

**HELSINKI UNIVERSITY OF TECHNOLOGY**

Department of Industrial Engineering and Management

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**MASTER'S THESIS**

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**Supplier management in a multi-national utility  
company:**

**Development of a supplier pre-selection and  
performance measurement system**

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the degree of Master of Science in Technology

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<p>The performance of suppliers is becoming a very important contributor to the success of companies as dependency on the suppliers grows. Therefore, a systematic way of managing suppliers is needed. The aim of this thesis is to discover a framework for supplier management and to study its relationship to purchasing activities. Furthermore, the aspects related to supplier measurement and evaluation are studied from the perspective of a case company. The research questions are as follows:</p> <ol style="list-style-type: none"> <li><i>1. What are the elements of supplier management and the purchasing process, and how do they relate to each other?</i></li> <li><i>2. What elements should a supplier pre-selection and performance measurement system include?</i></li> </ol> <p>As a result of the theoretical part a framework for supplier management containing six different elements is created. The first element is the creation of supplier management strategy which is the basis for all supplier management operations. The framework also includes supplier discovery, supplier pre-selection, and supplier selection, which relate to finding, qualifying, and choosing the best suppliers. Supplier performance measurement and relationship management are continuous activities taking place during the relationship and aiming at performance improvement. Most of the six aspects are in close connection to the purchasing activities or are actually the same activities viewed from a different perspective.</p> <p>The empirical part consists of interviews with employees of the case company, case studies, and a benchmark study. The findings of the empirical part are compared to the good practices found from the literature. A supplier pre-selection and performance measurement system is developed for the case company based on the current good practices and improvement suggestions. The recommendations contain processes for supplier pre-selection and performance measurement, illustrate their connection points to purchasing activities, and suggest methods, criteria, and rules for carrying out the processes. An implementation plan is created, too.</p>		
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<p>Toimittajien vaikutus yritysten menestykseen on kasvanut samalla, kun riippuvuus toimittajista on lisääntynyt. Tästä syystä myös tarve johtaa toimittajia systemaattisesti on kasvanut. Tämän diplomityön tavoitteena on kehittää raamit toimittajien johtamiselle ja tutkia sen suhdetta hankintatoimintoihin. Myös toimittajien mittaamista ja arviointia tutkitaan kohdeyrityksen näkökulmasta. Tutkimuskysymykset on muotoiltu seuraavasti:</p> <p><i>1. Mistä elementeistä toimittajien johtaminen ja hankintaprosessi koostuvat ja miten ne suhtautuvat toisiinsa?</i></p> <p><i>2. Mitä elementtejä toimittajien esivalinta- ja toiminnan mittaamisjärjestelmän tulisi sisältää?</i></p> <p>Diplomityön teoreettisessa osuudessa esitellään toimittajien johtamisen malli, joka koostuu kuudesta elementistä. Ensimmäinen elementti on toimittajien johtamisstrategia, joka luo perustan kaikille toimittajien johtamiseen liittyville toiminnoille. Malli sisältää myös toimittajien tunnistamisen, esivalinnan ja valinnan, jotka tähtäävät parhaiden toimittajien löytämiseen, hyväksymiseen ja valitsemiseen. Toimittajien toiminnan mittaaminen ja toimittajasuhteen hallinta ovat myös osa toimittajien johtamista. Ne jatkuvat katkeamatta koko toimittajasuhteen ajan ja niiden päämääränä on suorituskyvyn parantaminen. Suurin osa edellä mainituista kuudesta elementistä on kytköksissä hankintaprosessiin. Itse asiassa joiltain osin toimittajien johtaminen on vain yksi näkökulma hankintaprosessiin.</p> <p>Tutkimuksen empiirinen osuus koostuu kohdeyrityksen työntekijöiden haastatteluista sekä case- ja benchmark-tutkimuksista. Näillä metodeilla kerätystä aineistosta saatuja tuloksia vertaillaan teoreettisessa osuudessa löydettyihin hyviin toimintatapoihin. Nykyisiin hyviin käytäntöihin sekä tutkimuksessa löydettyihin kehityskohteisiin perustuen kohdeyritykselle annetaan suosituksia, kuinka sen tulisi rakentaa toimittajien esivalinta- ja toiminnanmittaamisjärjestelmä. Suositukset sisältävät ehdotuksen toimittajien esivalinta- ja toiminnan mittaamisprosesseista, havainnollistukset niiden suhteesta hankintaprosessiin sekä ehdotukset toimintatavoista, kriteereistä ja säännöistä, joita tulisi noudattaa prosesseja toteutettaessa. Lisäksi esitellään suunnitelma järjestelmän käyttöönotosta.</p>		
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# 1 Introduction

This first chapter presents the background of the study and the case company. Also the research questions and objectives of the study are introduced as well as the methods how the data is collected and the study carried out.

## 1.1 Background

Suppliers and their performance are becoming more and more important to companies as they focus more on their core operations and outsource others. In most companies the volume of purchases is 50-90 percent of the turnover while for example the corresponding figure for labor costs is six percent and for overhead expenses three percent (de Boer et al., 2001: 75; Iloranta et al., 2008: 85). There has also been a tendency towards decreasing the amount of suppliers caused by specialization and more complex technology (Choy et al., 2002: 239). As dependency on suppliers increases, companies have to pay more attention on how they manage their supplier base. A well-designed supplier management system can support professional purchasing and increase conformity and a systematic way of purchasing. It also has an effect on risk. Risk management is in close contact with supplier management because suppliers are also a source of risk. (Östring, 2004: 21). All in all, supplier management can be a great contributor to the success of a company.

“You cannot manage what you cannot measure” (e.g. Chan, 2003: 535). Therefore, it is easy to see that supplier evaluation and measurement are vital parts of supplier management. Evaluation can and should take place before anything is purchased from a supplier and continuously during the relationship. The case company of this thesis is dealing with challenges of how to actually execute these evaluations.

### 1.1.1 Case company

The case company is a multi-national utility company and has been formed by several mergers and acquisitions. (Internet reports of the case company). Consequently, there are many organizational cultures and ways of operating in the company. The organization consists of business units, service units, and corporate functions. The business units are responsible for the actual business and the service units provide services, for example IT support, for the business units. The corporate units also provide services and assistance for the business units in addition to which they control and supervise the actions of all units.

Purchasing is organized in a matrix in the case company. *The purchasing teams* of each business and service unit operate the purchasing in their own unit but there are also *lead buyer teams* that are responsible for the procurement of certain cross-border and cross-unit product categories. *Corporate purchasing* leads and supervises purchasing for example by setting some goals and strategies, controlling that the units are working as agreed, guiding the lead buyer teams, and harmonizing the processes. (Internet reports of the case company).

The systematic development of purchasing began in the case company in 2003 when the current purchasing organization was also established. The objective is to harmonize purchasing and make it more effective. One part of the development process is to be able to control the large amount of suppliers, altogether 20 000 companies. In 2009 the company listed development of a supplier management system in its strategic agenda. The starting point with supplier management is that some of the units have a system of their own in use and some units do not have a system at all or it's very informal. It has been recognized that decentralizing supplier management is not rational because there are a lot of benefits in sharing the information about the suppliers and their performance. Therefore, the target is to find a common system and rules for supplier management in all units.

## **1.2 Research questions**

Supplier management research has been rather extensive but unfortunately the studied topics have focused only on certain aspects of supplier management. For example supplier selection and performance measurement have been discussed by many researchers (e.g. Choy et al., 2002; Pal et al., 2008; Vokurka et al., 1996; Willis et al., 1993) but very few take the link between them into consideration or discuss their relationship with other processes, e.g. purchasing.

Many articles deal with choosing the best supplier with some complex mathematical criteria (e.g. Mandal et al., 1994). However, they lack a description of what type of data is needed to measure each criterion, for example how flexibility or commitment to communication should be measured. Moreover, the methods used to retrieve the needed data from the supplier or the buyer's own records could be discussed more in-depth.

The research about performance measurement of the existing suppliers suffers from the same problems as supplier selection research. The researchers have created some sophisticated mathematical models for measuring but many of them have not discussed for example whether the same models should be used for all the suppliers or if some modifications should be made between different suppliers (e.g. Talluri et al., 2002). Companies often have thousands of suppliers, and it is impossible to evaluate all of them in the same manner. Moreover, more research could be carried out about how to give some feedback to suppliers about the results of performance measurement.

Therefore, to clarify the concept of supplier management and its relationship with the purchasing process, and to bring some new perspectives into supplier evaluation, the research questions are as follows:

- 1. What are the elements of supplier management and the purchasing process, and how do they relate to each other?*

## *2. What elements should a supplier pre-selection and performance measurement system include?*

The first task when solving the first question is to define the most important concepts. In the literature many concepts have mixed meanings so one target is to harmonize them at least for the purposes of the case company. One task is to find descriptions of the purchasing process and the supplier management, and present the elements they consist of. After the frames for the thesis and the most essential concepts have been clarified the purpose is to discover the interfaces between the supplier management and the purchasing process.

The next task is to clarify how the units of the case company operate at the moment. After the current situation has been sketched the objective is to find some common, better practices. The case company wants to have some common guidelines for qualifying the suppliers as eligible business partners and for measuring their performance. The idea is to create some common criteria, processes, and tools for supplier evaluation and a solution for storing the data created in the process.

### **1.3 Scope of the study**

This thesis discusses supplier management on a general level but the focus will be on the supplier evaluations. This scope is selected because supplier management as a whole is too extensive to discuss thoroughly in the thesis and due to the needs of the case company. Because the case company does not have any systematic and organized supplier management in use, it wishes to start building it in stages, the first one being supplier evaluations. Furthermore, the scope of the supplier evaluations will be limited to only first-tire suppliers and contractors providing materials and services. Thus, the considerations related to sub-suppliers or suppliers providing utilities or legally obligated commodities such as water or employee insurances will not be discussed.

One element excluded from the study is supplier selection. In other words, assessment of suppliers' production facilities, prices, costs, delivery, and quality related to a particular product or service are not discussed. Moreover, tendering, contract negotiations, and contract making procedures are excluded from the scope.

Supplier management strategy and relationship management are elements that will only be discussed briefly. Supplier management strategy is a guideline for all supplier management actions and thus very important but in the case company it is already very well defined in the purchasing strategy. It has been aligned with the corporate strategy and there is no intention of suggesting any notable alterations within the limits of this thesis. Supplier relationship management in terms of supplier development is discussed to some extent. However, creating supplier development procedures for the case company is not very sensible at this point. A supplier evaluation system needs to be in place first.

## ***1.4 Research approach and methodology***

The research approach used in this study is the decision-making methodology approach (Kauranen et al., 1992: 30). The ultimate objective of this thesis is to find some solutions to the challenges that the case company is facing. The solutions may be of general nature and applicable in other companies as well but that is not the primary aim. Next, the research methods used to reach the objective are introduced.

### **1.4.1 Literature review**

The study begins with a literature review. The purpose of the review is to give some insight into the subject and the theoretical framework. The literature used in the review consists of books on purchasing and supply chain management, and scientific journals. Some material is also retrieved from Procurement Strategy Council (PSC), one of the sub-programs of Corporate Executive Board which is a network for corporate

executives. PSC enables knowledge exchange between procurement professionals in addition to offering some procurement research material.

### **1.4.2 Internal interviews**

Most of the purchasing managers of the business and service units of the case company are interviewed. The interviews are executed as semi-structured interviews (Järvenpää et al., 2003: 24). Some of the open-end questions and topics are formulated beforehand but otherwise the conversation is rather informal.

The interviews have two main topics: the current situation of supplier evaluation, and the ideal future situation. Of the two, especially the first one is very important in the beginning of the research. By developing a good understanding of what the starting point is, it is easier to start generating a plan for some improvements. Moreover, the opinions of the interviewees' about how supplier evaluation should be handled in the future are important because they have knowledge about the feasibility of different types of systems and processes.

The case company has also provided a project team that consists of the purchasing managers of the business units, and some members of the corporate purchasing team. The project team has meetings monthly and its purpose is to support the development of supplier management from the operative perspective. It makes the final decisions about the actual processes and procedures to be implemented in the company.

### **1.4.3 Purchasing cases**

Nine purchasing cases are reviewed to find out how the current procedures are realized in practice. To ensure an extensive review of the situation the cases include purchases of both materials and services that are made by different units. The information received from the internal interviews and the cases are compared to each other and final conclusions are drawn about the current situation.

#### **1.4.4 Benchmark study**

In addition to the methods mentioned before, a benchmark study is conducted in order to understand and learn from the supplier management practices outside the case company. The study will include interviews with the managers of two large industrial companies operating in Finland.

### **1.5 Terminology**

- *Buying*: Making orders according to predetermined conditions, and taking care of payment transactions. Refers only to reactive activities. (Iloranta et al., 2008: 58).
- *Purchasing*: Includes all the activities due to which a company receives an invoice (Iloranta et al., 2008: 58).
- *Sourcing*: Activities related to mapping potential suppliers, securing availability of commodities, and increasing knowledge of the supply markets (Iloranta et al., 2008: 60).
- *Supplier management*: Purposeful actions to utilize and develop supplier markets (Iloranta et al., 2008: 59).
- *Supply chain*: Includes all internal functions plus external suppliers involved in the identification and fulfillment of needs for materials, equipment, and services in an optimized fashion (Burt et al., 2003: 9).
- *Supply chain management*: Extends the concept of purchasing to the whole supply chain (Iloranta et al., 2008: 60). Includes the management and controlling of two-way movement of services, materials, information, and funds (Monczka et al., 2005: 9).

## **2 Literature review**

The literature review gives insight to the background of the subject and input mainly to the first research question. The different activities of purchasing are presented in subchapter 2.1 and they form the basis for the actual purchasing process. The reason why the purchasing process is presented in this thesis is to be able to illustrate the relation between supplier management and purchasing. If only supplier management was discussed, purchasers would not get a clear picture of how supplier management relates to their work and when it should be taken into consideration. Unfolding the purchasing process also gives the reader a better understanding about purchasing in general.

The elements of supplier management are studied one by one with the help of a framework in subchapter 2.2. The framework is designed to cover all the issues that need to be considered during a supplier relationship. In the last subchapter the connection points of the purchasing process and supplier management are discovered. The best practices related to supplier management are also summarized.

### ***2.1 Purchasing process***

Purchasing is related to the management of the external resources and its objective is to ensure in the most optimal way that all necessary products, services, and knowledge are available (van Weele, 2005: 12). Purchasing function is responsible for carrying out the purchasing related activities that can be illustrated as a process (van Weele, 2005: 13). Purchasing has a direct effect on business success: it contributes to sales margins through cost savings and to capital turnover by improving quality and logistics arrangements. Regardless of that, the purchasing process was for long seen only as a set of operational activities that had little or no strategic impact in the overall organizational effectiveness (van Weele, 2005: 16). However, nowadays the situation is changing as the executive managers rely on the purchasing function to attain

competitive cost, high quality, and on-time deliveries. (Monczka et al., 1993: 42). In other words, the major strategic importance of effective realization of purchasing has been noticed.

The first research question is concerned with the elements of the purchasing process and therefore, the purpose of this subchapter is to try to discover a viable model for the process. Dobler et al. (1996) present a list of purchasing activities that form a good basis (Dobler et al., 1996: 35).

- Identification of purchasing needs
- Discussion with sales people
- Identification of suppliers
- Market studies
- Negotiations
- Analysis of proposals
- Selection of suppliers
- Issuance of purchase order
- Contract administration
- Purchasing records

If the activities are closely reviewed it becomes obvious that they are in a chronological order. Monczka et al. (2005) present a process that consists of fewer steps: identify need; evaluate potential suppliers; bidding, negotiation and selection; purchase approval; release and receive requirements; and measure supplier performance (Monczka et al., 2005: 35). However, the way the process is presented is rather incoherent and therefore, not very viable. Van Weele (2005) on the other hand has a very comprehensible purchasing process model that consists of practically the same steps as the process of Monczka et al. (van Weele, 2005: 52). Therefore, in this thesis the process will be illustrated in the same form as van Weele's process but the

content will be a hybrid of the activity lists of Dobler et al., Monczka et al., and van Weele (Figure 1). Each of the steps will be discussed in the following subchapters.

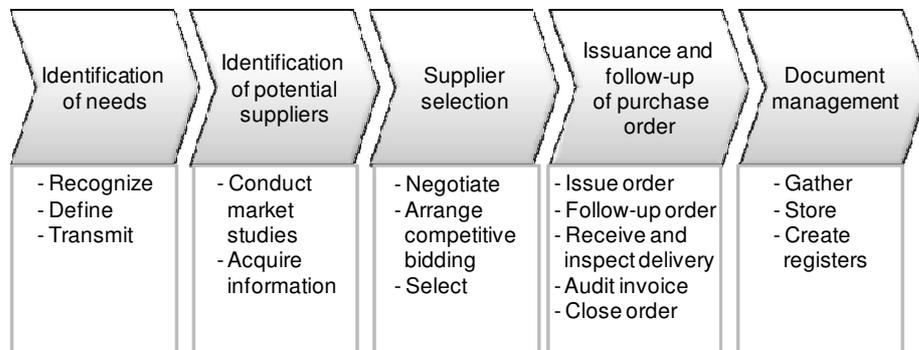


Figure 1 Purchasing process

### 2.1.1 Identification of needs



The first step in the purchasing process is identification of needs, which refers to recognizing, defining, describing, and transmitting the need of an internal customer, and discussions with sales people (Dobler et al., 1996: 64). The customer may need a product, for example raw material or subassemblies, or a service like transportation or maintenance (Monczka et al., 2005: 36).

Sometimes the purchasing function can also be proactive when determining the purchase needs, especially in the case of new product or service development projects. In these situations the purchaser has to clarify whether the new product or service fits into the assortment of the company and whether the market can satisfy the need. Based on the clarifications, needs or specifications may need to be adjusted. (van Weele, 2005: 303).

## 2.1.2 Identification of potential suppliers

The next step is identification of potential suppliers. The potential suppliers can be identified among the old, familiar suppliers or through a market study. A list is made of the potential candidates and a request for information (RFI)<sup>1</sup> is sent to the ones on the list. (van Weele, 2005: 52). Based on the information a shorter list of suppliers is drawn up, and a request for proposal (RFP)<sup>2</sup> is sent to this limited amount of potential candidates. (Monczka et al., 2005: 42). It must be noted that this procedure described above is a thorough way to identify the suppliers and is not always realized in the same manner in every company or in every purchasing case. For example a contract with a supplier may already exist for the needed products, which means that the contract supplier is the only potential supplier. (Monczka et al., 2005: 42).



## 2.1.3 Supplier selection

The most important step of the process is supplier selection that needs to be performed with care to avoid errors that may have long-lasting effects to a company. (Monczka et al., 2005: 44). There are two ways to decide which supplier to choose: competitive bidding and negotiations. After the bids requested in the RFP have arrived the purchaser can make a decision based on the information in the bids or invite the suppliers to further negotiations. Bidding is the most effective when the price is a dominant criterion and product specifications are well defined. Negotiations, on the other hand, are the most sensible option if the



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<sup>1</sup> RFI = Request for suppliers to provide information about their qualifications and references (van Weele, 2005: 52)

<sup>2</sup> RFP = Request for suppliers to submit a bid which meets the requirements laid down in the RFP (van Weele, 2005: 52)

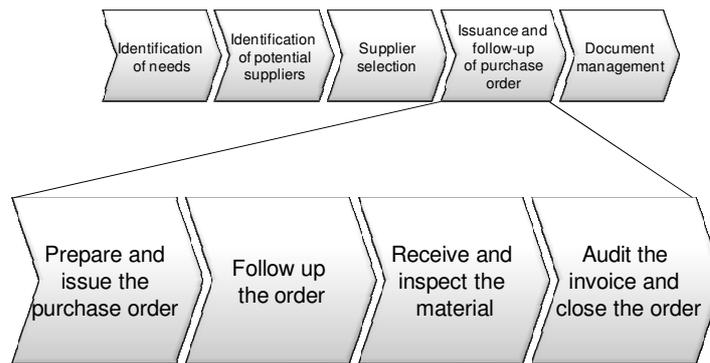
purchase requirements are complex, there are several performance factors that need to be agreed on, or there are some risks that need to be discussed. (Monczka et al., 2005: 45). After bidding, negotiations, or both, a proposal for selection is made, risks related to the selection are analyzed, and finally one or several suppliers are selected (van Weele, 2005: 53).

### 2.1.4 Issuance and follow-up of purchase order

What is perceived as buying in its most operative level takes place after supplier



selection. Issuance of purchase order and follow-up is divided into four steps as illustrated in Figure 2. (Dobler et al., 1996: 62).



**Figure 2 Purchase order process (Dobler et al., 1996)**

First, a purchase order (or a longer term contract) is prepared and issued (Dobler et al., 1996: 67). It can include an order for only one product or cover several routine re-buys for a longer period of time. In the latter case the order is called a call-off or a frame agreement (van Weele, 2005: 57).

After placing the order, especially in the case of products with long delivery times, it should be followed up. The follow-up of the order refers to checks that are made usually by phone or email once or several times during the delivery time to ensure that the supplier is able to deliver the product as agreed (Leenders et al., 2002: 102).

The next step in the process is to receive the product and inspect that it matches the order (Dobler et al., 1996: 72). The inspections are important because shortages and damages in the delivery are detected before the product is taken into use (Leenders et al., 2002: 104). The final step is payment. However, it shouldn't be made before the purchaser has checked that the purchase order, the received product, and the invoice are equivalent (Dobler et al., 1996: 74). If there aren't any problems, the order can be closed (Dobler et al., 1996: 75).

### 2.1.5 Document management

The last step in the purchasing process is the maintenance of the records. It



naturally involves gathering and storing the documents produced in the process but also analyzing which important documents to keep and which to dispose of. A vital point in document management is easy access. Hence, rational organization of the material is crucial. A company should at least have records of the purchase orders (i.e. contracts), the commodities, and the suppliers. (Leenders et al., 2002: 107).

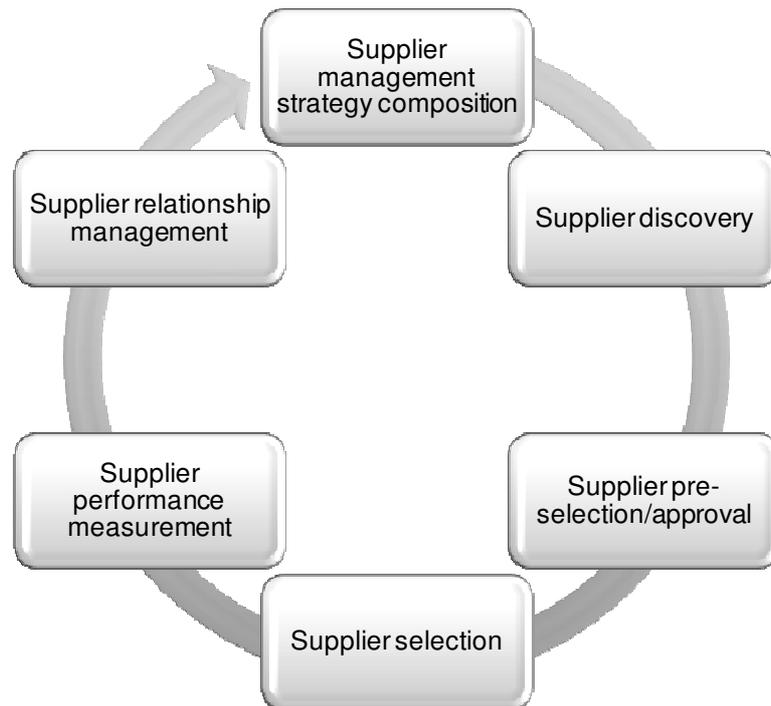
## 2.2 Supplier management

This subchapter presents the aspects of supplier management. Alike in subchapter 2.1, the purpose of this subchapter is to build a framework. However, unlike the purchasing process, supplier management has been studied from many different perspectives and hence, there is no unified framework available. Thus, an augmented framework is created based on the perspectives presented below.

According to Kannan et al. (2002) there are three dimensions that underlie supplier management: effective supplier selection, meaningful assessment mechanisms of supplier performance, and innovative supplier development strategies (Kannan et al., 2002: 11). Carr et al. (1999) and Wagner (2006) extend from the three dimensions by adding identification and pre-selection of the suppliers (Carr et al., 1999: 500; Wagner,

2006: 563). Another perspective taken into supplier management is the strategic perspective that is more abstract compared to the previous ones. The strategic perspective emphasizes the creation of long-term agreements and strategic relationships as well as the integration of purchasing, manufacturing, and technology into the product value chain. (Monczka et al., 1993: 51). Also Van Weele (2005) views supplier management from the strategic point of view. He states that the main element of supplier management is strategy. (van Weele, 2005: 161).

When constructing the framework, firstly, it is important that the strategic aspect is taken into consideration because supplier management strategy should be aligned with the needs of the business (Handfield, 2006: 233). The second step should be discovery of the potential suppliers (Burt et al., 2003: 329). Next, there should be a pre-selection step during which a large number of potential suppliers is limited to a smaller amount (Lasch et al., 2005: 411). The pre-selection phase results in an approved suppliers-list from which the final selection can be made (de Boer et al., 2001: 79). Measurement of the suppliers' performance should begin right after the first deliveries and it should continue along the relationship. The last part of the framework is relationship management. It includes supplier development and maintaining the relationship. (Lasch et al., 2005: 411). The supplier management framework consisting of the aforementioned elements is illustrated in Figure 3.

