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Aalborg University - Department of Business and Management

Master Thesis

Supplier Management at Siemens Wind Power

The Siemens logo, consisting of the word "SIEMENS" in a bold, blue, sans-serif font.A word cloud of terms related to Siemens supplier management. The terms are arranged in a roughly circular pattern. The largest and most prominent term is "Become a Supplier". Other terms include "Code of Conduct", "Sustainability", "Tools", "Supplier Qualification", "REACH RoHS", "Supplier Management", "Supply Chain Finance@Siemens", "eAuctions", and "Siemens Conditions of Purchase".

Code of Conduct Tools
Sustainability
Supplier Qualification
REACH RoHS Supplier Management
Become a Supplier
Supply Chain Finance@Siemens
eAuctions
Siemens Conditions of Purchase

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Number of Pages:80

Delivery date: 5th of November 2015

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Executive Summary

The study is focused on supplier management and development practices in the area of supply chain management. The empirical focus of the thesis is on Siemens Wind Power and how the company performs and is affected by these activities.

The methodological approach used was the system approach which enabled the possibility to use extensive secondary data, which was accessed from company's external and internal sources. The primary data was accessed through participant observation and from interviews conducted with Commodity Managers.

In the first part of the thesis the literature on supply chain management and in particular the procurement and supplier management processes are reviewed and compared. Furthermore Siemens Wind Power's Procurement and Supplier Management processes were analysed.

In the light of the analysis it was concluded that the success of the Procurement Process is highly depended on the practices of the Supplier Management Process. Moreover the findings show that supplier segmentation can assure the company that the sourcing decision is made based on the corporate strategy and support in reducing the supply risk. Supplier evaluations and performance measurement done periodically can identify risk and develop improvement strategies for suppliers.

1. Introduction

1.1 Topic introduction

Because of the ongoing changes in the business context, a lot of companies need to adapt. A lot of these changes are related to the rapid growth in technology and computer networks, the fast development of globalization in customer markets and the continuous change of customer demand and preferences. (Van Weele, 2002).

Globalization of trade has made an impact in the sense of growth in competition between companies. The focus of the company has shifted towards core competences and outsourcing activities of other operations. In some companies the percentage of goods purchased from suppliers is between 50 to 90 percent from the total turnover in contrast with the figure of labour costs which is six percent and for overhead expenses of three percent (Iloranta et al., 2008: 85; de Boer et al., 2001: 75).

The complexity of purchasing has been changed intensely increasing the influence of procurement. The spread of categories together with the increased geographical scope of supply options result in activities that enhance cost reduction and profit growth. (Anderson & Katz, 1998, p. 1)

Furthermore since the supplier base of companies is increasing the need of good supplier management systems is sensed. Supplier performance and development within the global procurement function is becoming an important factor in deciding the success of a company. For the last 10 years Siemens AG has been using the same Supplier Management system which is also applied to the business that Siemens Wind Power (SWP) does, as part of the Siemens Corporation. As part of this research, SWP's supplier management framework will be analysed. The focus of the thesis is to study how supplier management can be structured to reduce the supply risk and support the procurement strategy.

Therefore the focus should be directed towards highlighting the importance of a good supplier management system. A connection between suppliers and customers needs to be made in order

to create a good and profitable business environment or as sometimes referred to as “a win-win situation”.

“You cannot manage what you cannot measure” (e.g. Chan, 2003: 535) is the main idea that highlights the importance of supplier evaluation and performance measurement within the supplier management system. Evaluation of suppliers should be considered as first step before anything is purchased from the supplier and also should be considered and applied during the business relationship lifetime.

1.2 Research Questions

Even though supplier management has been previously researched and studied I seek to understand and explore the concept of supplier management and development in the area of supply chain management. The empirical focus in the thesis will be on Siemens Wind Power and how the company performs and is affected by these activities. To be able to accomplish the scope of this project the following research questions are introduced:

1. How does supplier management work and how is it integrated in the procurement process at Siemens Wind Power?
2. How should supplier management be structured in order to reduce the supply risk?
3. How can supplier development become an integrated part of the procurement strategy?

