
RAW MATERIAL
Number
Classification quadrant

- Duration of the relationship
- Information sharing
- Summary of supplier relationship (company view)
- Summary of relationship (supplier view)

NETWORK ANALYSIS
- Evaluation of network.

- Other products purchased from the supplier. Amount and importance of these.
- Accumulated purchases together with other lead-buyer.
- Relations other than seller-buyer with the suppliers.

LOGISTICAL ANALYSIS

Transportation:
- Transportation costs
- Transportation lead-time

Inventory:
- Average stock level
- Speed of stock turnover
- Capacity constraints in stock
- Handling/storing costs
- Control method of inventory
- Durability, special restrictions on how to store the raw material

Administration:
- Costs for administration
- Way of administrating/order handling/order quantity
PURCHASING HISTORY
- Key drivers of sourcing
- Briefly summarise the most important parts of the purchasing history.

SWOT-ANALYSIS
- Summarise all strengths
- Summarise all weaknesses (vulnerabilities)
- Summarise all opportunities (moving between quadrants, market opportunities, VMI, standardisation etc.)
- Summarise all threats (risks from suppliers, condition of market)
- Combine these

TOTAL COST ANALYSIS
- Total cost as the situation is today
- Comparison of total costs for different options.

PURCHASING STRATEGY
- Purchasing strategy

PURCHASING PLAN
- Concrete plan of how to fulfil the purchasing strategy.
- Describe how, and with whom business will be placed
- State the recommended length and nature of contracts
- Describe how implementation will be monitored, measured and reported