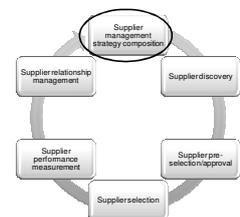


**Figure 3 Supplier management framework**

The framework will be the basis for this thesis and a guideline for explaining the elements of supplier management. The elements will be discussed in the six following subchapters. In the last subchapter the maturity levels of supplier management will be presented.

### **2.2.1 Supplier management strategy composition**

Traditionally purchasing functions have had very distant and arms-length outlook on suppliers. The main focus has been on selecting the cheapest supplier. (Iloranta et al., 2008: 123). However, nowadays the conceptions have changed towards understanding the strategic aspect related to suppliers and the need to develop some plans and guidelines for managing them. (Iloranta et al., 2008: 125). The benefit of having a strategy is that it gives the organization a common view of goals and means to reach them. The strategy facilitates decision making and focusing



on the right issues. It is also a tool that helps people to create, understand, and execute guidelines and working methods. (Iloranta et al., 2008: 116).

The strategy has five levels all of which are linked to each other. The first level is corporate strategy that defines the businesses in which the corporation participates. On the second level there are strategies of every business unit. They determine the scope and boundaries of the units. On the third level there is purchasing strategy which is one element in the group of functional strategies. It specifies how purchasing supports the various strategies of the business units and the other functional strategies, e.g. operations strategy. Commodity<sup>3</sup> and supplier management strategies lie on the fourth and fifth levels. The commodities and the suppliers are classified into segments, and based on the segmentations supplier management strategies are formulated. (Handfield, 2006: 243). Next, the segmentation of commodities and suppliers are discussed as well as the aspects that need to be considered during the formulation of the supplier management strategy.

### **2.2.1.1 Segmentation of commodities and suppliers**

Many companies have thousands of purchased commodities and suppliers, and not all of them should or could be managed in the same way. Therefore, creating strategies for segments that contain the suppliers of similar commodities seems rational. The biggest benefit of segmentation is that it helps companies allocate better their scarce resources (Procurement Strategy Council, 2007: VI).

Originally the purchasing portfolio model used for segmentation was developed by Peter Kraljic in 1983. The segmentation is based on two criteria: strategic impact to the business and the level of supply market risk. *Strategic impact* can refer to high

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<sup>3</sup> In this thesis 'commodity' refers to both products and services

purchasing volume but also to effect on the core business. If the strategic impact is high, the supplier has a major impact on revenue, customers, and the reputation of the company. (Handfield, 2006: 233). *Supply market risk* refers to the amount of potential suppliers in the market. The potential suppliers are the ones that can deliver commodities according to the specifications and requirements for quantity and delivery timeframe. A challenging market situation may be caused by long timeframes for obtaining a commodity, high costs, or some difficulties with switching a supplier. (Handfield, 2006: 234).

Based on the strategic impact and the supplier market risk, the commodities and the suppliers are classified into four segments: non-critical, bottleneck, leverage, and strategic (Kraljic, 1983: 6). They are presented in Figure 4 and explained more detailed below.

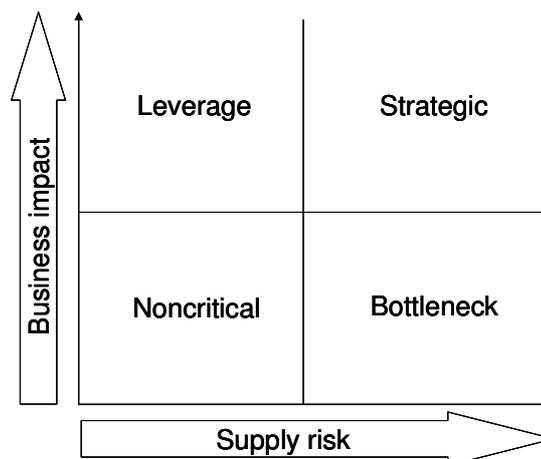


Figure 4 Purchasing portfolio (Kraljic, 1983)

### Non-critical commodities and suppliers

The non-critical segment includes standard commodities and their suppliers that represent a small value of the whole purchase volume but consume up to 80 percent of purchasers' time (van Weele, 2005: 151). They are costly because they are purchased without a formal procedure. (Handfield, 2006: 237). Therefore, it would be important

that the suppliers of non-critical commodities have efficient order-to-delivery and service capabilities as well as a flexible, automated support system. An example of a supplier of non-critical commodities is a copier maintenance service. (Handfield, 2006: 244).

### **Bottleneck commodities and suppliers**

The determinant of bottleneck commodities and suppliers is availability (van Weele, 2005: 151). For example advertising agencies that have some unique competencies can be regarded as bottleneck suppliers (Handfield, 2006: 244). Therefore, an effort should be made to find some new sources of supply to improve availability. (Monczka, 2005: 178).

### **Leverage commodities and suppliers**

The leverage segment contains commodities that have a large number of possible suppliers and a high annual spend. Often if strategies for these items have not been developed, the commodities are purchased from several different suppliers without utilizing economies of scale. Therefore, consolidation and reduction of the supply base should be used to gain cost reductions. (Monczka et al., 2005: 179). The best performing leverage suppliers are excellent in supply-chain management and customer service and they maintain a high level of quality. (Handfield, 2006: 244).

### **Strategic commodities and suppliers**

The strategic commodities are high-tech, high-volume products or services for which there is only one or few suppliers (van Weele, 2005: 149). The strategic suppliers have aligned growth plans and integrated supply chains with their customers. Through the integrated chains they provide their unique services or products. (Handfield, 2006: 245).

### 2.2.1.2 Strategy formulation for commodity-supplier segments

According to van Weele (2005), when creating strategies for the segments two main strategic aspects should be taken into consideration: sourcing and contract strategy (van Weele, 2005: 161) (Figure 5).

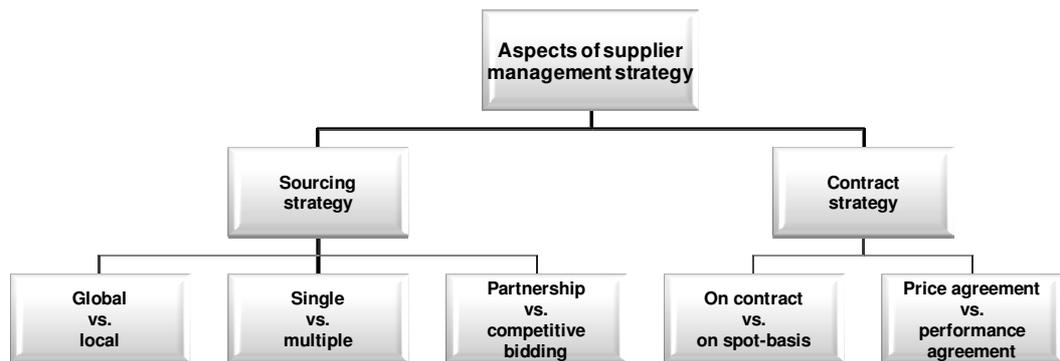


Figure 5 Main aspects of supplier management strategy (van Weele, 2005)

#### Sourcing strategy

Sourcing consists of three elements: geographical area, width of supplier base, and level of commitment to the relationship. The choice of the geographical area is made between local and global. Local sourcing has benefits like more dependable service but on the other hand global sourcing is competitive in areas such as price, quality, and bigger variety (Leenders et al., 2002: 546). The width of the supplier base depends on the decisions whether the company wants to buy certain commodities from one, few or several suppliers. A common rule is that the wider the supplier base the smaller the risk. (van Weele, 2005: 161). The level of commitment to the relationship refers to the choice whether the company wants to buy certain products from a partner supplier or from a supplier with whom it has an arms-length relationship (van Weele, 2005: 161).

## **Contract strategy**

In addition to sourcing, the approach to contracts needs to be considered when developing supplier management strategies. Decisions need to be made about two issues: whether to make a contract at all and whether the contract should be tied to price or performance (van Weele, 2005: 161). First, the volume of the purchased commodity and the situation in the market need to be analyzed. If the volume is very small or the buying company has a dominant position, the commodity should be bought on spot basis instead of making a contract with a supplier (Kraljic, 1983: 12). The benefit of making a contract is that the price and delivery are secured, which facilitates planning and budgeting. However, if the contract is long the company may lose its contact to the market and the latest developments. (van Weele, 2005: 161). If the company decides that a contract should be made, the next issue to consider is what the contract should be like. The options are contracts based on price or service level. The contract based on price is very straightforward whereas the service level agreement covers many issues such as guarantees, maintenance, and tests. The latter is mainly used in service and investments equipment purchases. (van Weele, 2005: 162).

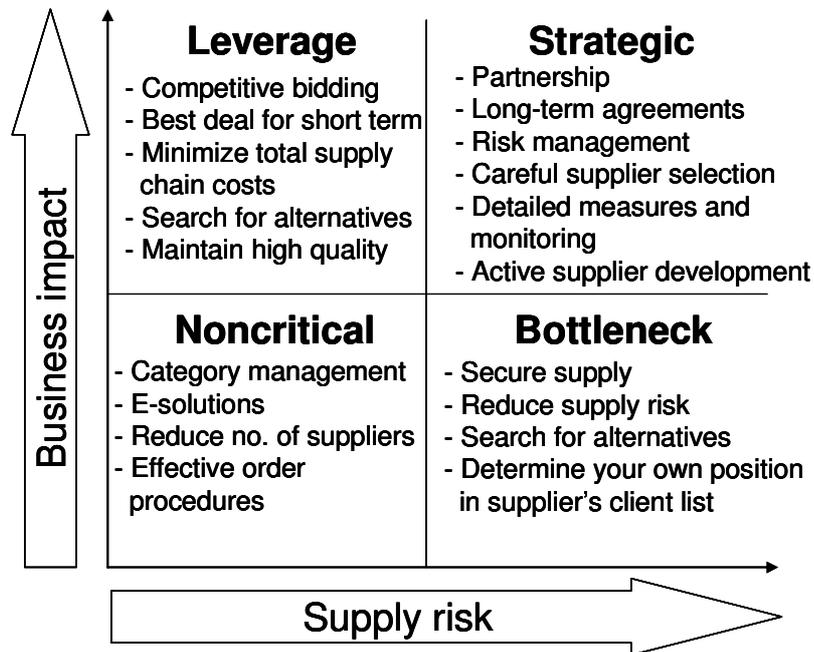
## **Strategies for commodity-supplier segments**

Finally, supplier management strategies are created for each commodity-supplier segment. Table 1 summarizes the most important sourcing and contract related issues for each of them.

**Table 1 Sourcing and contract strategies of each commodity-supplier segment (adapted from van Weele, 2005; Handfield, 2006)**

	Non-critical	Bottleneck	Leverage	Strategic
Sourcing strategy	- Small amount of selected vendors	- Global sourcing - Single sourcing - Search for alternatives	- Multiple sourcing - Competitive bidding	- Partnership - Find best possible supplier
Contract strategy	- Pursuing long-term contracts for product categories	- Secure supply - Performance based contract	- Spot-buying - Best deal for short term - Maintain high quality	- Long-term, performance-based agreements

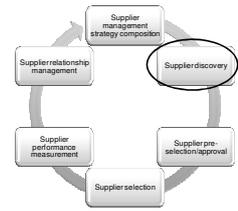
A remark should be made that van Weele’s model is quite limited as it focuses only on sourcing and contracts. Important aspects such as performance measurement and supplier development are not included in it. Thus, in the final strategies presented in Figure 6 van Weele’s model is complemented with other relevant points as well.



**Figure 6 Supplier management strategies (adapted from van Weele, 2005; Handfield, 2006)**

## 2.2.2 Supplier discovery

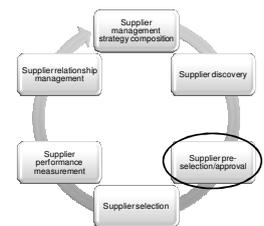
The effort needed to be able to discover an adequate amount of promising suppliers depends highly on the case. The two most important issues that have an impact are the capability of current suppliers to satisfy performance variables and the strategic importance of the purchase requirement (Monczka et al., 2005: 209). It should also be pointed out that more effort is needed to find suppliers if the particular commodity has never been bought before. In other words, the less experience a purchaser has of a commodity the more work is needed to discover suppliers. (de Boer et al., 2001: 78).



The sources of supplier information are numerous, thanks to information technology. For example suppliers' web pages and catalogs, trade registers and journals, sales personnel, and trade shows are good information sources. (Burt et al., 2003: 330). The buying company may also have a database that contains information about past, existing, and potential suppliers. The information can relate to commodities, future technologies, process capability ratios, or records of the suppliers' past performance among other things. (Monczka et al., 2005: 211).

## 2.2.3 Supplier pre-selection and approval

In many studies pre-selection is included in supplier selection but in this thesis it is a separate step. The main characteristic that differentiates supplier pre-selection from supplier selection is that it is a *sorting* process whereas the selection is a *ranking* process. The purpose of pre-selection is to reduce the set of all potential suppliers to a set of eligible, approved suppliers. By contrast, during the selection phase the products, prices, and other delivery related issues of the eligible suppliers are assessed, and a decision is made which supplier to do business with. (de Boer et al., 2001: 80). Moreover, pre-selection can be conducted proactively to potential suppliers unlike the actual supplier selection. That way the buying



company can have a list of approved suppliers that can be utilized when the purchase need actually arises. Presumably, once a supplier has been perceived as an eligible supplier, it won't lose its eligibility right away. Thus, the pre-selected suppliers can be considered approved suppliers for a certain period of time.

### **2.2.3.1 Supplier pre-selection process and criteria**

The pre-selection process contains two steps: criteria formulation and supplier pre-selection based on the criteria (de Boer et al., 2001: 79). There are two types of criteria: independent and dependent. The independent criteria are used when screening for eligible suppliers, and they relate to a supplier's organization and its prosperity (de Boer et al., 2001: 80; Mandal et al., 1994: 59). They are classified into four groups: general business environment and financial issues, organization and strategy, technology, and other factors (Table 2). The first two groups relate to the suppliers' financial well-being, management capabilities, and future plans and possibilities. The third group covers the technical issues that are linked directly to the production of the product or the service. The fourth group of criteria focuses more on sustainability and risks associated with it. Hence, if criteria from each group are used in the pre-selection, the buying company can ensure holistic evaluation of the suppliers.

**Table 2 Independent criteria (adapted from Dickson, 1966; Ellram, 1987; Iloranta et al., 2008; Mandal et al., 1994; Monczka et al., 2005)**

Independent criteria	
Factors	Criteria
General business environment and financial issues	Economic performance
	Financial stability
	Financial control and management system
	Competitiveness
Organization and strategic issues	Organizational structure, personnel, and management
	Communication and IT systems
	Supplier's strategy (e.g. cost-efficiency or specialized producer)
Technology issues	Manufacturing capabilities/facilities
	Design capabilities
	Operational control systems
Other factors	Business references
	Supplier's customer base
	Safety record
	Quality and environmental systems
	Geographical locations

The dependent criteria are utilized when selecting suppliers (de Boer et al., 2001: 80; Mandal et al., 1994: 59) and thereby they are discussed more thoroughly later.

### **2.2.3.2 Methods for gathering pre-selection information**

The right method for gathering information is chosen depending on the monetary value or importance of the commodities, or the amount of knowledge about the companies beforehand. (Burt et al., 2003: 332). The main methods are surveys, financial analyses, supplier visits, capability analyses, and third-party evaluations. The surveys and financial analyses are usually the ones to begin with.

#### **Supplier surveys**

A survey includes a series of questions which potential suppliers answer. (Burt et al., 2003: 333). Thereby, the survey is actually very similar to the request for

information (RFI) presented in subchapter 2.1.2. The typical questions of a survey are listed in Table 3.

**Table 3 Content of a supplier survey (Burt et al., 2003)**

Content of a supplier survey
Principal officers and titles
Bank references
Credit references
Annual history of sales and profit
Customer referral list
Number of employees
Space currently occupied
Expansion plans
Quality methods adopted
Production defect rate
Equipment and tools used to manufacture, test and inspect

In addition to the questions mentioned above, the survey can contain questions related to the particular purchase case, e.g. the product features. The answers of those questions can be utilized in the supplier selection phase.

The survey gives an overall picture of the size and the condition of the company. For firsthand experiences the evaluator can contact some of the references on the customer reference list (Leenders et al., 2002: 253).

A good survey is comprehensive, objective, and flexible. It should include all the necessary questions to be able to make pre-selection decisions, and the questions should be set in a non-biased way. Furthermore, it should be possible to make some minor modifications to the questions because of changing purchasing requirements. (Monczka et al., 2005: 222). Especially with high-value, high-volume commodities there may be a need for several additional and specifying questions (Leenders et al., 2002:

257). However, the survey can never fully cover all the independent criteria presented in Table 2. For example the assessment of the suppliers' competitiveness or of the feasibility of the strategies cannot solely be made with the survey. Supplier visits or capability analyses can be utilized if a more thorough evaluation is needed.

### Financial analyses

Even if the suppliers were asked to give some information about their sales, profits, and credit ratings in the survey, an objective financial analysis should be prepared by the financial department of the buying company. If the results of the analysis are very negative, the supplier can be excluded from further considerations because it is obviously incapable of performing satisfyingly. The financial well-being of a supplier is vital because if a contract is made with a supplier which is in a bad financial condition, a risk is taken that the supplier goes bankrupt, has no resources for investments, or becomes financially dependent on the buying company (Monczka et al., 2005: 219). Therefore, the financial analysis should be made already in the beginning of supplier pre-selection process to avoid spending time and money in other less important analyses (Burt et al., 2003: 333). A few most important financial ratios that can be used to analyze financial data are listed in Table 4.

**Table 4 Key financial ratios (Handfield, 2006; Östring, 2004)**

Ratio	Interpretation
<b>Liquidity ratios</b>	
Current ratio = current assets / current liabilities	<100 % refers to poor asset management
<b>Activity ratios</b>	
Total asset turnover = sales / total assets	Low refers to inefficient use of assets
<b>Profitability ratios</b>	
Return on equity = profit after taxes / equity	The higher the better; return on shareholders' investment in the business
Return on assets = profit after taxes / total assets	Return the company earns on everything it owns
<b>Debt ratios</b>	
Debt to equity = total liabilities / equity	Over 3 indicates high level of leverage
Equity ratio = equity / total assets	Shows solvency of a company, < 20 % indicates financial difficulties

## Supplier visits<sup>4</sup>

Visits to the facilities of the suppliers are beneficial especially if the suppliers provide commodities that are complex or expensive. During the visit the buying company gets some firsthand information about the manufacturing and technical capabilities of the supplier which cannot be obtained through any surveys. A team conducting the visit can consist of only purchasers but also of engineers or other experts. (Burt et al., 2003: 333). To be able to get the most benefit out of the visit it is important that the supplier is asked to provide all possible information beforehand, and an outline is made of the issues to be discussed before the trip. Afterwards a report should be written to illustrate the findings. (Leenders et al., 2002: 253). A checklist about the important issues that should be taken into consideration during the visit can be found in Appendix 1.

Often the team performing the visit has a limited amount of time to make observations in the facility. Goodson (2002) has created tools for fast audits that can be carried out even in half an hour (Goodson, 2002: 3). There are 11 categories that should be evaluated by giving each a score between 1 and 11 (see Table 5) (Goodson, 2002: 6).

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<sup>4</sup> Supplier visit = Supplier audit

**Table 5 Audit categories (Goodson, 2002)**

Audit categories	
• Customer satisfaction	• Safety, environment, cleanliness, and order
• Visual management system	• Scheduling system
• Use of space, movement of materials, and product line flow	• Levels of inventory and work in process
• Teamwork and motivation	• Condition and maintenance of equipment and tools
• Management of complexity and variability	• Supply chain integration
• Commitment to quality	

To be able to evaluate these categories there is a questionnaire containing 20 yes or no-questions that deal with the 11 categories (see Appendix 2). The questionnaire is rather short but has been used several hundreds of times and has been proved to give consistent results (Goodson, 2002: 9). After the audit, scores are counted. The total number of “yes”-answers in the questionnaire indicates the leanness of the facility. Based on the answers of the questionnaire and the auditors’ own perceptions they fill in a rating sheet where they give each of the 11 categories a score from 1 to 11. The aggregate score of the categories indicates the efficiency level of the plant. (Goodson, 2002: 11).

### **Capability analyses**

Depending on the buying company and the suppliers in question specific analyses of the suppliers’ capabilities can be made. Quality and environmental systems, capacity capability, and often also communication and e-business technology capability are issues of importance. (Burt et al., 2003: 334, Handfield, 2006: 219).

If a supplier’s quality level does not match the requirements of the buying company, the evaluation process should not go further with that supplier. (Burt et al., 2003: 334). The reason is that the product the supplier is offering has huge life-cycle costs caused by high quality defect expenses (Leenders et al., 2002: 172). It may be difficult to find a simple method or measures for evaluating quality and hence

nowadays many companies expect that the suppliers have quality certificates to prove their capabilities. ISO 9000-standard developed by International Organization for Standardization is a good example of this. The buying company saves resources if the supplier's quality capabilities are demonstrated with a certificate. (PSC, 2003a: 2). Many companies have realized their environmental responsibility and require the same from their suppliers. The suppliers may be required to prove that they have recycling or waste management in place or that they have an ISO 14000 environmental certificate (Monczka et al., 2005: 218).

The management and governance capabilities could be of interest to the buying company if it wishes to work closely together with the supplier (Leenders et al., 2002: 259). Management style can be evaluated during the visit to the supplier's facilities. For example motivated and professional sales personnel and documented plans for cost reductions are positive signs. (Burt et al., 2003: 334).

### **Third-party evaluations**

In some cases it is easier to outsource evaluations to a third party (Burt et al., 2003: 333). Outsourcing is a feasible option if the case company for example lacks time or skills to conduct evaluations, or if a facility visit needs to be made in a foreign country.

#### **2.2.3.3 Methods for pre-selecting suppliers**

In the second phase of the pre-selection process the information gathered about the suppliers is compared to the independent criteria, and the list of approved suppliers is compiled (de Boer et al., 2001: 79). There are various methods how to do that but four of them are discussed here: categorical methods, data envelopment analysis (DEA), cluster analysis (CA), and case-based-reasoning (CBR) systems. These methods sort suppliers into categories, which helps to determine which suppliers to include in the approved suppliers list.

### **Categorical methods**

The categorical methods are the most qualitative and informal of the four. The evaluator evaluates suppliers based on his own experience and historical data. Every pre-selection criterion is scored “positive”, “neutral”, or “negative”, and after the scores have been given the supplier is assigned with an overall rating with the same three options. Finally, there are three categories of suppliers. (de Boer et al., 2001: 80).

### **Data envelopment analysis (DEA)**

In the data envelopment analysis the suppliers are evaluated by two sets of criteria: benefit (output) and cost (input). A supplier gets a rating based on the ratio of the weighted sum of its outputs (i.e. performance) to the weighted sum of its inputs (i.e. costs). This way the suppliers can be classified into two categories: the efficient and the inefficient suppliers. (de Boer et al., 2001: 80). However, estimating the monetary values of outputs and inputs can be rather challenging.

### **Cluster analysis (CA)**

The basic idea of the cluster analysis is somewhat similar to the categorical methods: the suppliers are classified into clusters based on how they score on some criteria. The differences between the suppliers within a cluster are minimal and the differences between the suppliers from different clusters are maximal. (de Boer et al., 2001: 80).

### **Case-based-reasoning (CBR) systems**

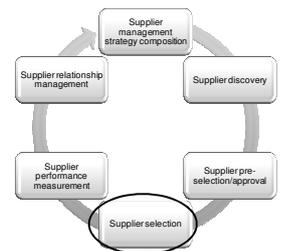
The case-based-reasoning systems use artificial intelligence. A software-driven system provides information about similar cases and decisions made before. The CBR systems are still very new and have not been utilized much in purchasing. (de Boer et al., 2001: 81). Thus, they are an option to consider sometime in the future.

## 2.2.4 Supplier selection

*“It is probable that of all the responsibilities which may be said to belong to the purchasing officers, there is none more important than the selection of a proper source.”*

**Howard T. Lewis, 1943**

Supplier selection was recognized as a part of the purchasing process in the subchapter 2.1 but it is also a significant part of supplier management. The purpose of this subchapter is not to elaborate on what was already discovered earlier but to take another viewpoint to the issue. In the subchapter 2.1 the discussion focused on bidding and negotiations whereas this subchapter reviews the criteria of supplier selection.



A remark needs to be made that many researchers have combined supplier pre-selection and selection as one single step (e.g. Kannan et al., 2002; Leenders et al., 2002). In those models independent and dependent criteria (Tables 2 and 6) are evaluated simultaneously, after which the supplier selection is made. However, even though Leenders et al. (2002) have combined supplier pre-selection and selection they recognize that criteria like facilities, financial status, management and organization, and location (i.e. independent criteria) create the basis for the evaluation but the actual selection is based on factors like quality, quantity, delivery, price, and service (i.e. dependent criteria). (Leenders et al., 2002: 243). In conclusion, independent and dependent criteria are separated from each other regardless whether there is a step for supplier pre-selection or not. Therefore, supplier pre-selection and selection will be discussed as separate steps in this thesis in order to get a more structured image of the issue.