1.3 Company Profile

Siemens Wind Power Company Description

Siemens Wind Power history starts with the Danish company BONUS ENERGY in 1980. The acquisition of BONUS Energy by Siemens took place in December 2004. The merge between BONUS energy technology and Siemens Power Generation’s global network and large scale project management experience was a perfect combination in consolidating and strengthening the position in the wind energy business.

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Right after the acquisition, Siemens Wind Power started to grow. In November 2005, the former German sales partner AN Wind Energy GmbH became part of Siemens Wind Power. This leads to an increase in the number of orders and sales. An extension of the existing producing facilities was needed and the built-up area in Brande increased by 44% and in Aalborg by 150 %. Now the companies headquarter is in Hamburg, Germany. Siemens Wind Power has nacelle production in Brande (Denmark) and Hutchinson, Kansas (USA) . R&D facilities are located in Brande (Denmark). Other production locations are in Aalborg and Engesvang (Denmark), Linggang (China), Fort Madison, Iowa (USA) and Tillsonburg, Ontario (Canada) where blades are produced.

The Wind Market

For Siemens the wind market offers continuous opportunities all over the world. An example of great achievement for Siemens Wind power was in 2011 when it supplied 80% of the offshore installations in the wind industry. This also confirms that Siemens remains a leading company in the offshore industry since 20 years ago. The total Siemens Wind Power (SWP) turbines accounted for 693 MW of connected capacity followed by Repower with 111,7 MW or 13% of the 2011 market. (ewea)

The year 2013 had a decrease of 8% in installations of new wind turbines compared with 2012 in Europe. There were 11.159 MW of wind power capacity and worth between 13 and 18 billion Euros installed in Europe.

The decrease in Europe is due to the negative impact of the market and political uncertainty. Also the uncertainty around the legislative frameworks for the wind energy is putting a pause on investments.

Even though the market suffered a decrease the Wind Power remained the technology that installed the most in 2013: a total 32% of the total power capacity installations with an increase of 5% compared with last year. The renewable sector was responsible for 72% of new installations in 2013: 25 GW of a total 35GW of new power capacity. (ewea)

In 2013, Siemens Wind Power is still the leader in the offshore market on an annual installation basis. Contributing with 1,082 MW of new capacity connected, Siemens accounts

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for 69% of the offshore wind market, followed by BARD (240 MW, 15%), Vestas (123 MW, 8%) and Senvion (REpower) (111 MW, 7%) (European Wind Energy Association, 2013)

From a global perspective SWP is the number 4 wind turbine manufacturer with 8% market share after Vestas (13,2%), Goldwind (10,3%), Enercon (10.1%) (Smith, 2014).

Organization

In October 2011 SWP joined the Oil & Gas, Fossil Power Generation, Energy Service, Power Transmission, Power Distribution and Solar energy divisions in the above mentioned sectors. Through this SWP has a higher importance and it is now responsible for its own profit and loss centre.

In April 2014 Siemens Wind Power went through a structural change that reflected the new organizational focus on two markets: onshore and offshore. By focusing on two different markets with different customer requirements, SWP is aiming to gain a better position on the onshore market. Before the structural change, the company was structured in three geographical business units- EMEA, Americas and APAC.

In the new organization the Strategic Procurement (SPR) department has gone through a structural change, being now part of the Supply Chain Management organization.

The Strategic Procurement (SPR) is a department within Supply Chain Management. The department's main focus is to take care of the supplier selection, negotiation and evaluation by cooperating closely with Supply Management, Quality and Engineering departments. The organizational matrix of SPR is divided by commodities and regions. The commodities decide from where they can source the materials either from a local and/or global supplier. They are responsible also for their own negotiations' outcomes.

The main units responsible for the sourcing of components are SPR Mechanicals, SPR Electricals, SPR Casting and Forgings, Blades and Transport and Logistics. Overall these commodities combined are responsible of purchasing all the critical components used in the manufacturing process of Wind Turbines. For example the electrical components are generators, lights, cables and control systems. They are placed in the main modules of a wind turbine, the nacelle and the tower. Among the mechanical components the most known are gearboxes, hydraulic systems, cooling systems and bearings. By making this division based on the main components, the company can focus on maintaining and developing their supply chain. The magnitude of the purchasing department is due to the fact that SWP is sourcing most of its turbine components from suppliers. The only components produced by the company are the blades.