### 2.2.4.1 Criteria for supplier selection

The dependent criteria are used for the actual supplier selection and they can be classified into three different categories: product quality, performance, and general factors. According to Vokurka et al. (1996) the criteria are somewhat different for the suppliers of strategic commodities than for the ones of non-critical commodities because they cover aspects of product and production more extensively. (Vokurka et al., 1996: 117). The criteria for both commodity groups are presented in Table 6.

**Table 6 Dependent criteria for suppliers of strategic and non-critical commodities (adapted from Dickson, 1966; Ellram, 1987; Vokurka et al., 1996)**

Dependent criteria		Strategic suppliers	Non-critical suppliers
Product quality factors	Quality of the product	x	x
	Quality control procedures	x	
	Historical performance	x	x
Performance factors	Price	x	x
	Delivery	x	x
	Lead time	x	x
General factors	Supplier's attitude towards buyer	x	x
	After-sales service	x	x
	Suitability of the solution	x	
	Training aids for product/service	x	
	Manufacturing cost control		x

The table illustrates that the dependent criteria for the strategic suppliers focus more on long-term issues such as suitability of the solution and training aids. On the other hand, with the non-critical suppliers attention is paid to manufacturing cost control.

The supplier segment is not the only thing that has an effect on the dependent criteria. There are three types of purchasing situations that affect supplier selection and the amount of information needed during it. In a *new-task* situation a completely new product is bought from an unknown supplier. Thus, high risks and uncertainty require thorough assessment of the dependent criteria. (van Weele, 2005: 30). In a *modified rebuy* a new product is bought from a known supplier or an existing product from a new supplier. As some information is already available, the assessments can be lighter. In a *straight rebuy* an existing product is bought from a known supplier, and uncertainty is very low. Therefore, a superficial assessment of the dependent criteria is sufficient. (van Weele, 2005: 31).

The information needed to analyze the dependent criteria is gathered in the same way as in the supplier pre-selection phase. Moreover, when surveys, visits, and capability analyses are made during pre-selection it is rational to ask some questions related to dependent criteria as well to avoid double work.

#### **2.2.4.2 Methods of supplier selection**

There are various ways how the selection can be made but this thesis presents only the ones most discussed in literature. Most of them rely on mathematics, which leaves qualitative methods in a minority.

##### **Linear weighting models**

In the linear weighting models each criterion is given a weight, and the scores are multiplied by it. The sum of the weights is 1,0 and the biggest weight indicates the highest importance. The suppliers' overall ratings are counted by summing the weighted scores. The supplier with the highest overall rating is selected. (de Boer et al., 2001: 82). In order to be able to count scores for the suppliers there has to be a scoring scale, and scales from 1-5 or 1-10 are good options. (Monczka et al., 2005: 223). Vokurka et al. (1996) use scales of "high-average-low", "favourable-average-

unfavourable”, or “yes-no” depending on the question (Vokurka et al. 1996: 117). However, to be able to count a final weighted rate the scores need to be converted to numerical.

A common practice for carrying out supplier selection that is based on linear weighting is to conduct a supplier survey presented in the subchapter 2.2.3.2 and score the answers. The most sensible way is to include all necessary questions regarding both the independent and the dependent criteria in the survey so that all information needed to first make pre-selection decisions and then the actual selection is received simultaneously. (Monczka et al., 2005: 223). Thereby, if the questions related to the dependent criteria are scored and weighted, it would be reasonable to give scores to the questions related to the independent criteria as well.

### **Total cost of ownership (TCO) models**

As the name indicates, the total cost of ownership model takes into account all the costs of the life cycle of a purchased item that relate to a certain supplier selection (de Boer et al., 1996: 82). The life-cycle costs can be divided into pre-transaction, transaction, and post-transaction costs. The pre-transaction costs relate to supplier pre-selection, and the transaction costs are the price paid for the product and the delivery. The post-transaction costs refer to rework, fallout, and cost of returns. (Ellram, 1993: 49). It is also necessary to take the associated risks and their probabilities into account in the calculations (McKinsey & Company, 2008: 38). When all the costs are summed, the supplier with lowest costs can be selected. According to a research conducted by McKinsey & Company (2008) the total cost of ownership method is the best way to select suppliers (McKinsey & Company, 2008: 38). However, TCO is the most beneficial with purchases that have high financial value (i.e. leverage or strategic commodities), high indirect costs, or include extensive planning and custom-made solutions (Iloranta et al., 2008: 196).

## Mathematical programming models

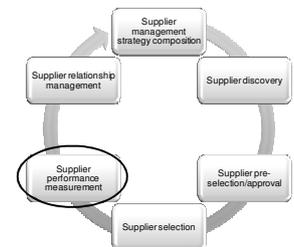
The mathematical programming requires that the decision problem is formulated into a mathematical objective function that can be either minimized or maximized by changing the values of the variables of the function. An example could be that the amount ordered from a supplier is varied in order to minimize costs. The mathematical programming could be very challenging because it may be difficult to convert the decision problem into an objective function. Furthermore, the function does not take qualitative factors, like suppliers' attitude towards the buyer, into consideration. (de Boer et al., 1996: 83). Thus, of the three supplier selection methods presented in this thesis mathematical programming is probably least utilized in practice.

### 2.2.5 Supplier performance measurement

*When performance is measured, performance improves. When performance is measured and reported back, the rate of improvement accelerates.*

- **Thomas S. Monson**

Supplier performance measurement refers to procedures used to collect information that is utilized to measure, rate, or rank supplier performance on a continuous basis. It differs from the supplier pre-selection evaluation because it is a continuous effort as opposed to a onetime event (Monczka et al., 2005: 269). At its most elementary level supplier performance measurement refers to controlling the quality, quantity, and delivery time of one delivery.



It is one of the enablers regarding purchasing and supply chain success (Monczka et al., 2005: 17). First, it removes subjective factors from decision making as it supports fact-based approach to management. It is also a way to enhance supplier relationships,

communicate requirements, and encourage improvement activities. (Monczka et al., 2005: 19; PSC, 2004: 2). Especially in the utilities industry measurement programs motivate suppliers into better performances (PSC, 2004: 2). However, at the moment supplier performance measurement is on an ad-hoc level in many companies. The measurements are usually conducted without any systematic procedures. If procedures exist all the suppliers are handled in the same way. (Iloranta et al., 2008: 336). Supplier segmentation is actually a prerequisite for supplier performance measurement (PCS, 2007: VI). It helps assigning some resources for measuring the performance of important suppliers. The more important a supplier is to the business the more benefits are gained from performance measurements. (Iloranta et al., 2008: 336).

### 2.2.5.1 Metrics and methods for supplier performance measurement

The following Table 7 presents the indicators that most companies use to measure their suppliers' performance. Each indicator is further explained and one or two examples of metrics are given.

**Table 7 Performance indicators and metrics (Kannan et al., 2002; Monczka et al., 2005; Prahinski et al., 2004; PSC, 2003b)**

Most commonly used performance indicators	Definition	Metrics
Delivery performance	- Correctness of delivery quantity and date	- Amount of on-time deliveries and deficiencies
Quality performance	- Ability to meet quality requirements	- Defect rates - Improvement levels
Cost reduction	- Supplier's costs against other suppliers in the industry	- Amount submitted cost-reduction ideas
Responsiveness	- Quick responses when problems - Flexibility in unexpected demand changes - Willingness to change specifications according to buyer's needs	- Promptness of problem notifications - Use of feedback to implement enhancements

After the specific measures are determined, the tools and the methods for measuring and interpreting the results need to be determined. There are three main measurement techniques companies can choose from: the categorical system, the weighted-point system, and the cost-based system. An observant reader may notice some congruence between these techniques and the methods for supplier selection discussed in subchapter 2.2.4.

The *categorical system* is the most informal and dependent on subjective opinions. Each metric is scored good, average, or bad. The categorical system is easy to implement and is often used by small companies and companies building a performance measurement system. However, it is not very reliable and it doesn't provide very detailed information. (Monczka et al., 2005: 271).

If the metrics and categories are weighted the system is called the *weighted-point system*. A company called Capital One has a scorecard which is a good example of the system (Appendix 3). The scorecard is filled in by purchasers or internal users and it includes metrics related to technology, quality, support, delivery, business, and economics. The metrics can be weighted differently depending on the importance of the measurement category. (PSC, 2007: 50). It is a flexible system because the weights can be easily varied and it allows ranking of the suppliers based on their scores. It is important to remember that a weighted-point system will not work without clear instructions how to score the suppliers. (Monczka et al., 2005: 272). A company called BNSF has a sophisticated way of scoring suppliers based on their performance (Appendix 4). For example, a supplier gets 5/5 points if its response time to warranty claims is under 30 days, 3/5 points if under 50 days etc. (PSC, 2007: 51). These limits remove the person dependence from the scoring since the purchasers do not give any points based on their own opinions. (PSC, 2007: 56).

The *cost-based system* is the heaviest and most expensive but also the most objective and thorough. It is based on the total costs of associating with a supplier,

approach that is very similar to the total cost of ownership-method presented in subchapter 2.2.4.2. To be able to calculate the total costs the supplier performance index (SPI) needs to be counted for each supplier:

$$\text{SPI} = (\text{Total purchases} + \text{Cost of nonperformance}) / \text{Total purchases}$$

Calculating the cost of nonperformance is the most difficult task. The cost can include factors like cost of late deliveries or material rework. The total cost for each supplier is calculated by multiplying the SPI with the unit price of the commodity. The cost-based system is the best for large companies that have large supplier bases. (Monczka et al., 2005: 273).

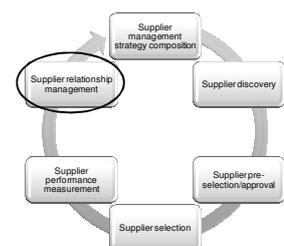
### 2.2.5.2 Importance of feedback

After the results of supplier performance measurement are ready they need to be communicated clearly to the suppliers, and improvement targets have to be set. (PSC, 2007: vii, 73). In addition to recognizing the suppliers' improvement targets, the buying company should identify how it could develop its own ways of operating. Two-way feedback can help to identify how the behaviour of the buying company affects the suppliers' performance. (PSC, 2007: 63).

Again, Supplier Management Playbook (PSC, 2007) contains many tools for feedback, one of them being the Cross-functional supplier evaluation survey (Appendix 5). As the name indicates, the survey gathers information about how different units or functions of a company work with the suppliers, and how satisfied the suppliers are with each of them. The survey includes for example some questions about communication, invoices, and supplier involvement. (PSC, 2007: 66).

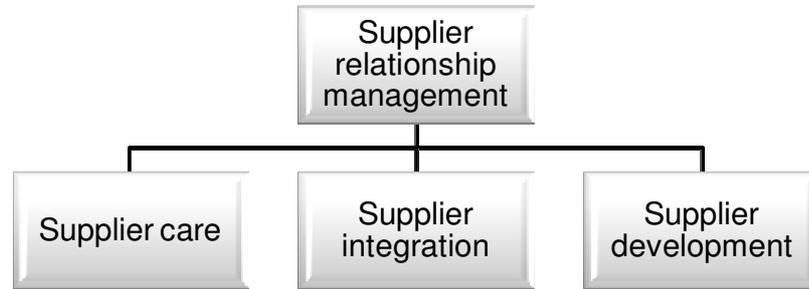
### 2.2.6 Supplier relationship management

Good relationships and co-operation in supply chains have been very popular discussion topics during



the past decades. There are two major benefits for having good relationships with the suppliers. The first one is a win-win-mindset which means that if problems occur the parties try to find a solution that satisfies them both. Secondly, a supplier and a buyer working together for the same target are more efficient than if they were acting alone. (Iloranta et al., 2008: 313). Furthermore, it has been recognized that supplier relationship management has a significant impact on the financial performance of a company, and that open cooperation between the two parties generates long-term benefits (Carr et al., 1999: 516). However, there are also some risks if the relationship is very close, e.g. dependency on one supplier may cause rise in the supplier's price level. (Iloranta et al., 2008: 315).

There are three ways for managing supplier relationships (Figure 7). They are not exclusive and can be used in parallel with each other. The first two methods are *supplier care* and *supplier integration* (Lasch et al., 2005: 411). They refer to a management model that takes suppliers into consideration and involves them comprehensively in operations (Iloranta et al., 2008: 322). Supplier integration also relates to the integration of suppliers' operations and aligning them to correspond with the operations of the buying company. (Iloranta et al., 2008: 323). Correspondence between the operations can seldom be reached without *supplier development*, which is the third method of supplier relationship management (Lasch et al., 2005: 411).



**Figure 7 Supplier relationship management (Lasch et al., 2005)**

Of the three aforementioned elements, supplier development has the highest positive correlation with supplier performance improvement (Wen-li et al., 2003: 247). Thus, it leads to greater long-term benefits than the other elements (Krause et al., 1998: 55). Due to these notable advantages of supplier development, the further discussion will focus on it.

### **2.2.6.1 Supplier development**

Supplier development has been defined as

*“any activity undertaken by a buying firm to improve either supplier performance, supplier capabilities, or both, and to meet the buying firm’s short and/or long-term supply needs”* (Krause et al., 2000: 34).

Conducting supplier development activities is still rather uncommon (Iloranta et al., 2008: 331). However, it is one of the best-practice procedures of high-performing companies (McKinsey & Company, 2008: 39). There are two perspectives to supplier development: the level of motivation and the role of the buying company, and the first

perspective can be divided into reactive and strategic development and the latter into external and internal development (see Figure 8). (Wagner, 2006: 557).

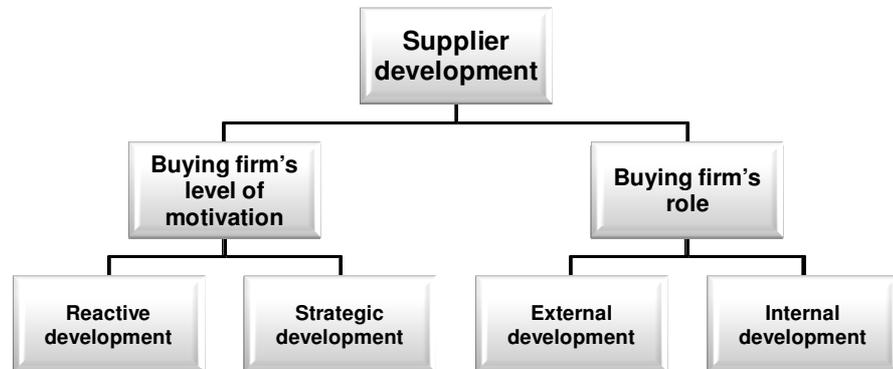


Figure 8 Supplier development perspectives (Wagner, 2006)

#### Level of motivation of the buying company

*Reactive supplier development* can be defined as a remedial approach that reacts to problems that are recognized through supplier performance measurement. On the contrary, *strategic supplier development* has the target of creating a supply base that provides sustainable competitive advantage. (Krause et al., 1998: 45). Figure 9 illustrates the strategic supplier development process.

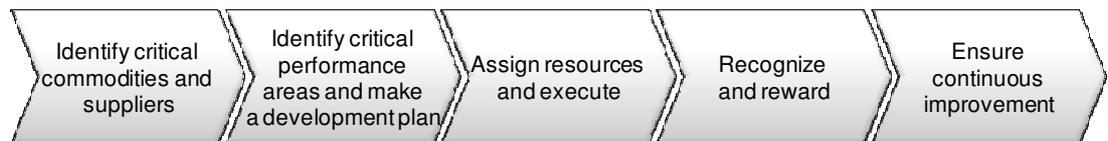


Figure 9 Strategic supplier development process (adapted from Krause et al., 1998)

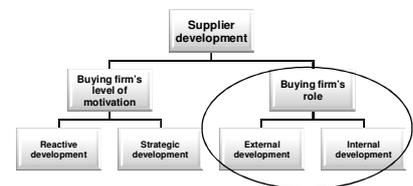
In the beginning of the process the critical suppliers and commodities that need development are defined. Kraljic's portfolio analysis presented in subchapter 2.2.1.1 can be utilized (Krause et al., 1998: 45). Furthermore, identification of the suppliers of

the critical commodities can be performed by a Pareto- or ABC-analysis<sup>5</sup> (Handfield et al., 2000: 40). After the critical commodities and suppliers have been identified, the critical performance areas related to them are clarified. Also a plan is created how to carry out the development. (Krause et al., 1998: 45). When the buying company and the supplier agree on the targets for improvement, they also agree on how improvements are measured. Cost saving and quality improvement percentages are examples of development metrics. (Krause et al., 1998: 51). The third step consists of assigning resources for the program by both parties and actually executing the development plan. If the program is successful it needs to be recognized and the supplier rewarded. (Krause et al., 1998: 45).

The reason why a process for reactive supplier development is not presented here is that the reactive development takes place in a more ad-hoc way and development plans are only made as needed. Therefore, it is difficult to present reactive supplier development as a process.

### Role of the buying company

The second perspective of supplier development relates to the role of the buying company and the amount of effort and resources it commits to the suppliers.



*External supplier development* refers to utilization of an external market to encourage suppliers to improve their performance. One external development method is thorough supplier performance measurement together with feedback. Companies

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<sup>5</sup> In ABC-analysis suppliers are ranked in order of the purchase volume. Then each supplier's relative share of the total volume is calculated. Suppliers are assigned to A, B, and C classes so that "A" is the most important class and it contains the largest suppliers that make up e.g. 80 % of the total purchase volume. The ABC-analysis is based on the 20/80 rule (i.e. Pareto rule). (Iloranta et al., 2008: 479).

can also have some incentives such as additional future business for suppliers if performance improves. (Krause et al., 2000: 36). In conclusion, the methods for external development do not require much extra effort from the buying company. Supplier performance measurement and feedback are very important but they are actually a starting point for supplier development rather than a method for improvement. Moreover, business incentives leave the responsibility for improvements solely on the supplier.

*Internal supplier development* refers to direct investment in the suppliers. It can include activities like training and education of personnel or assigning employees, capital, or equipment of the buying company temporarily to the supplier's use. (Krause et al., 2000: 37, Monczka et al., 1993: 50). If those activities seem too excessive, internal development can be carried out through annual supplier meetings or workshops. They can be used for teaching and learning as well as discussing the past performance. (Burt et al., 2003: 499). It is easy to perceive that these aforementioned activities require more effort from the buying company than the external development activities. The buying company also carries the risk of investing in a supplier that may fail to develop. (Krause et al., 2000: 37). However, internal supplier development is the only way to directly improve suppliers' performance. (Krause et al., 2000: 48).

### **2.2.7 Supplier management maturity**

This subchapter discusses the maturity levels of supplier management. Maturity refers to the sophistication level of the six supplier management elements (Figure 3). The five levels of supplier management maturity are presented in the following Table 8.

**Table 8 Levels of supplier management maturity (Handfield, 2006)**

<b>1. Adhoc</b>	<ul style="list-style-type: none"> <li>- No organized processes</li> <li>- Suppliers chosen as needed</li> </ul>
<b>2. Defined</b>	<ul style="list-style-type: none"> <li>- Policy for determining strategic sourcing exists</li> <li>- Measures used, e.g. supplier spend, total no. of suppliers</li> </ul>
<b>3. Managed</b>	<ul style="list-style-type: none"> <li>- Measures created by cross-functional teams</li> <li>- Supplier tracking, e.g. its relationship to buying organization's directions</li> </ul>
<b>4. Leveraged</b>	<ul style="list-style-type: none"> <li>- Strategic approach to supplier management</li> <li>- Measures are documented and accessible</li> <li>- Feedback provided to suppliers</li> </ul>
<b>5. Optimized</b>	<ul style="list-style-type: none"> <li>- Suppliers and customers join the cross-functional teams to find optimal solutions</li> <li>- Suppliers empowered to work with each other</li> <li>- Information sharing, e.g. demand forecasts</li> <li>- New technology utilized</li> </ul>

It is important to be able to recognize which level the company is on to be able to identify the deficiencies in the system and understand what the most logical path towards improvement would be. All in all, there are a few general advice that can be given to companies hoping to improve their supplier management systems. First, lack of time to execute supplier management procedures properly is a problem in many companies and should be tackled first. There are several means for time reduction in the supplier management process. To begin with, the process should be clearly illustrated and documented so that all the employees involved know how they should proceed. Moreover, opportunities for improvement become more evident from the process description. (Monczka et al., 2005: 230).

Secondly, supplier management should be integrated with internal customers to be able to anticipate rather than react to supplier management needs. A good solution is to establish some cross-functional development teams. Another organizational aspect to the issue is lead buyer teams that are responsible for in-depth understanding and development of certain commodity areas. The team members should for example offer their expertise when making visits to the suppliers' facilities. (Monczka et al., 2005: 230).

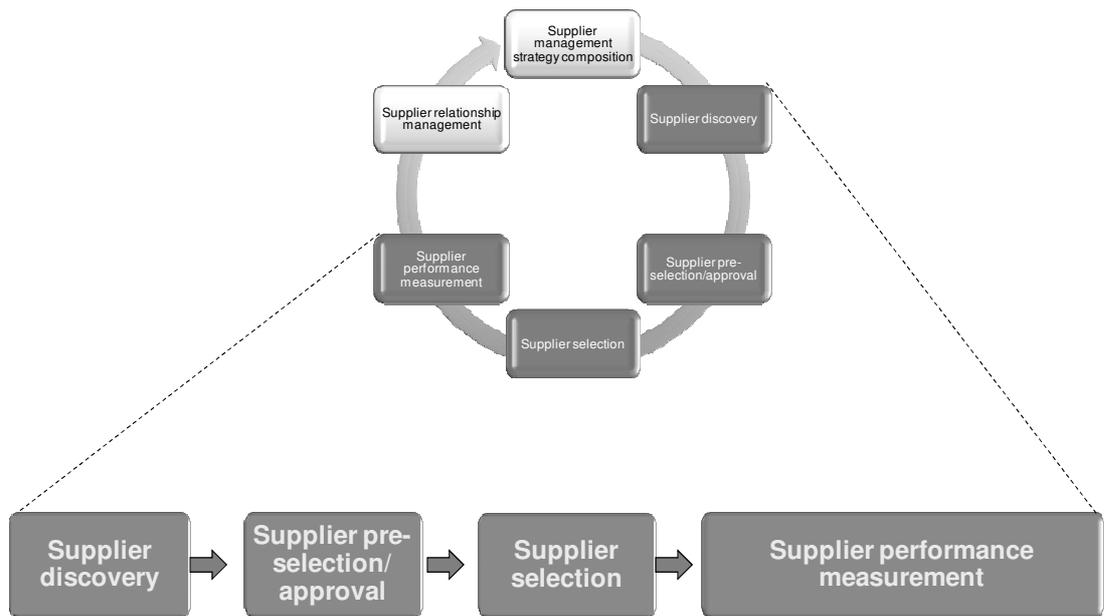
Thirdly, technology should be utilized in supplier management. If people had access to a data warehouse that contained information about potential suppliers, current suppliers' performance, and contracts, they would be able to gather needed information and make decisions faster. Internet applications such as online supplier surveys or up-to-date financial information could increase efficiency as well. The solutions can be provided by a third party or they can be companies' own tools (Monczka et al., 2005: 232). Finally, supplier management could be improved by using a preferred supplier list. The list contains the highest-performing suppliers that have proven to be reliable. If the purchasers were able to choose suppliers straight from the list the time used for pre-selection and selection would be reduced. (Monczka et al., 2005: 230).

## ***2.3 Synthesis***

The previous subchapters presented the concepts of the purchasing process and supplier management. This subchapter illustrates their contact points to discover how they could be integrated instead of executing them separately. Also a summary of the key points and best-practices of supplier management are presented in this subchapter.

### **2.3.1 Relationship between purchasing and supplier management**

For the illustrative purposes the operative steps of the supplier management framework are presented as a process (Figure 10). Supplier management strategy composition and supplier relationship management are not included in the process because they are continuous activities.



**Figure 10 Operative elements of supplier management illustrated as a process**

In order to find the contact points and similarities between purchasing and supplier management processes, they are presented in the same figure (Figure 11).



**Figure 11 Comparison of purchasing and supplier management processes**

Firstly, the illustration shows that most of the process steps are executed simultaneously. However, there is an exception: identification of purchasing need which has no major connection points to supplier management. Secondly, some of the steps in the processes are almost identical: identification of suppliers and supplier

discovery refer to the same activity, and both processes include supplier selection. However, the perspectives are not identical as Tables 9 and 10 illustrate.

**Table 9 Comparison of the first steps of the purchasing and supplier management processes**

Identification of potential suppliers in the purchasing process	Supplier discovery and pre-selection in the supplier management process
Identifying suppliers among old suppliers, through market studies, or other sources	Discovering suppliers from various sources, e.g. catalogs, trade registers
<b>→ Long list of potential suppliers</b>	<b>→ Long list of potential suppliers</b>
Sending the Request for Information (e.g. references)	Gathering information with financial analyses, supplier surveys, visits etc.
Analyzing the information received from suppliers	Pre-selecting suppliers based on the independent criteria (e.g. financial situation, quality system) with the help of mathematical methods
<b>→ Short list of potential suppliers</b>	<b>→ List of approved suppliers</b>
Sending Request for Proposal	

Table 9 shows that in the beginning the purchasing process and supplier management are almost identical but after a long list of potential suppliers has been created the perspectives differ. Supplier management describes in a much more detailed way how the suppliers are actually qualified from the long list to the list of approved suppliers. The methods for gathering information, the criteria, and mathematical calculations are explained. By contrast, it does not become clear how the suppliers are actually qualified in the purchasing process.