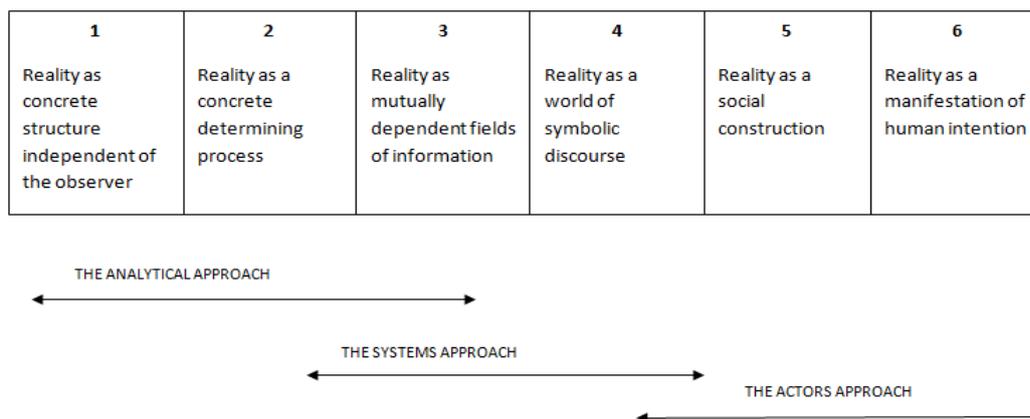
2. Methodology

2.1 Methodological approach

The methodological approach is based on the fact that problems could be solved from different angles and it is influenced on how the researchers see reality. As Johnson and Clark (2006) emphasize that the most important issues is not mainly if our research should be philosophically knowledgeable but it is about how well we are able to reflect on our philosophical assumptions and defend in connection with other alternatives we could have implemented. (Saunders et. all, 2009)

Because perceptions could be very different, social science has created paradigms. Paradigms are described as different views on reality that can influence the way a problem is approached and solved. The chosen methodological approach for this project is based on the work of Arbnor and Bjerke. The main social science paradigms according to Arbnor and Bjerke are presented in fig 2 (Arbnor & Bjerke 1997: 35)

Figure 1-Social Science paradigms



Source: Kuada 2012

The Analytical approach

Part of the last years business studies the analytical approach has been one of the most used methods in business research. Reality is seen as objective by the researcher and it is composed of facts and considered independent of individual judgement. The main focus of this research is to give a common understanding of the subject that is being studied through addressing the right questions. (Arbnor & Bjerke, 1997: 37-38)

The researcher that uses the analytical approach prefers to use as methods, secondary data collection like statistical reports and measured graphs as tools in solving the research question. The scientific motivation is that the researcher tries to find models and patterns to give a general explanation. The creator of knowledge believes that today you can find numerous entrepreneurship projects, more than before and therefor the issue is to find the "laws" which run society from an entrepreneurship point of view. The researcher is looking to find reality in an objective way and he or she is focused on concepts like "risk taking", "business idea" and "opportunity recognition" (Arbnor & Bjerke, 1997: 37-38).

The System approach

The reality as described by the system approach is created through systems .The researcher using this methodological approach sees the reality both objective and subjective. (Arbnor & Bjerke, 1997: 39).

In contrast with the analytical approach the researcher is seeking to understand the patterns and connections that will add or take value to the study. The scientific ideal is to create a better system by exploring the different patterns and systems. Ideas like organizational learning and network relations are usually discussed by the researcher. Under the system view the business unit is composed as a system that influence and determine one another (Arbnor & Bjerke, 1997: 39) The data collection methods include interviews and secondary data collection to create a better overview of the research conducted. The report usually contains empirical findings that are unique to the study. (Arbnor & Bjerke, 1997: 39).

The Actors approach

The last methodological approach used in business research is the Actors approach. The knowledge created using this approach is considered to be purely subjective. The reality is seen as a social construct and it is often created by those that participate. This can possible lead to a difference in results and could make the process of arriving at a general conclusion harder. (Arbnor & Bjerke, 1997: 50-54).

The researcher is seen as an actor engaged in the process of accumulating and gathering knowledge only by interacting with other actors making the nature of the reality subjective. The researcher is considered to be an active participator in the knowledge creation process. (Arbnor & Bjerke, 1997: 50-54).

The methods used by the researcher to collect data are in depth- interviews. In this process the truth is created by each independent actor and it is determined by the engagement of other actors in the environment. (Arbnor & Bjerke, 1997: 41-44).

Compared with the other methodological approaches presented earlier the Actors approach sees the entrepreneurship concept as specific and related with the single individual (Arbnor & Bjerke, 1997: 41).

2.1.1 Compared methodological approaches

As previously presented each methodological approach has a different way and method towards achieving the research goal. The analytical view puts an accent on objective knowledge accumulated through facts and figures in contrast with the actors approach which focuses mainly on knowledge accumulated through interviews making it's nature subjective. On the other hand the system's approach seeks to gather objective knowledge appropriate to the subject addressed connecting the information in such a way that to understand the facts you must understand the complete system connecting them.

2.1.2 Applied methodological approach

To be able to answer the research questions I need to study the specific relations between the elements of the procurement process and supply chain management and how they relate and influence each other. Because of this I consider the system approach as an appropriate methodological approach in conducting my research. The research data will be analysed considering that the company in this case Siemens Wind Power is composed of systems that are connected and linked to each other. The research will be largely designed based on the theoretical frameworks that will help in answering the problems addressed.

Based on the intentions presented earlier the chosen approach will have subjective and objective elements thus making the System approach the chosen methodological approach.

2.2 Research methods

The researcher will use both qualitative and quantitative data for conducting the research.

The researcher will collect the main source of data through:

1. Interviews with 10 Global Commodity managers. Each commodity was given a letter name from A to J to keep internal company information confidential. The interviews will be semi structured and will have as main goal to identify the current situation of the supplier base and supply market for each commodity. Due to certain time limitation such as availability of the managers for the interview the plan is that each interview will last

30 min. Thus allowing a better understanding of each commodity's supply market situation and supplier management practices.

2. Secondary data analysis. Quantitative data will be collected mainly from the company such as reports, supplier evaluation data, processes and procedures for managing supplier performance and development, target agreements. Data available on the internet as market reports and articles about the company will also be used in the data collection and analysis process.
3. Participant observation. As an employee of the strategic procurement department for almost two years I have obtained knowledge through informal discussion about the processes used thus giving me the opportunity to observe the issues, struggles and good practices of the company.

2.3 Delimitations

The thesis will discuss supply chain management from a general perspective with the clear focus on supplier development. This approach is chosen basically because the topic of supply chain management is very broad and cannot be completely covered throughout this thesis. During this research only 1st tier direct material suppliers will be analysed. Indirect material suppliers fall out of the scope of the thesis.

3. Procurement Process and supply chain integration

The scope of this chapter is to position procurement in the supply chain management and to explore the existing literature in order to create a framework to define the procurement process.

Although before we can define the procurement process the notion of supply chain and supply chain management should be defined. Emmett & Crocker describe the supply chain as a process

that coordinates and controls the movement of products, materials and information from a supplier to a customer all the way to the final user (Emmett & Crocker, 2009).

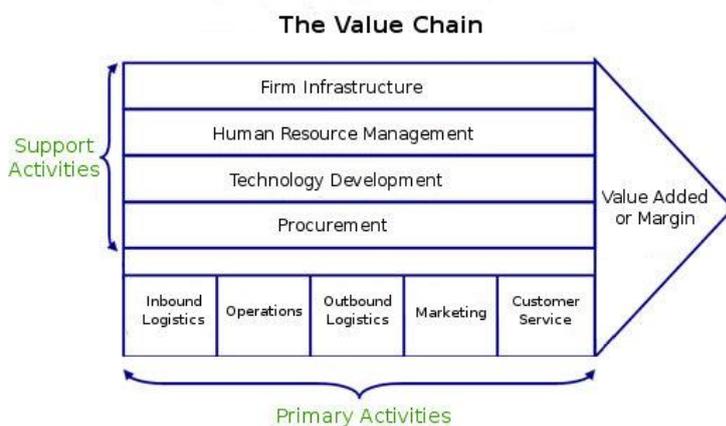
Another view of supply chain defines it as an organization that is involved by upstream and downstream connections in the different processes and actions that produce value in the form of services and products for the end consumer .(Mangan et all 2012)

Stevens (2007) puts an accent on the importance of integrating the customer requirements in the supply chain and thus putting pressure on companies to develop an effective and efficient supply chain.