**Table 10 Comparison of the supplier selection-steps of the purchasing and supplier management processes**

Supplier selection in the purchasing process	Supplier selection in the supplier management process
Assessment of bids	Assessment of suppliers based on dependent criteria (e.g. quality, price)
Comparison of bids	Comparison of suppliers with mathematical rating systems
(Negotiations)	
<b>→ Supplier selection decision</b>	<b>→ Supplier selection decision</b>

Supplier selection in the purchasing process deals only with bids and negotiations based on which a supplier is selected. By contrast, supplier management focuses more on the criteria and mathematical methods based on which the decision is made. All in all, Tables 9 and 10 illustrate that supplier management emphasizes objective evaluation of suppliers that is based on certain criteria and mathematical methods rather than purchasers' subjective opinions.

Purchase orders are made as needed, once or several times during a contract period (fourth step in the purchasing process). It is very important to link the follow-up of orders to supplier performance measurement because quality, quantity, and timeliness of the deliveries are very important performance indicators. Document management is the final step in the purchasing process but it should also be a part of supplier management because continuous performance measurement and follow-up of suppliers would be rather difficult without proper documentation.

As a conclusion, it can be stated that the purchasing process and supplier management are two sides of the same issue in many respects. The elements of supplier management that are performed during the purchasing process are actually purchasing activities explained from the supplier management perspective. This is very important because it would be necessary to include the supplier perspective into

purchasing to ensure more professional evaluation and control of suppliers. There is only one exception when the processes can take place separately: proactive pre-selection of suppliers which means that the first two supplier management process steps have been executed already before any need for purchasing has been identified. Proactive pre-selection may be sensible with suppliers of commodities that are usually needed at short notice.

### **2.3.2 Important considerations regarding supplier management**

The following Table 11 lists good practices related to the six elements of supplier management. The practices can be used when developing or improving a supplier management system.

**Table 11 Summary of the good practices found from the literature**

<b>Good supplier management practices</b>	
<b><u>Supplier management strategy composition</u></b>	
	<ul style="list-style-type: none"> <li>- Clear segmentation of commodities and suppliers based on supply market risk level and strategic impact</li> <li>- Both sourcing and contract aspects considered in the strategy</li> </ul>
<b><u>Supplier discovery</u></b>	
	<ul style="list-style-type: none"> <li>- Database containing information about suppliers</li> </ul>
<b><u>Supplier pre-selection/approval</u></b>	
	<ul style="list-style-type: none"> <li>- Independent criteria including business environment and financial issues, organization and strategic issues, and technology issues</li> <li>- Best tools for gathering information are chosen based on the importance of purchase. Options:               <ul style="list-style-type: none"> <li>- Financial evaluation</li> <li>- Supplier survey</li> <li>- Supplier visit</li> <li>- Capability analysis</li> <li>- Third-party evaluation</li> </ul> </li> <li>- Evaluation result based on mathematical rating of criteria</li> </ul>
<b><u>Supplier selection</u></b>	
	<ul style="list-style-type: none"> <li>- Selection based on dependent criteria: Product quality, price, delivery performance, lead times, service level, supplier's attitude, and overall solution</li> <li>- Most suitable criteria chosen based on commodity type and purchasing situation</li> <li>- Result based on mathematical rating</li> </ul>
<b><u>Supplier performance measurement</u></b>	
	<ul style="list-style-type: none"> <li>- Performance measures including delivery accuracy, quality, costs, and responsiveness</li> <li>- Results based on mathematical rating</li> <li>- Two-way feedback</li> </ul>
<b><u>Supplier relationship management</u></b>	
	<ul style="list-style-type: none"> <li>- Strategic, proactive supplier development</li> <li>- Direct investment in the supplier</li> </ul>
<b><u>General</u></b>	
	<ul style="list-style-type: none"> <li>- Processes clearly illustrated and documented</li> <li>- Utilization of information technology</li> </ul>

### **3 Empirical analysis**

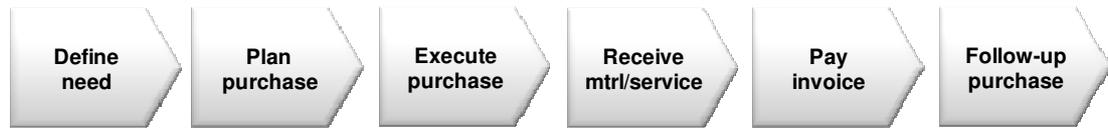
Whilst the literature review presented the concepts and good practices of supplier management and searched for the answer to the first research question, the empirical analysis focuses more on the second question: what elements a supplier pre-selection and performance measurement system should include. The analysis is divided into three main subchapters: the purchasing process of the case company, the current situation with supplier pre-selection and performance measurement in the company, and contributions to a new supplier evaluation system<sup>6</sup>. The first subchapter shortly presents the purchasing process of the case company to be able to indicate when supplier pre-selection and performance measurement take place. The second subchapter describes the current supplier evaluation practices and compares them to the good practices of the literature. It also contains an analysis of the purchasing cases. The ideas for a better and harmonized supplier evaluation system received during the internal and benchmark interviews are presented in the third subchapter. The internal interview schedule and questions are presented in Appendices 6 and 7, Appendix 8 illustrates the organizational structure of the case company, and Appendix 9 briefly presents the benchmark companies.

#### ***3.1 Purchasing process of the case company***

Compared to the purchasing process described in the literature review, the process of the case company (Figure 12) clearly puts more emphasis on purchase planning and ordering. Several similarities can be found in the purchase order process, a sub-process of purchasing presented in the literature in subchapter 2.1.4. Moreover, none of the process steps refer to activities related to suppliers.

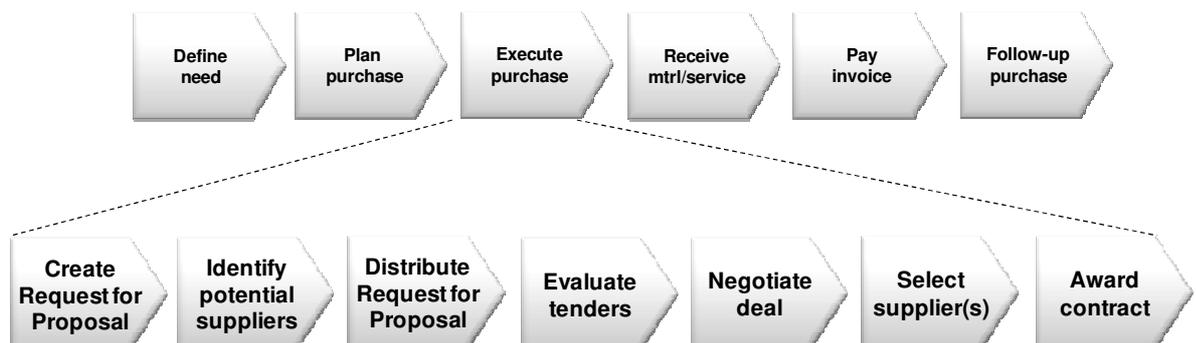
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<sup>6</sup> Evaluation refers to both supplier pre-selection and performance measurement



**Figure 12 Purchasing process of the case company**

The process begins with need definition, similarly to the process in the literature review, and continues with purchase planning which contains e.g. market studies and allocation of responsibilities. Purchase execution includes several sub-processes, e.g. tendering (Figure 13) and issuing an order from an existing contract. The two following steps, material receiving and invoice payment, differ from the others because they are straightforward, operative level activities. The last step is purchase follow-up that refers to checking volumes and internal efficiency but also to supplier performance measurement.



**Figure 13 Tendering process of the case company**

It can be concluded that the supplier related issues (i.e. supplier discovery and selection) are not in focus in the main purchasing process but they are taken into account during the tendering sub-process. In this sense there are differences from the process of the literature review which concentrates more on the supplier aspect in the main process.

### **3.2 Current supplier evaluation practices in the case company**

Because the case company is a large multi-national corporation, it wasn't possible to include an analysis of all the units in the scope of this thesis. Furthermore, in some units it was the most sensible to study the practices of only one subunit.

The units included in the study can be categorized into two groups: the ones that have established formal procedures for supplier pre-selection and performance measurement, and the ones that conduct evaluations on ad-hoc basis. Based on the internal interviews, three units out of ten fall into the first group and five to the second. Two units, C and E, have partially implemented supplier evaluation procedures (Table 12).

**Table 12 Level of supplier evaluation in the case company**

Unit	Procedures established	Ad hoc evaluations
A		x
B.1	x	
C	x	x
D		x
E	x	x
E.1		x
E.2	x	
G		x
H		x
I	x	
J	x	

This subchapter discusses the current practices related to supplier evaluations in the case company. First, the existing processes and guidelines are discussed because they are the basis on which evaluation systems are built. Next, allocation of evaluation responsibilities and conditions for making evaluations are introduced. Then, currently

used evaluation methods and criteria, and IT applications are presented. Finally, the results of the purchasing cases are discussed.

### 3.2.1 Evaluation processes

Process descriptions are tools for guiding and communicating, and their existence indicates that the issue has been systematically contemplated (Monczka et al., 2005: 230). This fact is clearly substantiated in the case company because the units that are the most advanced in evaluation procedures also have process descriptions in place.

Three units out of ten have actually created some formal process descriptions for supplier management. Unit B.1 refers to it as “supplier evaluation process”, unit I as “vendor management process”, unit J as “strategic sourcing process”. Common for all of them is that they have integrated supplier pre-selection, performance measurement, and partly also purchasing activities as a single process. The process description of unit I is a good example of a simple, integrated process description (Figure 14). Due to differing terminology, the meanings of the process steps are clarified in the parentheses.

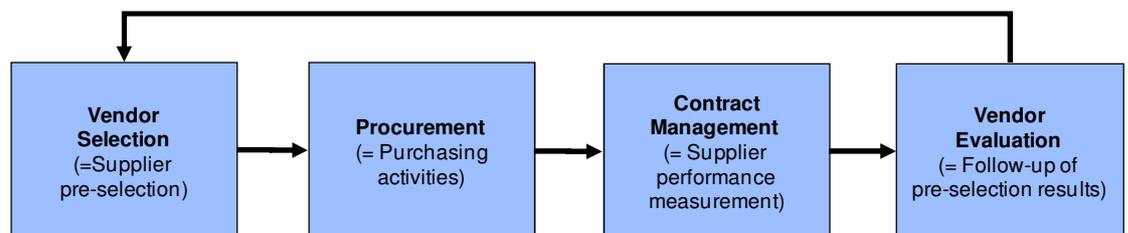


Figure 14 Vendor management process of unit I

The main anomaly between the process of unit I and the process presented in the literature review is that there are two steps for continuous follow-up of suppliers. *Contract management* refers to following up deliveries and possible deficiencies and *vendor evaluation* to ensuring that old suppliers still fulfill the pre-selection criteria and their skills and service level are satisfactory (PM I).

The strategic sourcing process of unit J (Figure 15) has fully integrated purchasing with supplier management in a way that resembles the processes described in subchapter 2.3. It begins with basic preparation phase that contains target setting, necessary analyses, and authorization of the purchase plan. After the authorization, the suppliers are contacted the first time. In the planning phase the potential suppliers are discovered and pre-qualified after which the RFP's are sent and evaluated, and based on the negotiations the selection is made. During execution and implementation a contract is made and the performance of the chosen supplier is followed-up. Consequently, the strategic sourcing process is actually a combination of the purchasing and supplier management processes presented in the literature review (Figure 11). Thus, it is a great example of how the two processes can be combined.

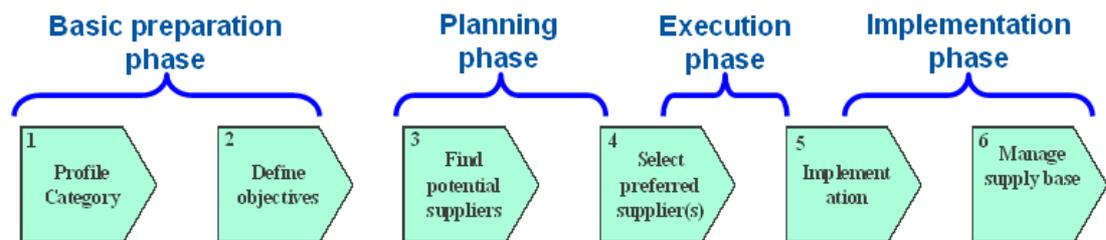


Figure 15 Strategic sourcing process of unit J

The process descriptions of units I and J are on an advanced level compared to the other units. In addition, the implementations of the processes have succeeded very well. (PM's I, J). However, it needs to be pointed out that units I and J are small units and have small supplier bases, which makes supplier management, implementation, and control easier.

Unit B.1 is the third unit that has a process description for supplier evaluation. However, the description is very different compared to the two processes presented above because it is an activity flowchart of supplier pre-selection and continuous performance measurement rather than a process description (see Appendix 10). It also demonstrates all the decisions made throughout the process. Its merit is the detailed

illustration of the order and the content of each step and the relationship between the steps. However, the flowchart is very complex and hence not a good tool for communication, and despite its preciseness it has some deficiencies like lack of integration to purchasing activities. Furthermore, it tries to illustrate both supplier pre-selection and performance measurement in the same figure which confuses rather than clarifies the issue. Nevertheless, there is a purpose for a specific activity description. As the higher level processes illustrate the main concepts and link supplier management with purchasing, the flowchart guides the purchaser through each decision and activity conducted along the process.

The following Table 13 compares the best-practices found in the literature to the procedures of the case company.

**Table 13 Good practices related to evaluation processes**

Literature	Case company
Processes clearly illustrated and documented	Units B.1, I, and J have developed process descriptions which are well documented
	The processes integrate supplier pre-selection and performance measurement with purchasing activities
	Diversity of process descriptions: - Process descriptions of units I and J better for communication purposes - Process description of unit B.1 better for mapping detailed activities

### 3.2.2 Evaluation guidelines

In addition to the process descriptions, written guidelines are important in order to carry out processes always in the same way. In the case company there are altogether five different supplier evaluation guidelines in two business units, B and E. This means that most business units have not created formal guidelines for supplier evaluation. In unit E there are three different guidelines, which is a consequence of subunits having distinct needs (PM E). This indicates the independent nature of business units and also subunits.

In the units where guidelines are actually utilized in practice, they cover multiple aspects of supplier evaluation (Table 14). However, the guidelines contain the instructions mainly for supplier pre-selection whereas performance measurement is discussed only briefly.

**Table 14 Typical contents of a supplier evaluation guideline**

Contents of a supplier evaluation guideline
Objectives
Scope of evaluation
Allocation of responsibilities
When is pre-selection needed?
Pre-selection methods
Criteria for approval
Result and consequences of pre-selection
Continuous performance measurement
Supplier database: administration and use

The *objectives* for conducting supplier evaluations are justified in all guidelines. The most common objective is that the suppliers need to be evaluated to ensure that they are able to act according to set requirements and that they reach sufficient quality and delivery reliability. All the guidelines also contain a description of the *scope* of the evaluation. The scope refers either to the applicability of the guideline or to the scope of the evaluation result. For example one guideline states that it is applied only to suppliers delivering commodities for the primary operations, and another that the suppliers are approved to supply only some certain commodity.

### **3.2.3 Allocation of responsibilities**

The responsibility for making supplier evaluations is assigned to the purchasers and the project managers. They perform both supplier pre-selection and performance measurement. (PM's A, C, D, E.1, J). In some units the administrative work related to evaluations is assigned to an assistant in order to give purchasers more time to focus on value-adding activities. The assistant's duties are e.g. to follow any need for re-evaluation and record the evaluation results in the supplier database. (PM's B.1, E.3). In addition, technical experts, purchasing managers, business controllers, and other employees regularly co-operating with the suppliers take part in evaluations when needed (PM E, E.1, G, I, J).

### **3.2.4 Conditions for performing evaluations**

The conditions in this case refer to the rules that state *when* and *which suppliers* need pre-selection or performance measurement, and *how long* the evaluation results are valid. Currently, these decisions are dependent solely on the purchaser's judgment in most units (PM's D, E, E.1, G, H, J).

#### **3.2.4.1 When are suppliers evaluated?**

Need for pre-selection is often connected to purchase need. In other words, the suppliers need to be approved before a purchase can be made (PM's A, J). By contrast, supplier performance measurement is not tied to any given event or time but is continuous of nature (PM's H, J).

#### **3.2.4.2 Which suppliers are evaluated?**

Some units try to pre-select all their suppliers (PM's C, H) whereas some decide to focus only on large or new suppliers (PM's E, I, J). The target of units' C and H seems impossible considering how many suppliers the company has. Unit E.2 has very clear requirements that originate from the law. If the product or the service has a safety

impact in the facility the supplier providing it needs to be pre-selected. There are several safety classes for commodities and the higher the level the more thorough the evaluation needs to be. In unit B.1 pre-selection is conducted to all the suppliers from which the unit is going to purchase with a volume of over 50 000 euros or with which it is planning on making an agreement covering several orders. The limits of unit B.1 seem very reasonable: resources are not wasted into pre-selecting small, less risky suppliers but regardless of the volume, all future partners are evaluated.

In regard to supplier performance measurement, unit B.1 is practically the only one having any strict instructions which suppliers to measure. The system is based on segmentation. First, the suppliers are divided into small and large, the large ones having a yearly volume over 50 000 euros and more than 10 deliveries per year. An ABC-analysis is made of the large suppliers. The largest suppliers that comprise 50 percent of the total purchase volume of the analyzed suppliers are A-suppliers, 30 percent B-suppliers, and the rest C-suppliers (Figure 16). The A-suppliers are the largest and the most important to follow-up and thereby they are measured most thoroughly. On contrast, the C-suppliers are monitored rather superficially. The measurement methods applied to the ABC-suppliers are further presented in subchapter 3.2.5.2.

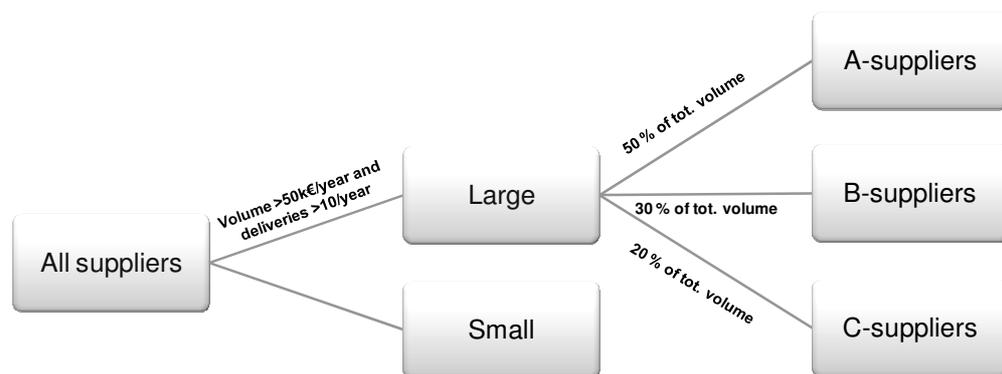


Figure 16 ABC-analysis of unit B.1

### 3.2.4.3 How long are evaluation results valid?

There are various practices regarding the validity of supplier pre-selection and performance measurement. In some units the validity time is one contract period (PM's A, I, J). In unit B.1 there is a clear rule that the pre-selection results are valid for three years. In unit I the validity ends if major changes take place in the supplier's company. If for example the owners of the company change or the financial situation of the supplier suddenly deteriorates, a check needs to be made that the supplier still fulfills the pre-selection criteria. (PM I).

Continuous performance measurement is conducted four times a year in unit G and once a year in unit B.1. In many units a clear timeframe for performance measurement has not been specified. Instead, for example in unit H the critical deliveries and the invoicing are monitored constantly. In unit E the employees' experiences are gathered along the projects, and feedback is given to the supplier when the project ends.

Table 15 summarizes the current good practices related to conditions for supplier evaluations.

**Table 15 Good practices related to evaluation conditions**

Literature	Case company
Clear segmentation of commodities and suppliers based on supply market risk level and strategic impact	<ul style="list-style-type: none"> <li>- Unit E.2 has a segmentation based on the safety impact of the commodity/supplier</li> <li>- Unit B.1:               <ol style="list-style-type: none"> <li>1. Segmentation based on purchase volume and intention to make long-term agreement (pre-selection)</li> <li>2. Segmentation based on ABC-analysis (performance measurement)</li> </ol> </li> </ul>
	<ul style="list-style-type: none"> <li>- Unit B.1 has a set validity period for pre-selection and performance measurement</li> <li>- Unit I conducts re-evaluation if major changes take place</li> </ul>

### **3.2.5 Evaluation methods and criteria**

The evaluation methods refer to the tools used to collect and analyze information about the suppliers and the ways to give feedback about the evaluation results. The evaluation criteria are needed to be able to draw conclusions from the information.

#### **3.2.5.1 Methods and criteria for supplier pre-selection**

There are two main methods that are used to gather information for pre-selection: supplier audit and questionnaire<sup>7</sup>. The audits are not conducted very systematically in the case company and most units do not have any instructions for auditing. Unit E.2 is the only exception because it has clear guidelines which suppliers to audit and how.

Many units utilize supplier questionnaires when making pre-selection evaluations (PM's B.1, C, E, I, J). In units B.1, C, and E the questionnaires are standard whereas units I and J make some case-by-case modifications. A summary of the issues that are evaluated in the pre-selection phase can be found in Table 16.

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<sup>7</sup> Audit = Supplier visit, Questionnaire = Supplier survey. Both presented in subchapter 2.2.3.2.

**Table 16 Areas of pre-selection evaluation<sup>8</sup>**

	A	B.1	C	D	E.1	E.2	G	H	I	J
Corporate structure			x		x	x				
Size of the company			x		x	x		x		x
Biggest shareholders			x		x	x				
Reputation									x	
Locations			(x)		x	x				x
Key personnel			(x)		x	x				
Financial information	x	x	x	(x)	x	x	x	(x)	(x)	x
Bank/Auditor			(x)		x					
Main products		x	(x)		x	x				
Main sub-suppliers			(x)		x	x				
References			x		x	x			x	x
View of the case company as customer						x		x		
Main production methods					x	x				
Supply capability						x		x		x
Delivery ability									x	x
Project management abilities							x			
E-invoicing-ability										x
EHSQ-issues		x	x		x	x	(x)		(x)	(x)
Act of Purchaser liability-issues	x									
Insurances			(x)							

Table 16 indicates that the financial situation of the suppliers, the EHSQ-issues (environment, health, safety, and quality), and the references are the three most commonly evaluated issues in pre-selection. Practically all the units check the financial situation of the suppliers. The financial information is provided either by the supplier or by an objective business and credit information company (PM's B.1, C). The EHSQ-issues are checked by seven units. It is a very positive sign that they are of interest to

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<sup>8</sup> The parentheses refer to limited or irregular evaluation of the particular area

many units, especially because the case company is committed to promote sustainability.

The table illustrates a few noteworthy issues about the units. Even though unit B.1 has a rather advanced evaluation system, the issues that are evaluated during pre-selection are rather limited, including only the financial situation, the main products, and the EHSQ-issues. By contrast, the subunits of E incorporate over 10 aspects in pre-selection evaluation. Based on Table 16 it seems that unit C evaluates a huge range of issues. Actually, unit C uses a supplier pre-selection service provided by a third-party evaluator, called Application S in this thesis. The suppliers register at the website of Application S and fill in their supplier questionnaire which is very extensive compared to the ones used in the case company. Unit C can then retrieve the questionnaire and other information from the website and perform pre-selection. In other words, unit C has outsourced a part of its supplier evaluation work. At the moment unit C does not utilize all the information the questionnaire provides though. Mainly the financial situation, the background information of the suppliers, and the references are checked through the web-site (PM C).

When it comes to the criteria based on which a supplier is approved or not approved, the procedures are diverse between the units. They range from “gut-feeling” to clear mathematical models. In unit C the supplier is approved if it has at least some positive answers in the questionnaire and if its financial situation seems good enough. By contrast, unit E.2 has strict approval criteria, mainly related to the suppliers’ quality systems. Unit J is using the weighted-point method to determine which suppliers to approve. Each question in the questionnaire is scored and the scores are weighted based on the importance of the matter. Unit B.1 also uses a mathematical model for determining the approved suppliers. It is a simplified version of the system of unit J because the scores are not weighted. The basic criterion is that the supplier needs to receive 50 percent of the maximum scores in every section of the questionnaire in order to be approved.

All in all, the diversity between the units is obvious after studying the currently used pre-selection methods and criteria. As Table 16 illustrates, the range of evaluated issues is wide and units are interested in different issues. In the future when a harmonized supplier evaluation is developed this will be a challenge. Nevertheless, the positive side is that practically all the aspects of the independent criteria presented in subchapter 2.2.3.1 are covered.

### **3.2.5.2 Methods and criteria for supplier performance measurement**

The methods that the units use for performance measurement are even more various and informal than for supplier pre-selection. Some units follow up deliveries or service levels continuously to be able to detect any possible problems as early as possible (PM's H, I, J) and some make random invoice checks to ensure that the suppliers' billing is according to the contracts (PM's B.1, I). Some of the units have feedback meetings with the suppliers regularly (PM's B.1, G, H, J) or if problems occur (PM I).

Units B.1 and I have the most formal methods for supplier performance measurement. In unit I the purchaser or other people dealing with a supplier fill in an evaluation template that is very similar to the one used for pre-selection. The evaluator scores every metric "good", "satisfactory", or "not satisfactory". Immediate actions are taken if there is even one "not satisfactory" score. The actions in this case refer to internal discussions and also meetings with the supplier in order to solve the problem. (PM I). The main content of the template is listed in Table 17.