The value chain of Porter (1985) is considered a term of reference and provides a clear picture of the value chain activities.

Porter separates into two different physical and technical groups of activities as seen in Fig 3. The primary activities are focused on the operations that cover the production and handling of the final product that will be delivered to the company's customer whereas the support activities sustain and support the primary activities (Van Weele, 2002)

Figure 2- Value Chain



Source: Redraw from Porter 1985

The supply chain is a complex structure that extends beyond than just the physical movement of goods to activities concerned with purchasing, supplier management, manufacturing

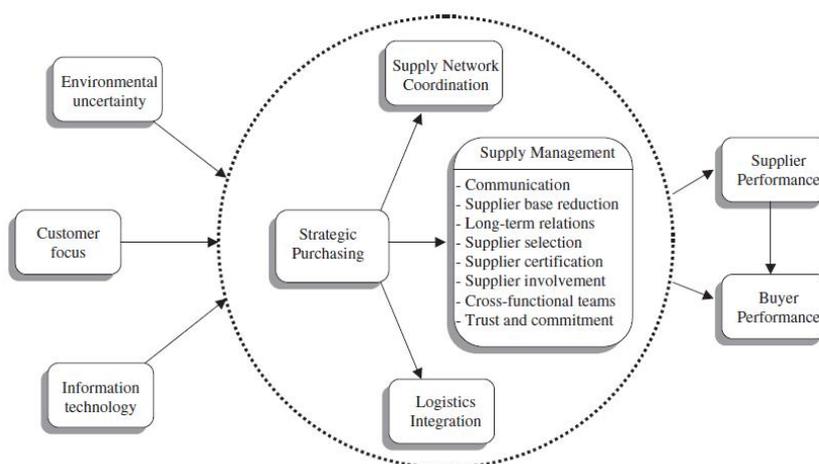
management, material management, planning, customer service and information flow together with transport and logistic distribution. (Stevens, 2007)

Companies will not look for cost improvement, profit and increase revenue at the expense of their supply chain partners but rather by making the complete value chain more competitive. Furthermore a part of the literature on the supply chain management or other similar terms such as value chain management and value stream management recognizes that the supply chain should have a central position in analysing a company's competitive advantage. (Macbeth and Ferguson, 1994; Cox, 1997)

Supply chain management covers from the supply of basic raw material to finish products (recycling and re-use) and has a focus on how the company uses their suppliers, processes, technologies and capabilities to enhance their competitive advantage. *“ It is a management philosophy that extends traditional intra-enterprise activities by bringing trading partners together with the common goal of optimization and efficiency”* Tan et al. (1998)

A more practical approach in understanding how SCM(Supply Chain Management) works was developed by Chen and Paulraj (2004) through creating the theoretical framework presented in the below picture.

Figure 3- Understanding supply chain management



Source: Adapted from Chen and Paulraj(2004)

The framework divides the existing literature on SCM in three focus areas: 1) Strategic purchasing/Supply Management; 2) Logistic Integration; 3) Supply Network Coordination.

When all strategic parts in the value chain integrate and work as a single organization, company's performance is enhanced through the system of suppliers. (Tan 2001).

The use of this theoretical framework in defining SCM will be of critical use throughout this thesis as it will support in defining what is procurement and supplier management, nonetheless showing the importance of supplier development and performance in supply network conditions.

If the main idea of the supply chain management is to follow the product through the value chain a more practical view on supply chain management shows the importance of using only strategically important suppliers in the value chain. Tan (2001) states that the most important points of purchasing and supply chain effectiveness are supplier base reduction, increasing customer satisfaction, concurrent engineering, reducing lead time and inventory.