**Table 17 Contents of the supplier performance measurement template of unit I**

Contents of the template
Credit rating
Ability to understand customer's needs
Supplier's competence and skills
Level of documentation
Delivery accuracy
Flexibility (availability) of supplier
Communication capabilities
Price level

In addition to the quantitative measures like the delivery capability and the price level, the performance measurement also focuses on the suppliers' commitment to co-operation, communication, and skills and competencies. In other words, smooth co-operation, responsiveness, and the service level of the suppliers are at least as important as the price and the delivery preciseness. Unit I measures the performance of ten largest suppliers which all are important partners. This may be the reason why smoothness of co-operation is such an important part of measurement. (PM I).

Also unit B.1 has established a systematic system for supplier performance measurement. As mentioned in the subchapter 3.2.4.2, the basis for the system is the ABC-analysis that is conducted to the large suppliers. Table 18 illustrates the methods used to measure the performance of the ABC-suppliers.

**Table 18 Performance measurement methods of unit B.1**

	Invoice check	Internal scorecard	Feedback meeting
A-suppliers	X	X	X
B-suppliers	X	X	
C-suppliers	X		

As the table indicates, there are three performance measurement methods used in unit B.1. *Invoice checks* are conducted to all large suppliers so that two or more invoices are chosen and their compliance with the prices and the terms of the contract are checked. If the invoices are not congruent with the contract, more invoices need to be checked to clarify if invoicing has been systematically incorrect, and further actions need to be taken to fix the situation. (PM B.1).

The second method, *internal scorecard*, is used to evaluate the performance of the A- and B-suppliers. The scorecard is filled in by two to four people who make purchase orders because they have experience of the suppliers' performance. The scorecard resembles the measurement template of unit I (Table 17) for it includes issues like suppliers' delivery reliability, price level, responsiveness, and competencies. Alike in unit I, the supplier's service orientation and prioritization of the case company as a customer are appreciated in unit B.1. However, there are some differences. The scorecard of unit B.1 includes issues like the supplier's security, and awareness of the environment, which indicate that the unit has realized that it is important to follow-up the suppliers' investments in sustainability. The evaluators score each issue with a score from 1 to 4. If the total average score is over 1,5, the supplier can be regarded as "approved" (PM B.1). Taking into account that the lowest score is 1, approval limit 1,5 seems very low and easy to reach.

Unit B.1 arranges *feedback meetings* with the A-suppliers. The B- and C-suppliers receive feedback from their performance only when there are problems (PM B.1). The

feedback is based on the two aforementioned evaluation methods but other important matters can also be discussed. According to the purchasing manager of unit B.1 the suppliers have been very satisfied with these meetings which help them to improve their operations. (PM B.1).

Altogether, the experiences of the system have mainly been positive in unit B.1. Unfortunately the lack of resources has been causing some problems. In 2008 performance measurement was carried out to all approximately 40 A-suppliers and most B-suppliers but unfortunately there wasn't enough time to evaluate the C-suppliers. (PM B.1). Thus, the system is rather heavy for the current resources.

The following tables illustrate the good practices of the case company in regard to the execution of supplier pre-selection and performance measurement.

**Table 19 Good practices related to supplier pre-selection methods and criteria**

Literature	Case company
Independent criteria including business environment and financial issues, organization and strategic issues, and technology issues	- Financial situation, EHSQ-issues, and references most commonly evaluated issues
Options for pre-selection methods: financial evaluation, supplier survey, supplier visit, capability analysis, third-party analysis	- Financial evaluation, questionnaires (=surveys), audits (=visits), and third-party analyses in use in several units
Pre-selection based on mathematical rating	- Unit B.1 has an elementary mathematical scoring system - Unit J utilizes the weighted-point method to score suppliers

**Table 20 Good practices related to supplier performance measurement methods and criteria**

Literature	Case company
Measures including delivery accuracy, quality, costs, and responsiveness	<b>Measures:</b> - co-operation - skills and competences - communication - flexibility - price - delivery preciseness/reliability - awareness of the environment etc.
Two-way feedback	- Several units have feedback meetings with suppliers regularly or if problems occur
Results based on mathematical rating	- Unit B.1 has a mathematical scoring system for performance measurement
Other	- Various methods such as invoice checks and internal scorecard - Continuous follow-up of deliveries and service levels in units H, I, and J

### 3.2.6 Supplier database and other IT applications

The supplier evaluations produce various documents and information that should be stored somewhere. The storage for the supplier related information is called a supplier database and it was first introduced in subchapter 2.2.2.

The practices of the case company related to the databases are as various as the evaluation methods. Actually most units do not have a formal database for supplier evaluation information at all (PM's A, E.1, J). Instead, all the evaluation information is stored in the employees' own computers or in the common folders of the units. The purchasing manager of unit J actually thinks that it is better that people do not have access to the previous evaluation results to avoid bias in their future decisions.

Some units use a simple Excel-sheet that is saved in Microsoft SharePoint<sup>9</sup> (PM's B.1, E, I). Units B.1 and E.2 store both pre-selection and performance measurement

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<sup>9</sup> SharePoint includes internet based collaboration functions, process management modules, search modules and a document-management platform (Microsoft Corporation, 2009)

information in their databases. In addition to basic (i.e. name, company number, product category) and contract information, the database of unit B.1 contains the results and the dates of both pre-selection and performance measurement. It is also mentioned if the supplier is one of the ABC-analyzed suppliers. The database of unit E.2 is very similar but it contains considerably more information about the execution methods and results of the evaluations, for example what type of quality and environmental systems the suppliers have. Furthermore, the unit also keeps track of reclamations to facilitate follow-up of the quality.

As mentioned in subchapter 3.2.5.1, unit C uses Application S that is administrated by a third party. The supplier information database provided by Application S contains a file of every registered supplier. There is some information provided by the suppliers themselves and third parties in the file. The suppliers are required to fill in the supplier questionnaire (see Table 16 column C for questionnaire contents) after which they receive the status “qualified” unless they have some unpaid taxes or fees, or they haven’t submitted the latest annual report and accounts (Internet report of Application S). Through Application S, the buying companies have straight contact also to Dun & Bradstreet, a source of commercial information (Dun & Bradstreet, 2009). As mentioned, the suppliers receive a “qualified”-status but that does not signify that the supplier would have undergone some formal pre-selection. (Internet report of Application S). Thus, if the buying companies want to pre-select the suppliers properly, they need to perform some evaluations based on the information in the questionnaire by themselves.

When it comes to other IT-applications related to suppliers and purchasing, the case company has an Idea and Deviation Reporting application in place which all the units use at least to some extent. At the moment it is mainly used to report EHS-related deficiencies or general improvement proposals. Nevertheless, for example unit A already reports some of its material deficiencies and supplier reclamations (4 reclamations during the first five months of 2009 and 11 in 2008) through this

application. In addition, the case company has recently implemented an e-sourcing solution, called Application P. It is utilized for sending and receiving RFP's. The suppliers can give their bids online without having to send any hard copies. At the end of the RFP-round, all material can be downloaded to one Excel-file. The application could be utilized for supplier pre-selection purposes as well (PM H).

Table 21 summarizes the current good practices related to supplier databases and IT.

**Table 21 Good practices related to supplier database and IT**

Literature	Case company
Database containing information about suppliers	<ul style="list-style-type: none"> <li>- Several units have databases, however they are accessible only for people from a certain unit</li> <li>- Units B.1 and E.2 store both supplier pre-selection and performance measurement data, as well as supplier segmentation data in the database</li> <li>- Unit E.2 also collects information about reclamations</li> </ul>
Utilization of information technology	<ul style="list-style-type: none"> <li>- Unit C uses a third-party database/information service that contains updated information about suppliers</li> <li>- Common idea and deviation reporting system utilized in the whole company</li> <li>- E-sourcing solution implemented</li> </ul>

### **3.2.7 Analysis of the purchasing cases**

In order to further examine the current situation of supplier pre-selection in the case company, nine purchasing cases were randomly chosen from a list of planned purchases. The purpose was to find some cases in different units but unfortunately the list was not inclusive because some units do not report their purchasing plans as actively as the others. Therefore, the sample doesn't fully represent the whole company. The purchases were made by four different business units, and among nine cases one was purely a service purchase and eight completely or partially material purchases.

The purchasers were asked whether they performed pre-selection and how they performed it. Their answers were compared to the current pre-selection instructions of the respective unit. A summary of the cases can be found in Table 22, and Appendix 8 illustrates how the units that made the purchases are located in the corporation.

**Table 22 Summary of the purchasing cases**

Case	Unit	What was evaluated?	Deviations from instructions
1 (Product)	B.2	- Quality system (ISO 9000)	(This subunit has no formal instructions)
2 (Product)	B.2	- Supplier's organization - Financial situation - Quality and environmental systems	(This subunit has no formal instructions)
3 (Product)	E.4	- Financial situation	(This subunit has no formal instructions)
4 (Product)	E.2	- Quality system - EHS-issues	- None
5 (Product)	E.2	(No pre-selection evaluation)	- None
6 (Service)	E.1	- Taxation issues - Financial situation - Project management system	- Instructions not followed (instructions exist but are not applied in most cases)
7 (Product)	J	- Various issues, e.g. financial situation, references, locations, e-invoicing capabilities, EHSQ-issues	- None
8 (Material and service)	F	- Taxation issues - Pension insurances paid - Operating under collective agreement	- Legal requirements followed
9 (Product)	F	- Taxation issues - Social fees paid - Financial situation - References - Quality and environmental systems	- Legal requirements followed

Almost in all of the cases some pre-selection evaluation was carried out. Only in case 5 evaluations were not carried out but that was due to the evaluation guidelines of unit E.2 stating that evaluation for that type of product is not needed. In six cases (2, 3, 4, 6, 7, and 9) evaluation was performed just before contract awarding and in two cases (1 and 8) evaluation had taken place prior to the purchase in some other context, for example during the frame agreement negotiations.

### **3.2.7.1 What was evaluated?**

The financial condition and the quality and environmental systems of the suppliers were evaluated in most cases. The financial conditions were reviewed in six, quality systems in five, and environmental systems in four purchases. In addition, business references were the fourth most evaluated issue. Hereby, these results are perfectly in line with the results of the internal interviews which indicated that financial condition, EHSQ-issues, and references are of greatest interest in pre-selection evaluations.

The financial condition of the suppliers was evaluated in various ways. For example in case 9 the purchaser made sure that the suppliers are not in risk of going bankrupt and that they have sufficient revenue considering the purchase, and in case 3 the purchaser requested the credit department of the case company to prepare objective financial reports about the suppliers' companies. By contrast, the evaluation of quality and environmental systems was more straightforward: in most cases the suppliers were expected to have the ISO 9000 quality system or the ISO 14000 environmental system.

### **3.2.7.2 Methods for gathering pre-selection information**

The most common method used for collecting evaluation information was to ask the suppliers to provide it. The suppliers were for example asked to deliver proof of their quality system certificate. Obviously, the purchasers themselves gathered a lot of the information. In addition to analyzing the information received from the suppliers, in case 9 Application S was utilized as an information source. The credit department of the case company assisted in the evaluation process by providing objective financial reports. In case 4 the purchaser made an audit at the suppliers' facilities and asked them to fill in a survey containing various questions about the condition of the company.

### **3.2.7.3 Summary**

In cases 4, 5, and 7 the supplier pre-selection instructions were well followed. These purchases were performed by unit E.2, which has strict instructions based on the law, and unit J, which has succeeded in implementing its strategic sourcing process very well in practice. In one purchase performed by unit E.1 the evaluations were not performed according to the instructions. However, the reason was that the instructions are rather informal and not applied in the whole unit. The purchases made by unit F were both cases which legal regulations apply to. The law of public procurement and the act of purchaser's liability require that the buyer performs certain supplier evaluations before selection. These requirements were well followed. In three cases (1, 2, and 3) there were no formal instructions that could have been applied to and for that reason the purchasers pre-selected the suppliers as they thought was the best.

All in all, the review of the purchase cases indicates that supplier pre-selections are conducted in the case company, even if there aren't always any formal instructions. Moreover, the instructions are followed in cases which they apply to. The purchasers comply well especially with the legal regulations related to supplier pre-selection.

### **3.2.8 Summary of the current situation**

Even though the case company is only starting to develop supplier management there are already several units that actually have some fairly advanced supplier management systems. Moreover, the purchasing cases indicated that pre-selection takes place almost every time a purchase is made. If the current situation is reviewed against the supplier management maturity table presented in the subchapter 2.2.7, the case company could be placed on the second level. In other words, some measures and processes are defined but there is still plenty of room for improvement.

When it comes to processes, there are several good ones in use. Units B.1, I, and J have been able to integrate supplier management perspectives into the purchasing

process, which facilitates well-timed execution of supplier management. There are also several guidelines for carrying out these processes and the guidelines cover multiple aspects related to supplier management. Thus, there is a good starting point for building a more developed supplier management system.

The main problem is currently that only the employees of the respective unit are aware of the good procedures in the unit. Moreover, many units operate very similarly but do not work together and hence, are not utilizing the benefits they might gain from common procedures and shared information. Supplier pre-selection is a good example: many units are using similar tools such as supplier questionnaires but have their own, different versions of them. The downside of this is e.g. non-uniform picture of the company towards the suppliers. These problems are a consequence of the wide range of operations and needs in the company, and the fragmented corporate structure caused by several mergers and acquisitions.

The most important task next is to harmonize the current procedures into one common way of operating. However, none of the supplier management systems in use can currently be implemented as such in the whole company. For example even though the system of unit B.1 has been well implemented, it has been found rather heavy and difficult actually to carry out.

### ***3.3 Contributions to a new supplier evaluation system***

Even though the current procedures regarding supplier evaluations are various in the case company, practically all the purchasing managers agree that evaluations are value-adding and there should be company-wide instructions for executing them.

The direct benefit of having a harmonized supplier pre-selection system would be transparency between the units. For example the purchasing manager of unit E.1 finds it very important that she has the possibility to see all the suppliers that have been pre-selected in the company and thus discover new suppliers for her unit. (PM E.1). Of

course one of the primary reasons why pre-selection should be performed is the ability to discover the strongest suppliers. Several other major benefits came up in the internal interviews: better control over risks and smaller costs and prolonged life-cycle of the purchased commodity through better quality (PM's E, E.1, G, H, J).

There are also many advantages related to supplier performance measurement. Firstly, it is important to know how well the suppliers are performing in order to be able to recognize the needs for improvement and to be able to develop (PM I). Secondly, if the suppliers think that the buyer does not follow-up their work at all, their performance level may begin to decrease (PM H). This may happen especially in a long, established relationship if the other party is taken for granted.

The following subchapter presents some suggestions about how supplier evaluations should be organized. First the ideas of internal experts are summarized and then the good practices found in the benchmark companies are discussed.

### **3.3.1 Development suggestions of internal experts**

The purchasing managers had many proposals how the evaluation system should be organized and how the evaluations should be carried out. Their ideas are presented under the same headlines as in the subchapter 3.2.

#### **3.3.1.1 Conditions for evaluation**

As mentioned, the conditions in this case refer to the rules that state when supplier pre-selection or performance measurement needs to be executed and with which suppliers.

### **Which suppliers should be evaluated?**

It is evident that the units make diverse purchases and thus have different types of suppliers. This came up when the purchasing managers were asked which suppliers should be pre-selected. The units making smaller purchases would pre-select if the purchase volume exceeds 50 000 euros (PM's A, B.1). The units that make large investments would prefer not to pre-select suppliers until they reach the volume of 200 000 or 500 000 euros (PM's E, E.1). Regardless, the suppliers' segmentation shouldn't be based only on the volume but on strategic aspects as well. The criticality of the supplier could be one way to segment suppliers. It refers to the influence that a sudden loss of a supplier would have to the case company. (PM's E, H).

When it comes to performance measurement, many purchasing managers think that it should be carried out depending on the suppliers' yearly delivery amounts (PM's A, B.1, H). In other words, the suppliers that do not continuously deliver something do not need to be measured. The purchasing managers of A and B.1 suggest that the whole case company should apply the current system of unit B.1. Hereby, performance would be measured depending on the suppliers' segment in the ABC-analysis. However, it should be possible to upgrade or downgrade the suppliers between the ABC-classes based on their criticality to the business (PM H).

### **How long should evaluation results be valid?**

There weren't many differing opinions about the validity period of supplier pre-selection and performance measurement results. Two or three years' validity time was perceived sufficient for pre-selection results (PM's A, H). Performance measurement taking place yearly or more often would be the best option for many units (PM's A, C, D, E.1, G). In the case of large projects, performance should be measured after the project has ended (PM E). These opinions are perfectly in line with the current

procedures, in other words the purchasing managers find that major changes are not needed in this area.

### **3.3.1.2 Evaluation methods and criteria**

This subchapter presents the suggestions that the purchasing managers had regarding the evaluation methods and criteria.

#### **Methods and criteria for pre-selection**

Two pre-selection methods were clearly perceived as the most potential: the supplier questionnaire and the audit. The questionnaire should contain some basic, general questions that could be asked from all the suppliers (PM's A, B.1, H). However, because the legislations and the supply market situations may differ between the countries, there should be some country-specific questions (PM's A, B.1, E). There should also be a shorter and a longer version of the questionnaire that could be used depending on how thorough information is needed (PM H). All of these are logical points but having several different versions of the questionnaire may hamper interpretation and comparison of the evaluation results because one version of the questionnaire has to be evaluated based on different criteria than another version. Thus, having more than three versions of the questionnaire is not reasonable.

The purchasing managers' thoughts about the criteria based on which suppliers should be approved comply with the current most important pre-selection points (Table 23). Purchasing manager H would also like to ensure smooth co-operation between the parties by evaluating the cooperativeness of the suppliers' contact people, the positioning of the case company as a customer, and the suppliers' flexibility.

**Table 23 Suggestions for pre-selection criteria (PM's D, E.1, H)**

Pre-selection criteria
Financial situation
Legal matters
Quality and environmental systems
Business references
Cooperativeness of supplier's contact person
Case company's position as customer
Supplier's flexibility

### **Methods and criteria for supplier performance measurement**

The internal experts' preferences for supplier performance measurement methods resemble the methods that are already in use. Most units think that it is very important to collect their own personnel's experiences about suppliers, and a good way to do this is an internal question template or a scorecard. The employees of the case company who collaborate with the suppliers on day-to-day bases fill in the template. (PM's A, C, D, E.1).

Furthermore, continuous follow-up of the financial situation of the suppliers is perceived important and it should be carried out with updated, objective data provided by third parties (PM's E.1, G, J). The purchasing managers think that the best way to communicate performance measurement results and facilitate improvement is to have meetings with the suppliers (PM's A, B.1, C, D). Moreover, the meetings shouldn't deal only with the suppliers' improvement points but also what the case company could do better as a customer and how to co-operation could be enhanced (PM D, H).

### **3.3.1.3 Supplier database and other IT applications**

The purchasing managers had a lot of opinions about how the evaluation information should be stored, shared, and managed. Based on the interviews it can be concluded that the information management is the most challenging part of supplier evaluations because it is difficult to find an application that suits everyone's purposes.

Nevertheless, many purchasing managers agree that the supplier database should be the same for all (PM's A, E, J). Actually, the units should also share the same purchasing platform that includes the supplier database. The case company is already using a purchasing platform, called Application M in this thesis, which has been selected as the official platform for the whole company. However, it has not been implemented in all the business and service units but the plan is that at some point all the units would use it. Application M for example enables issuance of purchase orders and contains information about the commodities and the suppliers. The purchasing managers of units E.1 and G think that it would be the most feasible solution for storing supplier evaluation information. However, these opinions are not shared by all the other interviewees. Unit A would prefer to use traditional Excel-files, at least until Application M is further implemented, and unit B.1 would like to use Excel especially for continuous performance measurement data to facilitate analyzing.

There are several requirements that the database or application should fulfill. Firstly, every supplier should have its own file that contains at least the information presented in Table 24.

**Table 24 Contents of a supplier database (PM's A, B.1)**

Contents of a supplier database
1. Name of the supplier
2. Contact person and -information
3. Product categories (i.e. what the supplier is delivering)
4. Result of pre-selection
5. Result of performance measurement (also historical results)
6. Who performed evaluations
7. When were evaluations performed

Secondly, a contract management tool should be included in the application (PM's B.1, H). Presently, information about the contracts is not in the same location as other supplier related information. The new application should contain some information about the person who is responsible for the contract, how long the contract is valid, and which commodities it applies to. (PM H).

Making sure that the information in the database is updated is the third most important issue. Especially financial data should be up-to-date (PM C). It could also be beneficial if the application was self-learning. For example, it shouldn't be necessary to fill in the product category information when adding a new supplier but the application could save it when an order is made for a certain commodity. (PM B.1).

The purchasing manager of unit C thinks that the best way to utilize the available IT is to use Application S, or somehow link it and Application M to each other. However, the other managers do not support the idea. The reason is that Application S is only used in one country and despite the efforts the implementation has not succeeded in other countries due to the suppliers' lack of interest. If a sufficient amount of suppliers has not registered, competition will be limited due to lack of options (PM A, E).

Furthermore, the suppliers receive the “qualified”-status fairly easily because of which the case company needs to perform pre-selection anyway (PM E).

IT should be utilized when sending and receiving the supplier questionnaire in order to decrease the amount of administrative work. For example Application P could be used for this (PM H). The following Table 25 summarizes the internal experts’ ideas.

**Table 25 Internal experts' suggestions regarding supplier pre-selection and performance measurement**

	Pre-selection	Performance measurement
<b>Supplier segmentation</b>	- Volume-based - Supplier’s criticality to business	- Amount of deliveries/year - ABC-analysis - Supplier’s criticality to business
<b>Validity period of results</b>	- Re-evaluation every 2 or 3 years	- Evaluation yearly or more often
<b>Execution of evaluation</b>	- Tools: Supplier questionnaire and audit - Criteria: Financial situation, legal matters, quality and environmental systems, business references, cooperativeness, case company’s positioning as customer, suppliers’ flexibility	- Tools: Internal questionnaire, meetings, follow-up of financial situation
<b>Database</b>	- Combined purchasing system and supplier database - Application M (and Application S) should be utilized	

### 3.3.2 Implications of the benchmark study

The benchmark study consisted of the interviews with two companies (called X and Y in this thesis), both having major operations in Finland. Some basic information about the companies can be found in Appendix 9. The procedures of the companies related to supplier evaluations are presented in the following subchapters.

#### 3.3.2.1 Supplier evaluations in Company X

Company X has started to build supplier management in 2008 and it will create and implement the system in three stages: first supplier approval procedures, then

continuous evaluation and supplier requirements, and last directions for evaluating products and prices. The three stages are equivalent to supplier pre-selection, performance measurement, and supplier selection. At the moment the implementation of the first phase is finished (Informant X). This stepwise implementation seems very sensible because there is time to focus on one aspect at a time and learn from the previous implementations.

### **Supplier pre-selection**

The responsibilities for conducting supplier pre-selection are clearly assigned in Company X: the initiative for pre-selection comes from a local unit that is also responsible for all decisions but if there is need for an audit, it is carried out by trained auditors. The initiator in the local unit can for example be a purchaser. (Informant X).

The conditions for performing pre-selection are based on a segmentation system for the suppliers: all the new suppliers are pre-selected if possible but especially all the new Chinese suppliers and the suppliers that relate to R&D operations. (Informant X). In other words, the company focuses on the most risky new suppliers. Furthermore, the purchasing managers of different material clusters define which old suppliers are critical to the business and need regular follow-up of the pre-selection results. They also name companies that have caused problems and those suppliers' results are followed up as well. (Informant X).

The evaluation methods used in pre-selection are supplier questionnaire, audit, and financial analysis. The content of the questionnaire of Company X is illustrated in Appendix 11 together with the content of the questionnaire of Company Y. It shows that the questions are very similar to the ones in the questionnaires of the case company currently: the financial situation of suppliers and the EHSQ-issues are clarified. Company X focuses more on the suppliers' production capabilities as opposed to basic, company related information.

Company X performs audits at the suppliers' facilities if they seem necessary on the grounds of the answers of the questionnaire or the risks of the purchase (Informant X). It has a *general question list* that serves as a checklist in every audit. In addition, there is an extensive collection of *special question lists* that contain some questions about production of certain commodities. When it comes to estimating the results of audits, Company X has a fairly sophisticated system. A supplier receives either zero or one point for every question on the *general question list* and the questions are weighted either with a coefficient one or two. The general audit questions are divided into seven sections, first two containing questions regarding management and employees and the rest questions regarding operations and procedures. In order to be "approved", the supplier needs to receive 70 percent of the maximum points in the first two sections and 80 percent in the other five. However, if there are some minor deficiencies the supplier may also receive "approved with conditions"-status which means it needs to create an improvement plan. (Informant X).

Company X has a database that was already in use as a contract management tool before supplier management was initiated. It contains all the templates and material that is needed to carry out pre-selection, and the results and the findings of conducted evaluations. (Informant X).

### **Supplier performance measurement**

Alike the case company, Company X has some procedures for supplier pre-selection, but performance measurement is carried out in a more informal manner. It is recommended that at least commodity quality and suppliers' delivery accuracy should be measured (Informant X). Quality is measured as a number of claims or defect-free lots, and delivery accuracy as percentage of complete and on-time shipments. On top of them, units can have their own metrics as well, as long as everything is measured according to the same principles (Informant X). Similarly to supplier pre-selection, the performance of the suppliers that belong to a certain segment should be measured.

The segment is determined by the criticality of the supplier and the criticality is determined by the unit managers (Informant X).

### 3.3.2.2 Supplier evaluations in Company Y

In Company Y the evaluation system has been developed in the central management and given top-down. Company Y has been a forerunner in supplier management and has had a system for several years. However, Informant Y estimated that only one third of the units have succeeded in implementing the system. Moreover, many units have implemented their own supplier management procedures in addition to the common one. (Informant Y).

Company Y has a four-phased supplier evaluation system that is presented in Figure 17.

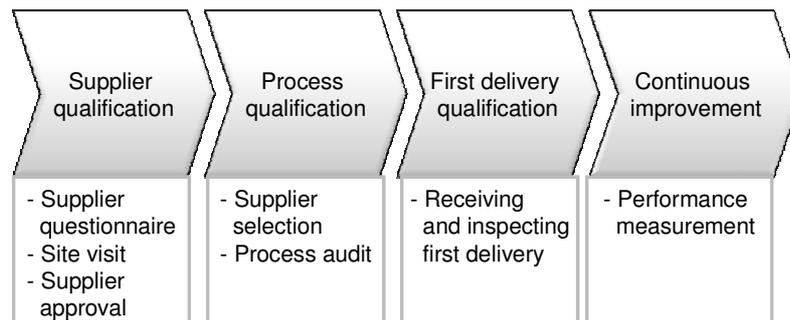


Figure 17 Supplier management system of Company Y

The first and the last steps resemble supplier pre-selection and performance measurement presented in subchapter 2.2. However, the second and third steps differ from the typical supplier management models discussed before in this thesis. The second step, process qualification, contains supplier selection and process audit. The supplier selection in this case means that among the approved suppliers one is chosen for further evaluation which is conducted depending on the scope and criticality of the delivery. In the process audit the supplier's production system is audited and approved.

After this deliveries can begin. (Informant Y). The third step, first delivery qualification relates to receiving and inspecting the deliveries.

### **Supplier pre-selection**

The conditions for performing pre-selection are defined on a general level in Company Y. All the suppliers go through the pre-selection procedure even though it seems like a huge challenge considering that the company has approximately 30 000 suppliers. Hence, in practice small and familiar suppliers are excluded from the procedure (Informant Y).

The evaluation methods used in pre-selection are very similar in both benchmark companies, i.e. questionnaires, audits, and financial analyses. As mentioned, Appendix 11 illustrates what types of questions the questionnaires include. Similarly to the questionnaire of Company X, the questionnaire of Company Y contains questions about the financial situation of the suppliers and the EHSQ-issues. However, Company Y focuses more on the structure of the suppliers' organizations, supply chains, and sales. For the supplier questionnaire only Company Y has a scoring system. It is a simple scoring system because all questions are weighted equally. Hence, it resembles the categorical method presented in sub-chapter 2.2.3.3. The answer options are "yes", which gives one point, "partial", which gives 0,5 points, and "no", which gives zero points. The final score is the aggregate points divided by the amount of questions. A supplier receives an "Approved"-status if its final score is at least 50 percent of the maximum. With 20-50 percents it is "Under development" and with 20 percent or less "Rejected". "Under development" means that the supplier needs to create a plan to improve its performance so that it will reach 50 percent of the maximum scores within a year. It is good that Company Y rates the answers of the questionnaire to avoid subjective evaluations but maybe weights should be given to questions to reach more realistic results.

The process qualification audit in Company Y is performed with the help of a question list (Table 26). The questions are very generic and not connected to a certain company or commodity type. In Company Y the scoring system of the process audit question list is very similar to the system of the supplier questionnaire discussed above. In other words, all questions are weighted equally and in order to be approved the supplier needs to score at least 80 percent of the maximum points.

**Table 26 Contents of the process qualification audit question list**

<u>Headlines</u>	<u>Questions about..</u>
Pre-production	Activities that occur prior to the creation of the product/service, e.g. identification of bottlenecks
Sub-supplier management	Procedures related to supplier pre-selection, performance measurement, and validation of deliveries
Production/Service execution	Procedures related to e.g. testing, tools, process controlling
Logistics	Procedures related to e.g. lead-time measurement, inventory checks, inspection of transport companies
General	Procedures related to e.g. safety, cleanliness, handling of non-conformances

The results of pre-selection do not have a set validity period. Instead, it depends on the criticality of the supplier. In Company Y the criticality is determined with Kraljic's portfolio that was presented in the subchapter 2.2.1.1.

For storing evaluation information Company Y uses some basic Excel-sheets that are saved in a database and are available for all. However, they are very difficult to find due to the complexity of the database. Thus, in practice only people in the respective unit have access to supplier evaluation information. (Informant Y).

### **Supplier performance measurement**

Alike Company X, Company Y has a rather informal system for performance measurement. The units are given recommendations that at least the commodity quality and the suppliers' delivery accuracy should be measured (Informants Y). There

are no centrally set limits for acceptable performance levels but in cases of repeated poor performance or failure to improve suppliers' "approved"-status may be cancelled. Problems can be discussed in the meetings that are held with the important suppliers every quarter or seldom. (Informant Y).

### **3.3.2.3 Good practices in the benchmark companies**

In the following Table 27, the good practices found in the benchmark study are summarized.

**Table 27 Good practices in the benchmark companies**

Important considerations based on the literature	Good practices found in the benchmark study
Clear segmentation of commodities and suppliers based on supply market risk level and strategic impact	<ul style="list-style-type: none"> <li>- New suppliers: country and commodity risk taken into consideration</li> <li>- Old suppliers re-evaluated based on their criticality to business</li> <li>- Segmentation based on Kraljic's matrix</li> </ul>
Database containing information about suppliers	<ul style="list-style-type: none"> <li>- Database containing pre-selection templates and evaluation information</li> </ul>
Independent criteria including business environment and financial issues, organization and strategic issues, and technology issues	<ul style="list-style-type: none"> <li>- Various issues like financial situation, shareholders, main products, main customers, and production equipment taken into consideration during pre-selection evaluation</li> </ul>
Best tool for gathering pre-selection information is chosen based on the importance of purchase. Options: <ul style="list-style-type: none"> <li>• Financial evaluation</li> <li>• Supplier survey</li> <li>• Supplier visit</li> <li>• Capability analysis</li> <li>• Third-party analysis</li> </ul>	<ul style="list-style-type: none"> <li>- Financial evaluation, supplier questionnaire, and audit in use as pre-selection methods in both benchmark companies</li> </ul>
Pre-selection result based on mathematical rating	<ul style="list-style-type: none"> <li>- Same simple scoring system for both supplier questionnaire and audit</li> <li>- Weighted scoring system for audit</li> </ul>
Performance measures including delivery accuracy, quality, costs, and responsiveness	<ul style="list-style-type: none"> <li>- Delivery accuracy and commodity quality measured in both companies</li> <li>- Units able to develop their own additional metrics</li> </ul>
Two-way feedback, follow-up of improvements	<ul style="list-style-type: none"> <li>- Meetings held with suppliers where evaluation issues may be discussed</li> </ul>
Evaluation processes clearly illustrated and documented	<ul style="list-style-type: none"> <li>- Illustrative and easily communicative activity flowchart</li> </ul>
	OTHER GOOD PRACTICES: <ul style="list-style-type: none"> <li>- Stepwise implementation of supplier management system</li> <li>- Clear division of responsibilities</li> </ul>

### 3.3.3 Summary

The attitude towards supplier management is clearly very positive in the case company and practically all the interviewees agreed that supplier management would be value-adding and there should be a common system for it. There is a consensus about having a segmentation system for the suppliers, using the supplier self-evaluation questionnaire and the audit as main pre-selection tools, and having e.g.

financial situation and EHSQ-issues as pre-selection criteria. In addition, performance measurement should include meetings with the suppliers and gathering opinions from own employees. However, there are also some differing opinions regarding the composition of the system. Firstly, despite the desire to have a common system, some units would still like to customize e.g. the supplier questionnaire to suit their own needs. Secondly, there is no high-end IT-solution available and thus, everyone has their own suggestion for how the situation should be handled.

All in all, the interviewees had many good suggestions but fairly few of them were very radical. Mainly current good policies were supported, which is understandable for it is easier to implement something familiar that is slightly modified than a totally new solution, especially in a large multi-divisional company.

The benchmark study gave the good examples of how supplier management can be organized but also reassurance that other companies are working with the same challenges with similar means. The study gave input especially to supplier segmentation, supplier questionnaire and audit, and scoring the answers. In addition, it became evident that implementation will be a great challenge because in Company Y it has succeeded in only one third of the units. Thus, attention needs to be paid especially on follow-up of implementation. But all in all, the existing supplier management procedures of the case company combined with the literature and the benchmark study will definitely provide a good starting point.

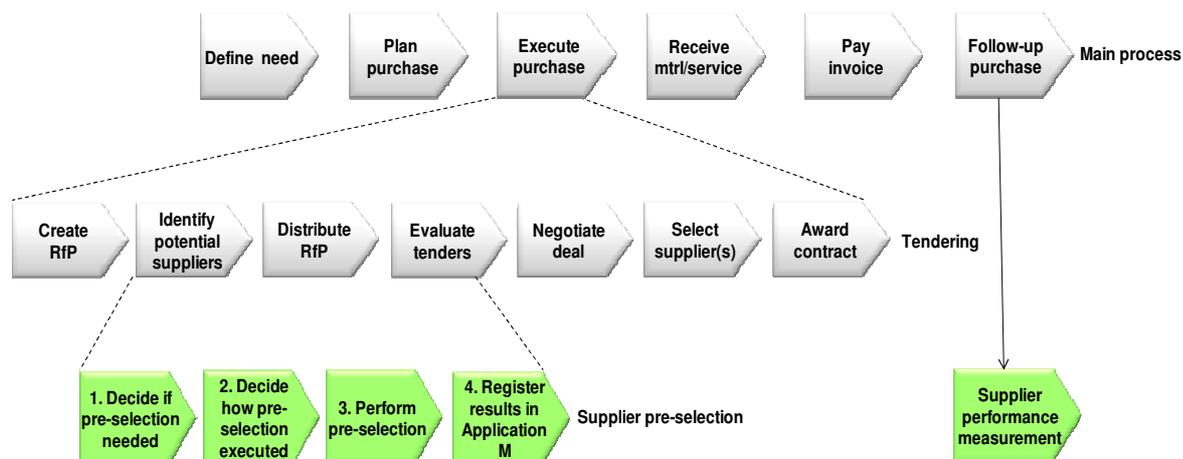
## **4 Conclusions and recommendations**

This chapter summarizes the most essential findings of this thesis and gives some recommendations to the case company. The limitations of this thesis and some subjects for further study are discussed in the final two subchapters.

### ***4.1 Supplier management and its relation to the purchasing process***

Supplier management contains six elements: supplier management strategy composition, supplier discovery, supplier pre-selection, supplier selection, supplier performance measurement, and supplier relationship management. When the elements were studied in relation to the purchasing process, it was discovered that they overlap in several stages. In fact, they may be even considered as a single process that is only viewed from two different perspectives: supplier and purchase activity aspects.

The main purchasing process of the case company emphasizes purchase activities and ordering. None of the process steps directly relates to supplier management. Thus, finding the connection points between supplier management and purchasing differs somewhat from what was discussed in the literature synthesis. The scope of this thesis included supplier pre-selection and performance measurement and hence, only their relationship to purchasing from the perspective of the case company will be discussed in this thesis. The following Figure 18 illustrates that supplier pre-selection takes place during tendering which is a sub-process of purchase execution. A four-stage supplier pre-selection process is suggested for the case company: need identification, choice of pre-selection methods, pre-selection execution, and result registration. These four steps are further divided into activities that are presented in the flowchart in Appendix 12.



**Figure 18 Purchasing process, supplier pre-selection, and performance measurement in the case company**

Compared to supplier pre-selection, finding the connection points between the purchasing process and supplier performance measurement is easier. As mentioned in subchapter 3.1, purchase follow-up contains supplier performance measurement.

## **4.2 Organizing supplier pre-selection**

The following sub-chapters present the findings and recommendation related to supplier pre-selection.

### **4.2.1 Conditions for performing pre-selection**

Supplier pre-selection is the most logically performed during purchasing execution and thus the responsibility for making the pre-selection evaluation is assigned to the purchaser. The decision how and which suppliers to evaluate is more difficult. The literature review suggested that the best practice would be to segment the suppliers according to the level of supply market risk and the strategic impact but for the case company it may be easier to start with a more straightforward segmentation rule. It could be based on the purchase volume as the interviewees suggested. In other words, if a purchase that exceeds a certain volume limit is planned, the potential suppliers

need to be pre-selected. A good limit for the case company would be 50 000 euros because the same limit is applied to a few other purchase activities as well. In addition, if a supplier has been previously pre-selected and approved, and the result is still valid, there should be no reason to pre-select the supplier again. It is important to have a clear rule which suppliers to evaluate in order to decrease subjectivity and harmonize practices.

Figure 19 illustrates the conditions for supplier pre-selection in the case company. They relate to the first step (Need for pre-selection) of the process presented in Figure 18.

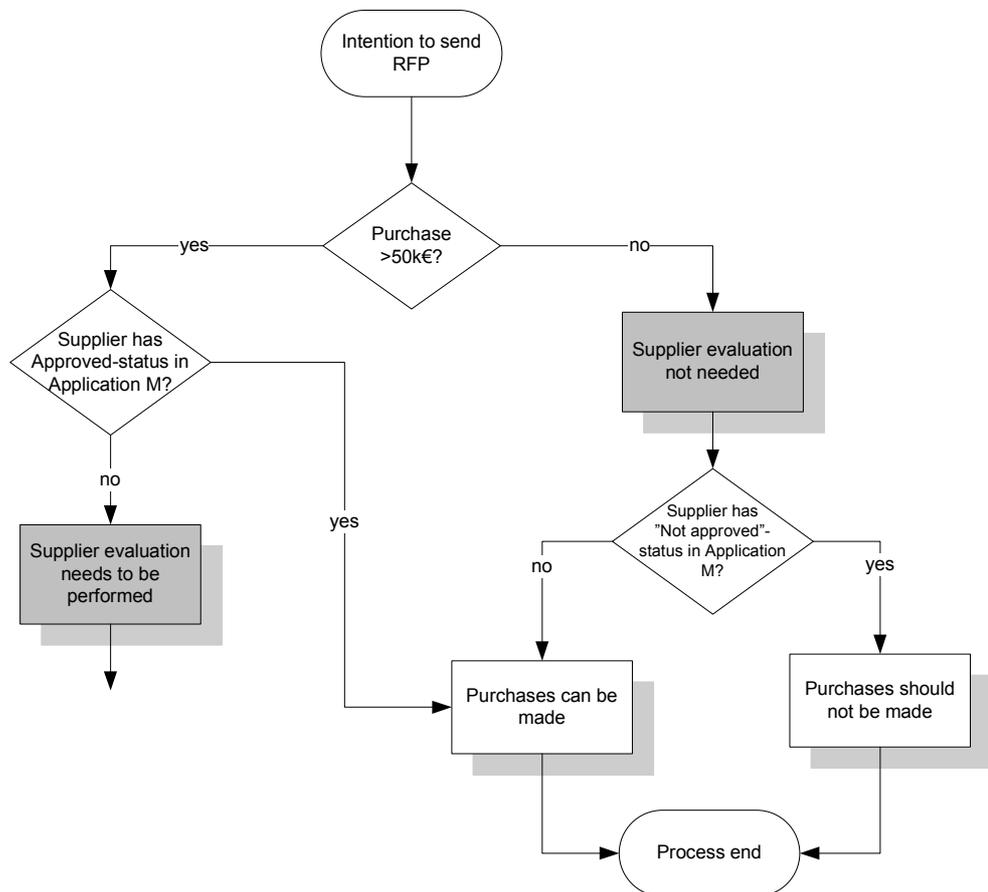
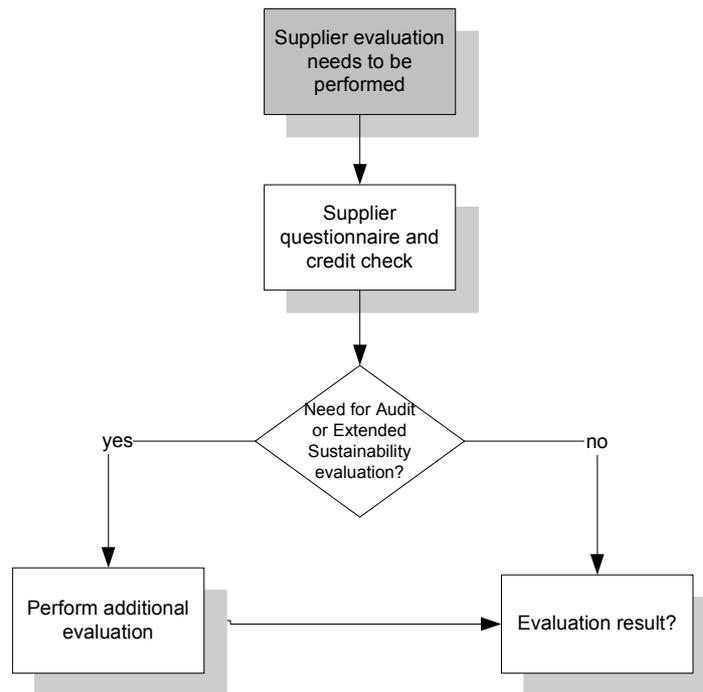


Figure 19 The first step (Decide if pre-selection needed) of the pre-selection process

There should also be a set limit for the validity of pre-selection results to ensure that re-evaluation is performed regularly. A decision was made in the supplier management project team of the case company that three years' validity time would be suitable for the company.

#### **4.2.2 Pre-selection methods and criteria**

According to the literature, the internal interviews and the benchmark study, the best tools for supplier pre-selection are financial analysis, supplier questionnaire, and audit. In the case company a decision was made that the *financial analysis* (i.e. credit check) and *supplier questionnaire* will be mandatory methods that are always used in pre-selection, and *audit* and an *extended sustainability evaluation* will be performed if necessary based on the results of the first two methods (Figure 20). The extended sustainability evaluation refers to a thorough sustainability assessment that should be conducted if there are any unsatisfying answers in the supplier questionnaire. The purchaser is responsible for estimating the need for additional evaluation.



**Figure 20** The second and the third step (Decide how to perform pre-selection, Perform pre-selection) of the pre-selection process

#### 4.2.2.1 Supplier questionnaire and financial analysis

In the course of this study, a *supplier questionnaire* (Appendix 13) was created for the case company by combining the aspects of the literature (Table 3), the existing questionnaires of the case company, and the suggestions received from the internal experts. The questionnaire consists of two sections: general information and sustainability. The first section gathers basic information: locations, shareholders, financials, references, insurances etc., and the second section concentrates on the suppliers' sustainability<sup>10</sup> because it is an important focus area in the case company. The questionnaire presented in the Appendix 13 covers most of the independent criteria presented in the Table 2. It will require improving though. For example at the

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<sup>10</sup> Sustainability refers to business principles and labor standards in addition to EHSQ-issues

moment it does not include any questions about technology, i.e. manufacturing capabilities and operational control. The next step would be to take those issues into consideration as well because a more extensive evaluation would increase the reliability of the pre-selection results. When developing the next version of the questionnaire, the questionnaires of the benchmark companies can be used as examples. The benchmark companies could be used as examples also when developing a scoring and weighting system for the questionnaire.

*Financial analysis* should be received from a third-party providing commercial information to avoid subjectivity and extra work for purchasers. The analysis should contain the most important financial ratios (see Table 4) and information about creditworthiness. The analysis together with the financial questions in the supplier questionnaire should reveal if a supplier can be regarded as a high risk supplier.

#### **4.2.2.2 Audit**

Audits have been carried out very informally in the case company and hence it is recommended that instructions for actions needed before, during, and after an audit are formulated. The important issues to consider before and during an audit found from the literature are listed in Appendix 1. To ensure non-bias in comparison of audit results, there should also be an instruction or template for writing an audit report.

The case company faces a few challenges in relation to the audits, e.g. lack of resources and culture for performing audits. Therefore it would be very important to establish some formal procedures and arrange training. In addition, the practice of having trained auditors conducting all audits would suit the case company. Having two or three of them in every unit should be sufficient.

The supplier management project team of the case company decided that audits should be performed if they are perceived necessary by the purchaser. However, that instruction increases subjectivity in the process so perhaps a volume limit could be

used as a condition for audits as well. For example, if the volume of a purchase exceeds 500 000 euros the potential suppliers need to be audited. Because the resources for performing audits are rather limited in the case company, the volume limit should not be much smaller than that. Another option is to name the areas that are perceived riskier than others, for example that all Asian or East European suppliers need auditing. Of course, if a segmentation system based on the suppliers' risk and the strategic impact is developed in the future, then it could be stated that all suppliers of a certain segment need to be audited.

It is important to have some common audit tools to be able to harmonize procedures and increase comparability of audit results both between the suppliers and between the previous results of one supplier. For example a general question list to be used during the audits should be developed, similar to the one presented in Appendix 2. In addition to the general question list, there should also be question lists for the suppliers of specific commodity areas, e.g. a question list for cable suppliers. These commodity specific questions would promote harmonization of the whole audit procedure in the respective commodity area. Furthermore, there should be some instructions for how to weight and score the questions. A scoring system of 1 to 5 may be feasible because five options bring out the differences between the suppliers but there aren't too many options for the auditor to choose from. To be able to weight the questions, they should be divided into two categories: the essential questions that are weighted with coefficient 2 and other questions that are weighted with coefficient 1. Based on the weighted scores the suppliers would be divided into categories (cf. cluster analysis in subchapter 2.2.3.3). To be able to define where to draw the limit between the categories, it is important to perform benchmark audits. In other words, visit the suppliers that are not perceived critical and would not otherwise be audited.

### 4.2.2.3 Pre-selection results

Setting any strict criteria for supplier pre-selection is very difficult in the beginning of the development of the supplier evaluation system because there is very little information available about the suppliers. Therefore, it is recommended that the company begins with setting only three criteria: the financial condition of the supplier is in order, the supplier does not have any unpaid taxes, and there are no major deficiencies in sustainability issues. Other issues can be evaluated with case-by-case considerations. Later on, when there is more information available about the suppliers, other criteria can be set as well. Based on the criteria, the evaluated suppliers are either approved or not approved. They are given a status that is recorded in Application M where also all the evaluation material is stored (Figure 21).

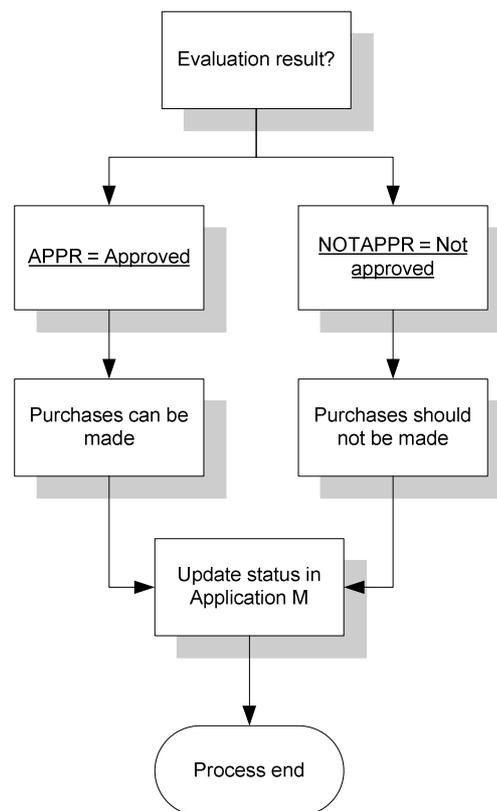


Figure 21 The fourth step (Register results in Application M) of the supplier pre-selection process

### **4.2.3 Supplier database and other IT applications**

Finding a feasible and practical solution for storing the supplier pre-selection data is vital for ensuring that the benefits of a harmonized system are realized. It is very important that everyone knows how to use the system and has the access to necessary information. For the case company, Application M is the most recommendable of the ones available. It already contains many of the needed components, e.g. supplier information, it enables reporting, and it is chosen as the formal purchasing platform for the whole company so even though it is not yet implemented in the whole company, in the future it will be. Naturally, a few modifications are needed. As mentioned, the suppliers are either approved or not approved after pre-selection and hence there should be a place for a respective status that indicates the result. Application M should also have a place where the purchasers could explain what type of evaluation they performed and what the results were.

Furthermore, there should be some clear guidelines for utilizing Application M to avoid any misunderstanding regarding how, where, and what type of data to enter in the application. If the information is mislocated, it ceases to be available for others and the benefits of a common supplier evaluation system will be lost. For the moment it is recommended that all the pre-selection information is stored in Application M but it would be sensible to start looking for another application to support archiving of the material. Application M is not originally designed to be a data storage. Furthermore, a proper tool for archiving would contribute towards combining supplier database and contract archives.

Application P that was mentioned in the subchapter 3.2.6 should be utilized to facilitate sending the supplier questionnaire. The questionnaire can be transferred as such to the application. Thus, only a link to the website of the application needs to be sent to the suppliers, who can then fill in the questionnaire online, after which the

answers can be exported to a file and analyzed. As a conclusion, Application P speeds up the process and facilitates data processing.