Reducing the supplier base can be considered as a first step in supplier development and creating an effective supply chain. This can be achieved by reducing the number of first tier suppliers where a few suppliers get integrated in the value chain by having more capabilities and taking in more responsibilities. Due to the technical complexity of the value chain, it is hardly possible to achieve a full integration of all business units, thus making possible sourcing from immediate strategic suppliers to enhance competitiveness and value chain integration.

Producing after inventory is being replaced by manufacturing based on customer orders, thus reducing lead time of the final product to the customer and reducing inventory.(Tan 2001) Although for this to take place the need of a good communication flow and supply chain integration is necessary.

Early engineering and supplier involvement in the early stages of development of a product will reduce manufacturing risks, ensure a good technical knowledge transfer and achieve a more effective supply chain.

Customer satisfaction is the key objective that defines a firm's competitive position and shows the effectiveness of the supply chain. By increasing the time to market and to the customer, increasing quality and possibility of product customization, customer satisfaction is achieved and kept (Tan 2001). Sometimes supplier development and supply chain integration actions are monitored through this specific KPI.

The topic of the thesis is therefore positioned in Strategic purchasing/ Supply Management area of the overall SCM theoretical framework. Furthermore after showing the importance of supply chain management and having a focus on supply chain development from a purchasing perspective the next section of the thesis will discuss in more detail purchasing.

3.1 Definition of the procurement process

To understand the correlation between supply management and purchasing, both processes must be defined and understood. The existing literature provides a theoretical framework in defining the procurement process.

Procurement serves as a support function in the value chain having as main role purchasing of raw material, supplies, machinery, office buildings etc. Through these examples procurement can be seen as link between the primary functions and support functions.

Van Weele (2002) also differentiates the terms procurement and purchasing. He gives the procurement function a more complex meaning by including activities that follow the product from the supplier to the end customer. Purchasing is defined as *“obtaining from external sources all goods, services, capabilities and knowledge which are necessary for running, maintaining and managing the company's primary and support activities at the most favourable conditions”* and does not consist of functions like incoming inspection, inventory management, material planning and quality control. These roles together with the purchasing function define procurement. (van Weele 2002)

The next section will have as main purpose to define the steps of the procurement process within a company that will serve as a guiding framework throughout this thesis. The work of some of the most acknowledged writers will be discussed.

3.1.1 Dobler's purchasing activities

The purchasing process has been studied by many researchers and its steps have been defined in different ways. For example Dobler et al. (1996) created a list of purchasing activities:

1. Identification of purchasing needs
2. Discussion with sales people
3. Identification of suppliers
4. Market studies
5. Negotiations
6. Analysis of proposals
7. Selection of suppliers
8. Issuance of purchase order
9. Contract administration
10. Purchasing records

3.1.2 Van Weele's procurement process

The main purpose of purchasing is to ensure the availability of all products, services and knowledge to the company. Its function is closely related to the management and handling of external resources. All the activities in purchasing can be illustrated as a process (van Weele, 2005: 12-13). Van Weele developed a comprehensive and easy to follow procurement process presented in the next figure.