#### **4.2.4 Summary and key suggestions**

All in all, it is very challenging to develop reliable and systematic supplier pre-selection tools and criteria. Especially in a large multi-national company the various needs and different types of suppliers pose challenges. It is difficult to develop e.g. a supplier questionnaire that contains all necessary issues but nothing too specific. Furthermore, it is complicated to develop a reliable scoring and weighting system because the same weights may not be applicable to all units and all suppliers. Also, it is important to consider that there may be some issues that are non-compensatory. In other words, good scores in other questions cannot compensate poor scores in non-compensatory questions.

Nevertheless, the following recommendations regarding pre-selection are given to the case company (Table 28).

**Table 28 Summary of recommendations related to supplier pre-selection**

	<b>Recommendations for supplier pre-selection</b>
Responsibility	Respective purchaser responsible for pre-selection
Conditions	<ul style="list-style-type: none"> <li>- Purchase volume over 50 000 euros</li> <li>- No previous pre-selection result valid</li> </ul>
Validity of results	- 3 years
Methods	<ul style="list-style-type: none"> <li>- Financial analysis</li> <li>- Supplier questionnaire               <ul style="list-style-type: none"> <li>- Questions related to manufacturing capabilities and operational control to be added</li> <li>- Scoring and weighting of questionnaire</li> </ul> </li> <li>- Audit               <ul style="list-style-type: none"> <li>- Guidelines for actions needed before, during, and after audit</li> <li>- Template for audit report</li> <li>- Trained auditors</li> <li>- Clear conditions for performing audits</li> <li>- General and specific audit question lists</li> <li>- Scoring and weighting of question lists</li> <li>- Benchmark audits</li> </ul> </li> <li>- Extended sustainability evaluation</li> </ul>
Approval criteria	<ul style="list-style-type: none"> <li>- Financial condition, tax debts, sustainability aspects in order</li> <li>- Later on other more specific criteria need to be developed</li> </ul>
IT	<ul style="list-style-type: none"> <li>- Evaluation results and material stored in Application M               <ul style="list-style-type: none"> <li>- Guidelines needed</li> <li>- New archiving application needed</li> </ul> </li> <li>- Sending Supplier questionnaire electronically through Application P</li> </ul>

### **4.3 Organizing supplier performance measurement**

Currently supplier performance measurement is clearly organized in a more informal manner than supplier pre-selection, in both benchmark companies and the case company. According to the benchmark interviews, only a framework and common metrics are given to the units and the units are fairly free to decide how to execute the measurement. This may be a good way to start in the case company as well because of the differing needs and dispersed nature of the organization.

Unit B.1 has created a good basis for performance measurement that could be the framework in the whole company, at least to the appropriate extent. Using the process

description of unit B.1 as a model, a performance measurement activity flowchart is developed for the case company (Appendix 14).

#### **4.3.1 Conditions for performing supplier performance measurement**

Again the best practice would be to segment the suppliers based on their criticality and measure the performance of the most critical ones but until the instructions for the segmentation are developed, the ABC-analysis of the suppliers would be a very feasible option to be used in the case company. Because the purchasing volumes vary between the units, it is sensible that the ABC-analysis is performed separately in every unit. With the help of the analysis, the units would be able to differentiate the important suppliers from the less important ones. However, ABC-analysis should not be the final solution as it takes only the volume and the invoice amount into account. It should be developed further because for example it doesn't take the aspect of supply market risk into consideration. Furthermore, the suppliers that qualify as large, ABC-suppliers are only a small minority of the whole supplier base. For example small bottleneck suppliers that provide critical spare parts are completely excluded from the performance measurement system. Thus, the next step would be that every time the ABC-analyses are conducted, the purchasing managers would go through the whole supplier list of the unit and make sure that also smaller important suppliers are placed in one of the ABC-classes and involved in the measurements.

#### **4.3.2 Performance measurement methods and criteria**

On the basis of the ABC-analysis it is sensible to create a similar measurement system as currently in unit B.1 (Figure 22). In other words, performance would be followed up with invoice checks, internal scorecards, and feedback meetings. The invoice checks refer to making sure that the invoices are congruent with the respective contracts. The internal scorecards are templates that include questions about supplier performance, e.g. delivery reliability and quality, and they are filled in by the

employees if the buying company. In the feedback meetings the buying company can give feedback to the suppliers and also receive it.

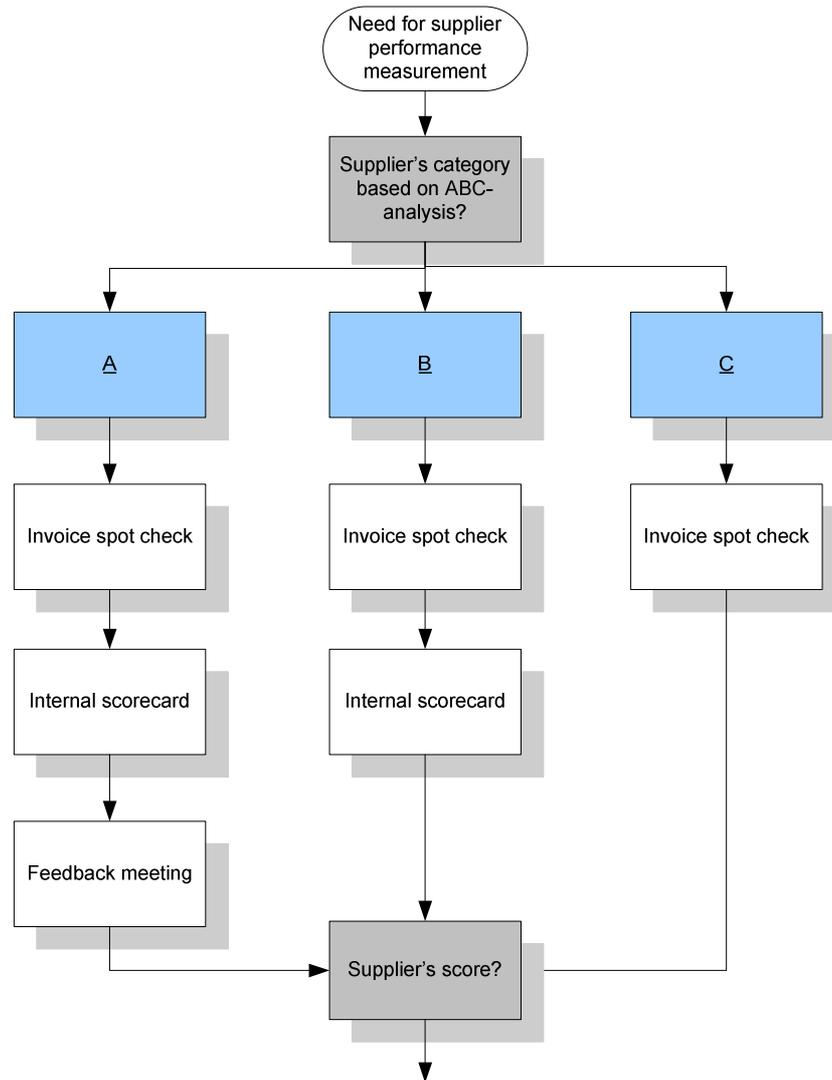


Figure 22 Supplier performance measurement system in the case company

However, there should also be some mathematical metrics in use. A good starting point would be to measure at least delivery reliability and quality. In fact, based on the internal and benchmark interviews the delivery accuracy, the quality of deliveries, the

cooperativeness, and the financial situation of the suppliers are the most important issues to follow-up continuously.

Firstly, after Application M is fully implemented, it is fairly easy to measure *delivery accuracy and quality*. Reception of every delivery is recorded in the application after which reports on differences between the planned and the actual delivery dates can be run. Moreover, it should be mandatory for the person receiving the goods to record the quality level of the delivery in the application. There could for example be options from 1 to 5, 5 signifying excellent quality and 1 poor quality. However, Application M cannot be utilized yet in the whole company and until it can, delivery accuracy and quality could be measured subjectively with a scorecard by asking the purchasers' opinion. The internal scorecard should of course include other questions as well, for example about level of *cooperation, flexibility, and skills* (see e.g. Appendix 3). Alike the supplier questionnaire and audit questionnaire, also the scorecard needs to be weighted and scored, and a limit for acceptable performance needs to be set.

Updated reports of the *financial situation* of a supplier are easily accessible. For example Suomen Asiakastieto, a third-party commercial information provider, offers a service that automatically sends a report if changes in the financial situation of a company take place. As the case company is already a customer of Asiakastieto, adopting this service is very easy.

For gathering information about miscellaneous deficiencies regarding suppliers the case company should use the idea and deviation reporting application that was presented in the subchapter 3.2.6. It could easily be introduced as a system for reporting supplier deficiencies, especially in the production plants where the system is already in regular use. However, it is not a means to prevent problems but a fast way to detect them and start actions to correct them. It could also be utilized for creating statistics about the most typical deficiencies or about the suppliers causing most problems.

As a result of performance measurement, the suppliers should receive a status that indicates their performance level (Figure 23). A satisfying score leads to an “Approved”-status and as a result of a low score the supplier will be put “Under observation”. “Under observation” implicates that corrective actions and a development plan are required from the supplier. If the supplier fails to improve its performance, it will be disqualified and further orders will be suspended.

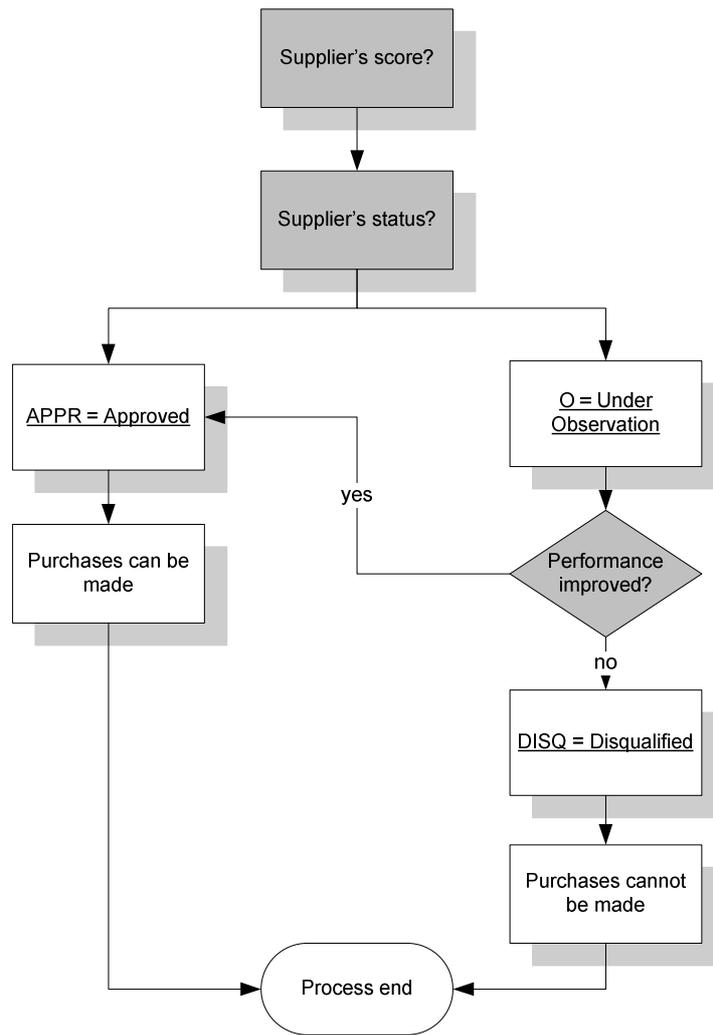


Figure 23 Results of supplier performance measurement

### 4.3.3 Summary and key suggestions

The following Table 29 summarizes the recommendations related to supplier performance measurement.

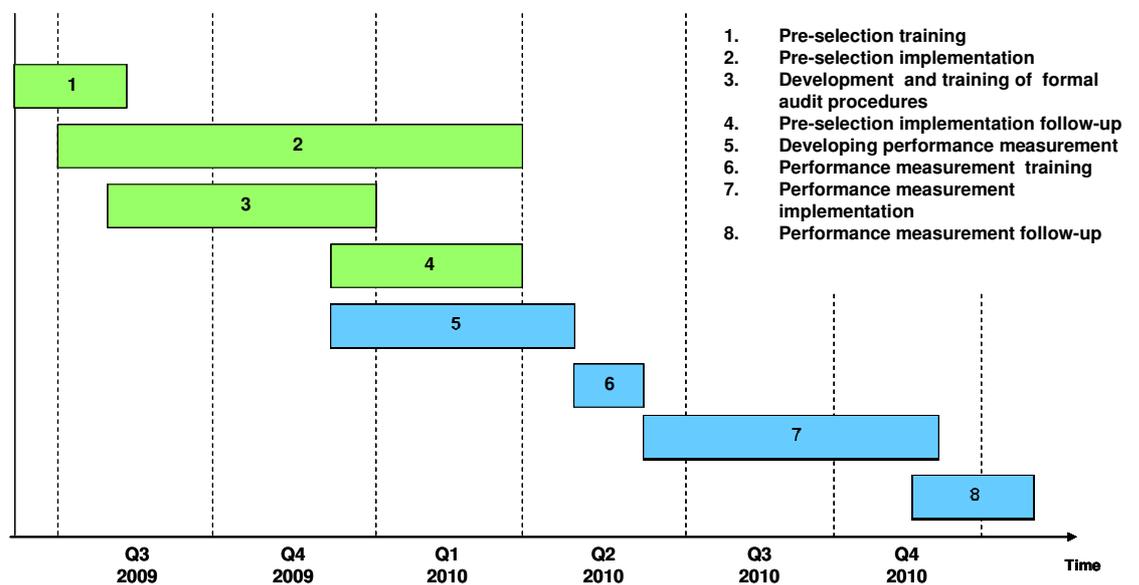
**Table 29 Summary of recommendations related to supplier performance measurement**

	<b>Recommendations for supplier performance measurement</b>
Principle	- Framework given, units fairly free to choose how to apply it in practice - System of unit B.1 good basis
Conditions	- ABC-analysis
Methods	- Invoice spot checks - Internal scorecard - Feedback meetings
Metrics	- Delivery reliability - Quality of deliveries - Responsiveness - Supplier's financial situation
IT	- Application M used to acquire statistics about delivery reliability and quality - Financial information from Suomen Asiakastieto - Information about miscellaneous deficiencies from Idea and deviation reporting application

### ***4.4 Implementation of the supplier evaluation system in the case company***

This thesis was one part of the development project of supplier management in the case company. The supplier management project team started its work already prior to this study, by working on supplier related sustainability issues. As a common effort, the first versions of the process, tools, and evaluation principles were created for supplier pre-selection during spring 2009. Also a guideline for pre-selection was written to clarify the execution of the process to the purchasers. At the end of June 2009 pre-selection training sessions were held for the purchasers in the Nordic countries and the launch of the system was planned to take place gradually during summer and fall 2009 (Figure 24). However, guidelines and procedures for auditing were not specified even though audits are an important part of pre-selection. Therefore the development work

for them was scheduled to take place during summer and fall 2009. After the launch of pre-selection, the actual implementation will take several months because the case company is geographically and organizationally dispersed, and it will take time before the system has penetrated all the subunits. The implementation is a long process and certainly cannot be covered with only a few training sessions. Instead, it is important to visit the subunits, revise why supplier pre-selection is important, and discuss how the purchasers should take the distinctions of the particular unit into account during the process.



**Figure 24 Implementation of supplier pre-selection and performance measurement in the Nordic countries**

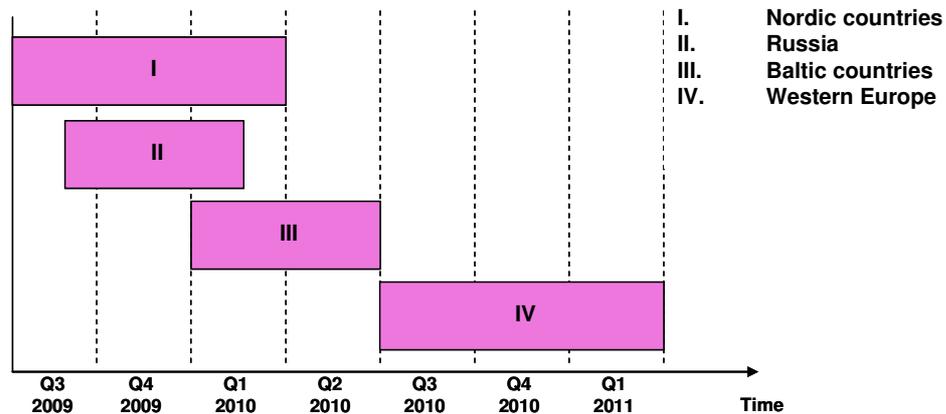
The first follow-up of the pre-selection implementation should take place at the end of 2009 and it should be organized centrally by corporate purchasing to ensure that all units are properly followed up. It is suggested that the follow-up is conducted with purchase spot checks, i.e. choosing a few purchasing cases from each unit and finding out whether supplier pre-selection was conducted. Of course checks need to be performed continuously, and in the future they should be the responsibility of the purchasing managers. Basically there are two ways to follow-up the utilization rate of

supplier pre-selection: purchase spot checks and reports from Application M where the pre-selection data should be stored. The purchase spot checks are the best option in the beginning because Application M is not in use in all units. However, later on it is more practical to follow-up statistics received from the application.

The project team of the case company made the decision that implementation of pre-selection and performance measurement should take place in stages so that pre-selection is developed and implemented first. Thus, developing a performance measurement system for the case company should begin sometime after the implementation of supplier pre-selection has started (see Figure 24).

Similarly, because the case company operates in several countries it is sensible to follow through the implementation of supplier pre-selection (and later supplier performance measurement) one block of countries at a time so that all that is learned in the previous implementations can be utilized in the next ones. Figure 25 is an illustration how pre-selection could be implemented in the whole company.

After the implementation has begun in the Nordic countries it should soon after begin in Russia, where the management has decided to implement both supplier pre-selection and performance measurement with some minor modifications in a short time scale. Next would be the Baltic countries where mainly unit A has operations. Of all the units, unit A has been the most interested in developing supplier management, also in their overseas locations. Last, the implementation should take place in the small units in the Western Europe.



**Figure 25 Implementation of supplier pre-selection in the whole case company**

Communication, motivation, and functionality of IT will be the keys to success. Naturally, the employees of the case company need to be informed why, when, and how they need to conduct evaluations but also the suppliers should be aware that an evaluation system has been implemented. They could be informed informally by the purchasers but arranging a formal “supplier day” where the suppliers could ask some questions may be sensible.

Finally, to avoid the supplier evaluation system becoming passivated after the implementation, clear division of responsibilities is needed. A good option would be to have a supplier manager who would be the main responsible instead of the purchasing managers. The supplier manager would own the process, control the system and develop it further. In the long run, it is better to have one person managing the system as opposed to assigning the responsibility to the purchasing managers who already have many other duties. Also it is recommendable to allocate administrative tasks related to supplier evaluations to the assistants or other administrative personnel to relieve the purchasers for more value-adding work.

#### ***4.5 Generalizability and limitations of the study***

This thesis developed the basis for a supplier evaluation system to be used in the case company. Therefore, all the recommendations given in this chapter may not be generalizable for other companies. Nevertheless, the supplier management framework, its relationship with the purchasing process, and the best-practices discovered from the literature and the empirical study are universal and can be utilized elsewhere as well.

The study has a few limitations. Firstly, the empirical data was mainly collected with the interviews, so the interviewer or the interview questions may have created a bias. In addition, it wasn't possible to interview people from all the units of the company due to scheduling problems. On the other hand, the results of the literature review, internal interviews, and benchmark interviews are very similar so the reliability of the results must be on a high level. Furthermore, the rather tight schedule of supplier pre-selection implementation which had to begin already before the finalization of this thesis caused a few challenges.

#### ***4.6 Further research agenda***

In the limits of this thesis, a benchmark study of only two interviews was performed. It could be relevant to discover further what kinds of procedures other companies have. Hence, an extensive benchmark study of e.g. other large multi-divisional companies could be a subject for further study.

The scope of this study included supplier pre-selection and performance measurement. Next, supplier management procedures related to supplier selection or relationship management could be studied, either on a general level or from the perspective of the case company. A research about the aspects of supplier development would be essential to the case company if it wishes to increment on the levels of supplier management maturity.

From the researcher's point of view a follow-up research regarding the success of the implementation of the evaluation system would be interesting. That study would facilitate future implementations of similar systems because it would reveal the biggest challenges and obstacles.

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# Appendices

## Appendix 1: Supplier visit checklist

- Notify potential suppliers beforehand about documentation that is needed during the audit (Handfield, 2006: 224)
- Arrange an *initial orientation meeting* (Burt et al., 2003: 358)
  - Attendants: sourcing team and the counterparts of the potential supplier
  - Buying company: Provide general information of your company and your interests
  - Potential supplier: Provide additional information about company history, customers, sales, and financial condition
- If you are satisfied with the orientation meeting, arrange a *tour at the facility* (Burt et al., 2003: 358)
  - Observe the *environment* (Iloranta et al., 2008: 484)
    - Logistic connections
    - General facilities, capacity, and potential
    - Nearby knowledge and technology centers
  - Observe issues related to *sustainability*
    - Safety (Iloranta et al., 2008: 484),
    - Quality (Handfield, 2006: 216), e.g. how are rules related to ISO9000 realized
    - Environment (Handfield, 2006: 217), e.g. recycling and pollution
  - Observe employees' *attitudes* (Burt et al., 2003: 358)
    - Do employees seem to work harmoniously with each other and their supervisors?
    - Are they interested in quality and production development issues?
  - If possible, ask the *workers about their opinions* about working conditions, quality, tools etc. (Burt et al., 2003: 358)
  - Make sure plant *equipment* is modern and in good operating condition (Iloranta et al., 2008: 484)
    - Condition, age, technology
    - Level of automation
    - Maintenance plans
  - Observe the *housekeeping* because good housekeeping is a sign of efficiency (Burt et al., 2003: 358)
    - Are tools, machines etc. clean and well-organized?
    - Are tools, equipment etc. well-accessible?
  - Observe production *methods and efficiencies* (Burt et al., 2003: 358)
    - Is JIT utilized?

- Is material moving freely from storage to production?
- Are there bottlenecks, is there reserve capacity available?
- Are scheduling and control well-organized? Is MRP/ERP in use?
- Quantity of back orders? (Dobler et al., 1996: 243)

## Appendix 2: Rapid plant assessment questionnaire

No	Assessment Questionnaire	Yes/No
1	Are visitors welcomed and given information about plant layout, workforce, customers, and products?	
2	Are ratings for customer satisfaction and product quality displayed?	
3	Is the facility safe, clean, orderly, and well lit? Is the air quality good and noise levels low?	
4	Does a visual labeling system identify and locate inventory, tools, processes, and flow?	
5	Does everything have its own place, and is everything stored in its place?	
6	Are up-to-date operational goals and performance measures for those goals prominently posted?	
7	Are production materials brought to and stored at line side rather than in separate inventory storage areas?	
8	Are work instructions and product quality specifications visible at all work areas?	
9	Are updated charts on productivity, quality, safety, and problem solving visible for all teams?	
10	Can the current state of the operation be viewed from a central control room, on a status board, or on a CRT?	
11	Are production lines scheduled off a single pacing process with appropriate inventory levels at each stage?	
12	Is material moved only once as short a distance as possible and in appropriate containers?	
13	Is the plant laid out in continuous product flow lines rather than in "shops"?	
14	Are work teams trained, empowered, and involved in problem solving and ongoing improvements?	
15	Do employees appear committed to continuous improvement?	
16	Is a timetable posted for equipment preventive maintenance and continuous improvement of tools and processes?	
17	Is there an effective project management process, with cost and timing goals, for new product start-ups?	
18	Is a supplier certification process--with measures for quality, delivery, and cost performance--displayed?	
19	Have key product characteristics been identified and fail-safe methods used to forestall propagation of defects?	
20	Would you buy the products this operation produces?	
	<b>Total number of Yeses</b>	

### Appendix 3: Supplier scorecard of Capital One

Category	Include	Weight	Metrics	Rating			Comments	Category Weight
				Below Expectations	Meet Expectations	Above Expectations		
<b>Technology</b> The features and usability of the product or process that results in increased effectiveness for Capital One	<input type="checkbox"/>		Management commitment to continuous innovation	○	○	○	○	□
	<input type="checkbox"/>		Effective technology infrastructure	○	○	○	○	
	<input type="checkbox"/>		Technical demands met in timely manner	○	○	○	○	
<b>Quality</b> The adherence to agreed-upon standards of the product or process	<input type="checkbox"/>		Takes ownership of quality problems	○	○	○	○	□
	<input type="checkbox"/>		Ensures consistent quality throughout processes	○	○	○	○	
	<input type="checkbox"/>		Continuously improves process performance; proactively suggests/initiates process improvements	○	○	○	○	
<b>Support</b> The ability to support the product or service such that it increases the effectiveness of Capital One's ability to service its customers	<input type="checkbox"/>		On-time service dependability; commitment, timely services, and responsive support	○	○	○	○	□
	<input type="checkbox"/>		Informs parties of process changes/potential problems	○	○	○	○	
	<input type="checkbox"/>		Responds to, owns, and resolves problems in a timely manner	○	○	○	○	
<b>Delivery</b> The delivery or manufacturing of products or services within expected delivery window	<input type="checkbox"/>		Informs other party of potential problems promptly	○	○	○	○	□
	<input type="checkbox"/>		Adherence to forecasts	○	○	○	○	
	<input type="checkbox"/>		Demonstrates flexibility/meets special requirements	○	○	○	○	
<b>Business</b> The compatibility of the two company's operating cultures	<input type="checkbox"/>		Commitment to long-term stability and success	○	○	○	○	□
	<input type="checkbox"/>		Has long-term financial growth potential	○	○	○	○	
	<input type="checkbox"/>		Conducts business in a highly ethical manner	○	○	○	○	
<b>Economics</b> The monetized value of the relationship to Capital One and the supplier	<input type="checkbox"/>		Shares cost breakdowns/market data	○	○	○	○	□
	<input type="checkbox"/>		Frequency/value of cost reductions; commitment to fair pricing/cost reductions	○	○	○	○	
	<input type="checkbox"/>		Effective, accurate, and efficient billing process	○	○	○	○	
	<input type="checkbox"/>		_____	○	○	○	○	

## Appendix 4: Supplier scoring model of BNSF

	Attribute	Measurement	Scoring			
			5	3	1	0
Affordability	Cost Trends	Percent Variance Compared to Prior Year (Rolling 12 Months)	> 5% Decrease	1-5% Decrease	+/-1%	> 1% Increase
	Price Competitiveness	Ranking of Like Suppliers	> 5% Below Market	3-5% Below Market	+/-3%	> 3% Above Market
Delivery	Undue Rush Shipments	Defects per Million (DPM)	< 25	< 100	< 500	< 500
	Line Item Fulfillment	Percent Fulfilled	> 98%	95-98%	90-94%	< 90%
	Compliance to Route Guide	Defects per Million (DPM)	< 25	< 100	< 500	< 500
	Order to Ship	Average Number of Days Order to Ship by Supplier	< 1	> 7	> 30	> 30
	Packaging Quality	Defects per Million (DPM)	< 25	< 100	< 500	< 500
	Labeling	Defects per Million (DPM)	< 25	< 100	< 500	< 500
	Duplicate Shipments	Defects per Million (DPM)	< 25	< 100	< 500	< 500
Ease of Doing Business	Electronic Purchase Orders	Percent Electronic	100%	75%	50%	< 50%
	Electronic Invoice	Percent Electronic	100%	75%	50%	< 50%
	Invoice Accuracy	Percentage of Error-Free Invoices	> 98%	95-97%	90-94%	< 90%
	Electronic Acknowledgment	Percent Electronic	100%	75%	50%	< 50%
	Electronic Payment	Percent Electronic	100%	75%	50%	< 50%
Quality	Number of Quality Issues	Number of Quality Issues	No Issues	One Issue	Two Issues	Three or More Issues
	Severity of Quality/Warranty Issues (Detection Point)	Sum of Severity Ratings for Each Issue/Total Number of Issues	No Issues	Supplier Notification	Incoming Quality/Receiving Inspection	In Shop/In Field
	Impact of Quality/Warranty Issues (BNSF Required Response)	Sum of Impact Ratings for Each Issue/Total Number of Issues	No Response	Field Notification—Sort	Field Notification—Scheduled Removal	Field Notification—Unscheduled Removal
	Percent Accepted Warranty Claims	(Number of Accepted Warranty Claims/Total Number of Warranty Claims Submitted) x 100	> 95%	80% < x < 94%	65% < x < 79%	< 64%
	Response Time to Warranty Claims	Time	Within 30 Days	Within 50 Days	Within 70 Days	> 70 Days

## Appendix 5: Cross-functional supplier evaluation

<b>Response Rating</b> 1—Unacceptable 2—Needs Improvement 3—Meets expectations 4—Exceeds expectations	<b>Function Code</b> Purch—Purchasing Engr—Engineering SQA—Supplier Quality Assurance Mat—Materials Accts Pay—Accounts Payable				
1. Are communications generally clear and timely?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4	Mat 1 2 3 4	
2. How well does the company involve suppliers in decisions or changes that affect supplier's ability to meet changes or commitments?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4	Mat 1 2 3 4	
3. How well are quality standards and delivery requirements communicated?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4	Mat 1 2 3 4	
4. Does the company provide adequate lead-time for scheduling material deliveries, and are schedules updated frequently enough?	Mat 1 2 3 4				
5. Do we pay your invoices per agreed-upon payment terms?	Accts Pay 1 2 3 4				
6. How well does the company communicate and involve suppliers to resolve quality issues?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4		
7. How well does the company communicate and involve suppliers on design changes?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4		
8. What is your overall rating of the following functions within the company?	Purch 1 2 3 4	Engr 1 2 3 4	SQA 1 2 3 4	Accts Pay 1 2 3 4	Mat 1 2 3 4
9. How does your partnership with the company overall compare with your relationships with your other customers?	1 2 3 4				
10. What changes could the company make that would enhance our partnership?					

**Appendix 6: Schedule of the internal interviews**

<b>Interviewee</b>	<b>Date</b>
Purchasing manager A	2.2.2009
PM B.1	5.2.2009
PM C	5.2.2009
PM D	6.2.2009
PM E	10.2.2009
PM E.1	11.2.2009
PM G	12.2.2009
PM H	13.2.2009
PM I	4.3.2009
PM J	12.3.2009

## Appendix 7: Questions of the internal interviews

### Approving a new supplier: How is it done before selection?

- PROCESS:
  - Which steps does your supplier pre-selection process contain at the moment?
  - Do you have different types of processes/ policies inside your business unit?
  - How often is a supplier re-evaluated after it has been accepted for the first time?
- SUPPLIERS:
  - What are the criteria a supplier has to fulfill?
  - Which suppliers are taken into evaluation (based on volume, importance of purchase, agreement etc.)?
  - Are all frame agreement suppliers evaluated?
  - Is the supplier selected first or approved first?
  - What type of status (approved, on hold etc.) can a supplier have and what kind of actions do they call for?
- EVALUATION METHODS:
  - Which evaluation methods are in use (questionnaire, audit, review of finances etc.)?
  - Are the same methods used for every supplier?
  - Are you familiar with Application S? Do you think it is a good tool for evaluation?
  - Is a separate risk assessment made? Is there a format for that? (based on country risk, currency risk, financial information, supply risk etc.)
- EVALUATOR:
  - Who makes the evaluations? Can the same person evaluate all the suppliers regardless of the volume etc.?
- Is there a register of the accepted suppliers? If yes, in which application and what data does it contain?
- How well does the model really work in real life?
- If there isn't any formal pre-selection system, is there any control procedures in place before selecting the supplier?

### Continuous performance measurement and follow-up

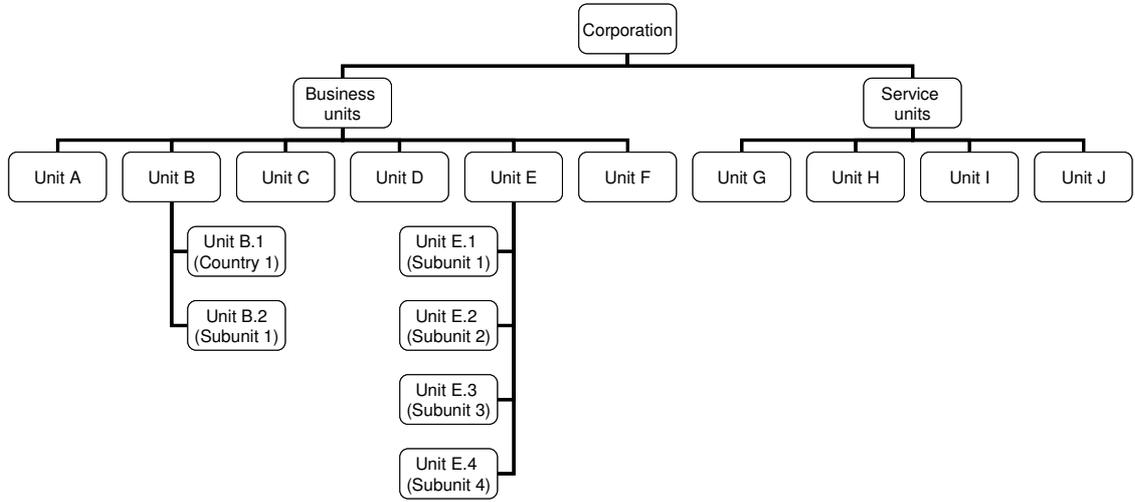
- SUPPLIERS:
  - Which suppliers are selected for continuous performance measurement (based on volume, amount of yearly deliveries etc.)?
  - What are the consequences of poor measurement result? Is the supplier put on hold? How are the improvements followed-up?

- PROCESS
  - What are the process steps?
  - Are the measurements made annually or continuously?
  - Who keeps track that the measurements are actually made annually/every 2 years etc.?
  - How long is the measurement valid?
- METHODS:
  - What types of performance measurement methods are used, are the same methods used for all suppliers?
- EVALUATOR:
  - Who performs the measurements; do the same people evaluate all the suppliers?
- Is there a register for the measurement results? Is it the same register as for pre-selection results?
- Are there any proactive supplier development initiatives/training etc. going on? If not, what type of initiatives should there be?

#### Future state of evaluations and supplier management in general

- Do the current systems work, what could be improved?
- Is there a specific type of system that would not work in your unit?
- What do you think is the best way of managing suppliers?
- What are the major problems you have with suppliers? Could these problems be prevented with evaluations?
- How much freedom should BU's have when deciding about evaluations, should everyone have own database, questionnaires etc.?
- Why should evaluations be made? What is the added value of supplier evaluations?

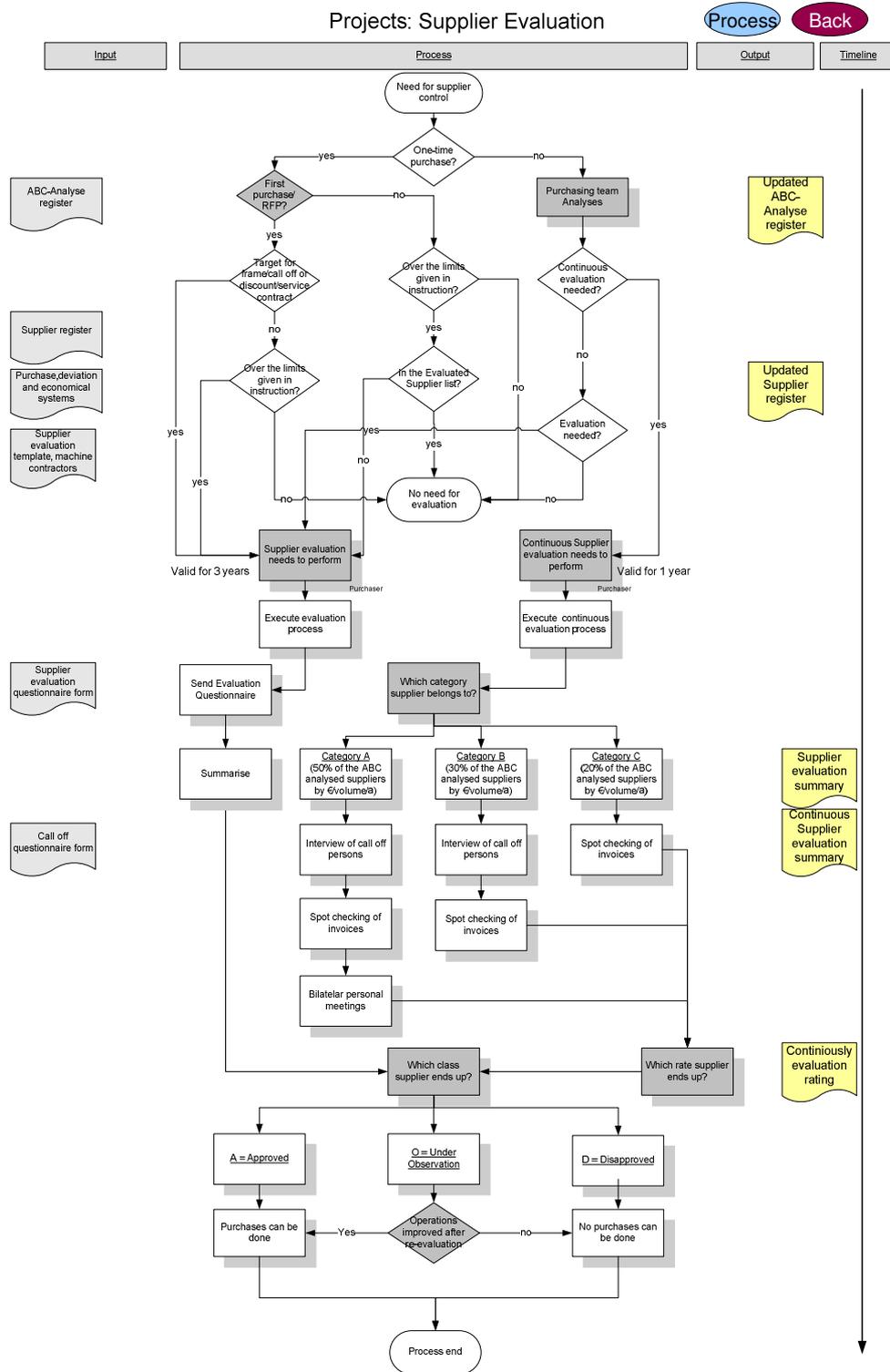
## Appendix 8: Organizational structure of the case company



## Appendix 9: Benchmark companies

	Company X	Company Y
<b>Date of benchmark</b>	30.4.2009	16.6.2009
<b>Revenue / % of purchases of revenue</b>	2,0 Mrd € / ~65 %	1,7 Mrd € / ~70 %
<b>Number of employees</b>	~10 000	~11 000
<b>Number of countries where operating</b>	~40	~100
<b>Number of suppliers</b>	~30 000	~30 000
<b>Organization type</b>	Matrix (material clusters and area units)	Matrix (business units and country units)
<b>Start of supplier management system</b>	2008	End of 1990's

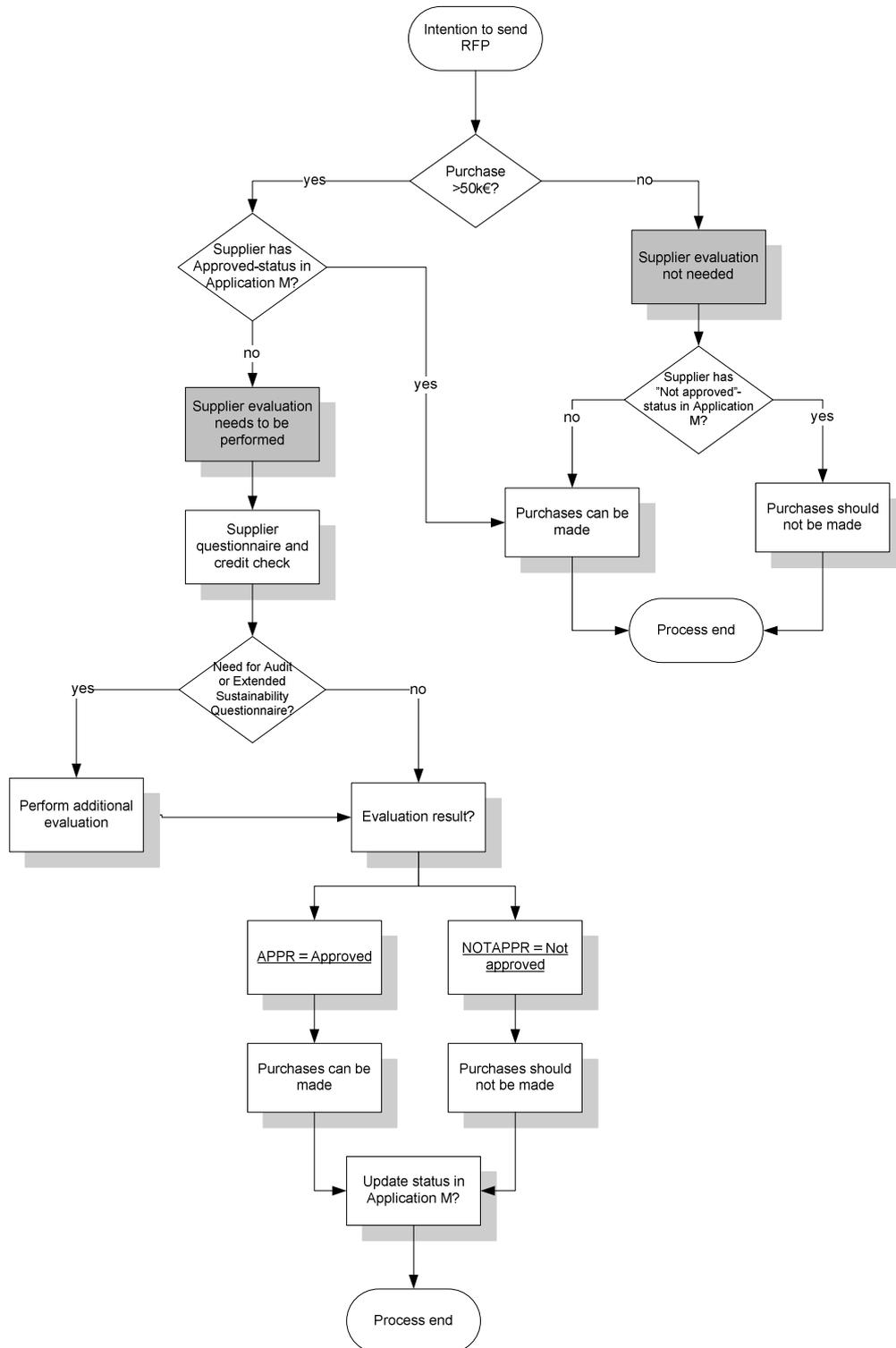
# Appendix 10: Supplier evaluation process of unit B.1



**Appendix 11: Contents of the supplier questionnaires of the benchmark companies**

	Company X	Company Y
Financial issues	x	x
EHSQ-issues	x	x
Human resources (employees)	x	x
Subsidiaries		x
Shareholders		x
Main sub-suppliers		x
Main customers		x
Main products		x
Existing sales with the customer		x
Performance improvement	x	x
Insurances		x
Product design procedures		x
Production equipment	x	
Production processes	x	
Raw materials	x	
Operation excellence (e.g. controlling, tracing)		x
Cost control		x

## Appendix 12: Suggested supplier pre-selection flowchart



**Appendix 13: Suggested supplier questionnaire**

GENERAL INFORMATION				
<b>1. Basic information</b>				
<b>1.1 Supplier contact information</b>				
Date:				
Official name of Company:				
VAT number / Company register number:				
Address:				
Contact name:				
Position / Title:				
Telephone number:				
E-mail:				
Name of person responsible for sustainability:				
E-mail:				
Telephone number:				
<b>1.2 Company and personnel</b>				
Name of mother company (if applicable):				
Subsidiaries:				
Main shareholders:				
Number of employees:				
<b>1.3 Describe your main facilities, their locations, and types of activity. Start with facility related to this procurement: (Also all locations outside EU shall be mentioned)</b>				
City, Country	Manuf. or assembly	Storage	Engineering R&D	Administ. or Head office
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

## 2. Financial information

Turnover from previous three years:

Operating profit (EBIT) from  
previous three years:

Net profit from previous three years:

Credit rating:

Main auditor:

### Does your company have unpaid tax debts?

YES

NO

Comment:

***Please attach an official statement of paid taxes***

## 3. Products, references, and sub-suppliers

Main products/services

supplied to Case company:

Other main products/services:

References:

Most important sub-suppliers:

Comment:

## 4. Insurances

### 4.1. Does your company have a third-party liability insurance?

YES

NO

Comment:

*Please attach a copy of your insurance certificate.*

**4.1.1 If you answered “Yes”, what is the value of your third-party liability insurance?**

**4.2. Does your company have a transportation insurance? (if applicable)**

YES  NO

Comment:

**4.3. Does your company have a property insurance? (if applicable)**

YES  NO

Comment:

**4.4. Does your company have personnel insurances? (if applicable)**

YES  NO

Comment:

## **5. E-invoicing**

**5.1 Are you currently using real electronic invoicing through service providers (e.g. operators and banks)?**

YES  NO

Comment:

**5.1.1 If you answered “Yes”: Are you willing to use the electronic invoicing with Case company?**

YES  NO

Comment:

**5.1.2 If you answered “No”: Are you planning on implementing an electronic invoicing system?**

YES  NO

Comment:

## SUSTAINABILITY

### 1. Basic information

**1.1 Does your company have a code of conduct based on the UN Global Compact ([www.unglobalcompact.org](http://www.unglobalcompact.org)) or guidelines which cover the issues in the UN Global Compact?**

in place       partial       planned       none

Comment:

**1.2 Has your company been under investigation by national authorities and/or international governing bodies (for instance the United Nations) for environmentally damaging or other unethical practices, or for bribery or corruption during the past five years? (YES/NO)**

NO       YES

If yes, please explain briefly:

### 2. Business Principles

#### 2.1 Legal Compliance

**Does your company have procedures and/or guidelines to ensure compliance of laws and regulations?**

in place       partial       planned       none

If not in place, please explain briefly:

#### 2.2 Anti-Corruption

**Does your company have procedures and/or guidelines in place to prevent corruption, including bribery or excessive gift-giving?**

in place       partial       planned       none

If not in place, please explain briefly:

### 3. Labor Standards

#### 3.1 Freedom of association

**Does your company have a written policy or guidelines stating that all your employees are free to join or to be represented by trade unions of their own choosing, or similar external representative organizations?**

in place       partial       planned       none

If not in place, please explain briefly:

#### 3.2 Forced labor

**What percentage of your workers has a written and signed employment contract?**

more than 75 %       51-75 %       26-50 %       25 % or less

If not 100 %, please explain briefly:

### 3.3 Employment conditions

**a) Does your company have records to demonstrate compliance with national laws on the working hours and overtime of your employees?**

in place       partial       planned       none

If not in place, please explain briefly:

**b) Does your company have a system for establishing worker wages that considers the type of work, market wages, and the legal minimum wage?**

in place       partial       planned       none

If not in place, please explain briefly:

### 3.4 Child labor

**Does your company have and use a documented procedure to prevent underage children from being hired for work?**

in place       partial       planned       none

If not in place, please explain briefly:

### 3.5 Non-discrimination

**Does your company have a written policy or guidelines to prevent discrimination in hiring, promotion, equal pay, benefits and training?**

in place       partial       planned       none

If not in place, please explain briefly:

### 3.6 Health & Safety (Working conditions )

**a) Does your company have a safety certificate?**

in place       partial       planned       none

If in place, please add License number, Certifying Body and Locations:

**b) Does your company have written safety rules and procedures?**

in place       partial       planned       none

If not in place, please specify:

**c) Does your company have a written safety program?**

in place       partial       planned       none

If not in place, please specify:

**d) Does your company have procedures or guidelines to prevent alcohol and drug use at work?**

in place       partial       planned       none

If not in place, please specify:

---

**If you are a contractor, please answer to all Health & Safety questions.**

**Other suppliers: Please go on to the section Environment.**

---

**e) Does your company have procedures to ensure clearly specified responsibilities in projects?**

in place       partial       planned       none

If not in place, please specify:

**f) What is the Lost Workday Injury Frequency (LWIF) for the past three years?**  
 (LWIF = Number of accidents resulting in an absence from work for more than one (1) day per 1 million working hours)

Year	Unit	Company
200__	_____	___
200__	_____	___
200__	_____	___

**g) Does your company have personal protective equipment (PPE) according to the latest technical standards?**

in place       partial       planned       none

If not in place, please specify:

**h) Does your company have a documented safety and other training systems?**

in place       partial       planned       none

If not in place, please specify:

**i) Does your company have a procedure for reporting accidents and near-misses and for follow-up of correctives actions?**

in place       partial       planned       none

If not in place, please specify:

**j) Does your company have a practice of discussing safety related topics regularly in meetings?**

in place       partial       planned       none

If not in place, please specify:

**k) Does the management in your company do safety observation tours and safety inspections?**

in place       partial       planned       none

If not in place, please specify:

**l) Does your company have a system for EHS-requirements for sub-contractors?**

in place       partial       planned       none

If not in place, please specify:

## 4. Environment

**4.1 Does your company have an environmental management system based on ISO14001 or similar?**

in place       partial       planned       none

If in place, please add License number, Certifying Body and Location:

If not, please comment how your company manage the environmental issues:

**4.2 Does your company have procedures and/or guidelines in place to take into account environmental considerations in the development of new products or services?**

in place       partial       planned       none

If not in place, please explain briefly:

**4.3 Does your company have a tracking system to monitor and systematically mitigate environmental impacts of your operations?**

in place       partial       planned       none

If not in place, please explain briefly:

**4.4 Does your company have a programme to assess the environmental performance of your suppliers?**

in place       partial       planned       none

If not in place, please explain briefly:

## 5. Quality

**5.1 Does your company have a quality management system based on ISO 9001 or similar?**

in place       partial       planned       none

If in place, please add License number, Certifying Body and Location:

If not, please comment how your company manage the quality issues:

**5.2 Does your company have a programme to assess the quality performance of your suppliers?**

in place       partial       planned       none

If not in place, please explain briefly:

**5.3 Does your company have a documented procedure for customer complaint**

**handling?**

in place       partial       planned       none

If not in place, please explain briefly:

**6. Additional information**

**6.1** Person who filled in this questionnaire (if other than "contact name"): Name and E-mail

**6.2** Please feel free to leave a comment about sustainability issues not addressed in this questionnaire:

Comment:

## Appendix 14: Suggested supplier performance measurement process