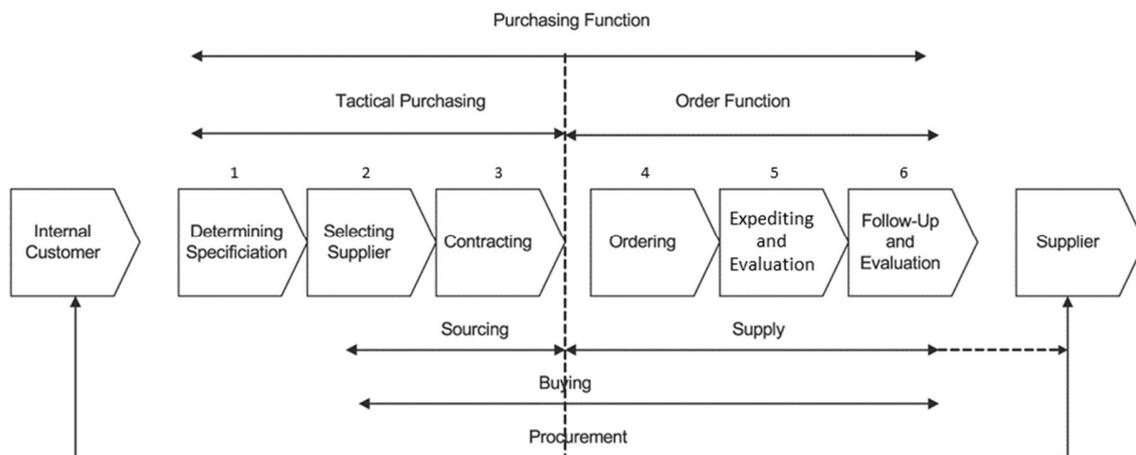


Figure 4- Van Weele's Purchasing Process

Source Van Weele, 2005

Van Weele (2002) presents a process divided in two main areas: tactical and functional purchasing. The activities within the tactical purchasing cover a more commercial and technical area compared with the activities in the functional ordering that require handling in a more administrative and operational way. Van Weele (2002) discusses that the role of purchasing in companies except the immediate savings impact is also to improve the company's competitive advantage by indirect contribution. This indirect input can be seen in improvement of the product and process through innovation, reducing stock levels, reducing production complexity and reduction of quality resources and costs.

One of the milestones of the companies today is ensuring that the decision made in one of the steps in the process is the right one by balancing the available resources- skills, experience and knowledge. With the corporate growth the complexity of purchasing in organizations is growing and its function is covered by different departments that have different stakeholders in the decision making process, making the role of the purchasing department to simplify the supply chain and cross functional alignment. To make the process easier to comprehend, van Weele proposes a more detailed illustration.

Figure 5- Van Weele(2005) Procurement Process

	Define specification	Select supplier	Contract agreement	Ordering	Expediting	Evaluation
P&S Role	<ul style="list-style-type: none"> • Get specification 	<ul style="list-style-type: none"> • Assure adequate supplier selection 	<ul style="list-style-type: none"> • Prepare contract 	<ul style="list-style-type: none"> • Establish order routine 	<ul style="list-style-type: none"> • Establish expediting routine 	<ul style="list-style-type: none"> • Assess supplier
Elements	<ul style="list-style-type: none"> • Functional specification • Technical changes • Bring supplier-knowledge to engineering 	<ul style="list-style-type: none"> • Prequalification of suppliers • Request for quotation 	<ul style="list-style-type: none"> • Contracting expertise • Negotiating expertise 	<ul style="list-style-type: none"> • Develop order routines • Order handling 	<ul style="list-style-type: none"> • Expediting • 'Trouble-shooting' 	<ul style="list-style-type: none"> • Supplier evaluation • Supplier rating
Documents	<ul style="list-style-type: none"> • Functional specification • Norm/spec control 	<ul style="list-style-type: none"> • Supplier selection proposal 	<ul style="list-style-type: none"> • Contract 	<ul style="list-style-type: none"> • Order 	<ul style="list-style-type: none"> • Exception report • Due date listings • Invoices 	<ul style="list-style-type: none"> • Preferred supplier list • Supplier ranking scheme

Source: Van Weele 2005

3.1.3 Emmett and Crocker's procurement cycle

Emmett and Crocker (2008) developed, somehow similar more detailed description of the procurement process. The procurement process cycle as shown in the below figure should be considered from an overall perspective and should not be treated as what each department in procurement does. Depending on the organization the procurement department could have partial or complete participation in the overall process.

Figure 6- Procurement Process Cycle



Source: Emmett and Crocker 2008

Their procurement process involves the following stages:

- **Pre-Order**: a) Need; b) Specify; c)Sourcing; d)Enquire; e)Evaluate ; f)Negotiate /
Selecting
- **Order** – a)Progressing; b) Delivery
- **Post-Order**: a) Progress; b) Delivery; c) Pay; d) Review

3.1.4 Process comparison and structure definition

To be able to find the link between these processes and to establish the process model that will be used through the thesis the three theoretical frameworks are compared in the below table.

Table 1- Procurement Process Comparison

	Dobler's Model	Van Weele's model	Emmett and Crocker's cycle
1	Need identification	-	Identification of need
2	Discussion with sales/ specifications	Define specifications	Specify
3	Identification of suppliers/ supplier selection	Supplier selection	Sourcing/Enquire/ Evaluate
4	Negotiations	Contract agreement	Negotiate
5	Issuing purchase order	Order	Order
6	Contract administration	Expediting	Progress/Delivery/Pay
7	Purchasing records	Evaluation	Review

Source: Self Made

In the next section a description of the process steps will be provided.

Identification of need

The first step of the purchasing process is described as an identification of needs. The need is defined, described and recognized and presented to the sales personnel (Dobler et al., 1996: 64). The purchasing need is created when the customer may need a certain product or service. This is one way of arriving at the need to buy, second the need may come from inside the company presented by an internal customer as it is in the case of a new product or service that fits in the overall portfolio of the company and may satisfy the need within a certain market. Based on the clarifications and on what the product will be like, some specifications need to be created and adjusted so they can be purchased. (van Weele, 2005: 303). This step in the process exists only in Dobler's purchasing list and Emmett and Crocker's purchasing cycle. In Van Weele's view this step is part of the larger procurement view and not directly part of the purchasing process.

Define specification

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In this step the company is faced with the decision of “make-or-buy” in regards to what products will be produced “in house” and what products and activities will be outsourced. The technical requirements and specifications are created for the items that will be purchased. This step is present in all three models. The distinction that Van Weele makes is in relation to the classification of the specifications. He distinguishes two categories, the functional specification which describes in detail the functionality that the product must have and detailed technical specifications which describe the technical requirements of the product together with the production process that must be performed at the supplier. (Van Weele 2005)

Supplier selection

Emmett and Crocker (2009) note that selecting the right markets to source the products needed is essential as it might influence the balance of power in the relationship. On certain markets the price can be influenced by the number of suppliers and their geographical location.

To arrive at selecting the suppliers, first the identification of the potential supplier is done. This can be done through accessing the company’s data base of possible suppliers or through conducting a market study. Furthermore a list is created with the top potential suppliers to be contacted. Then a request is sent to the suppliers to provide information about their qualifications and references, called Request for information (RFI) (van Weele, 2005: 52). After analysing the information received from the suppliers, a narrower list is put together.

Furthermore a request for proposal (RFP) is sent to this last list of potential suppliers. Together with the RFP the RFQ (request for quotation) is sent to the suppliers as a bidding procedure.

After receiving the RFP, the most important step of the process takes place and that is the supplier selection. This needs to be performed with a lot of focus and care because a miss direction could have a long term negative impact on the company. (Monczka et al., 2005: 44)

Negotiations & Contract agreement

The supplier selection can be conducted in two ways:

1. Competitive Bidding

2. Negotiation's

After receiving the request for proposal, the buyer can make a decision based on the information in the bids or he can further invite the supplier for negotiations.

Biding is described as most efficient when the product specifications are defined correctly and the price is considered the most important determinant factor in the decision making step of the process.

Compared with the bidding, the negotiations carry a more subjective factor in the decision making process. These are carried out when the product or service requirements are more complex and when factors like performance and risk need to be discussed and taken into considerations. (Monczka et al.,2005: 45)

After the biding or negotiations are closed a proposal to the selected supplier, or to the several selected suppliers is made. (van Weele, 2005: 53). Negotiation is defined as "*the resolution of conflict through the exchange of concessions*" (Emmett and Crocker, 2008).

After the suppliers are selected, the legal department of the company prepares the collaboration contract. The terms of the contract must be agreed by both parties involved and they must be in alignment with the law. (van Weele, 2005: 53).

Ordering & Expediting

The most operational task after the supplier is selected is issuing the Purchase Order and follow up. This process is done in four steps as presented below (Dobler et al., 1996: 62):

- Prepare and issue the order
- Follow up the order
- Receive and inspect the product
- Audit the invoice and close the order

First a purchasing order is prepared and issued either for one material or several according the agreement and frame contract. (Dobler et al., 1996: 67).

After the order is placed, then the follow-up process should start with a focus on the materials with a long delivery time. This is done via e-mail or phone calls until the product arrive at the established destination. In Emmett and Crocker's process this step is described by three separate steps: Progress, Delivery and Pay. Following the payment is made this usually is done before all checks to the documentation, purchase order, the invoice and the delivered product are made and they match the requirements. In case of any problems the order can be closed. (Dobler et al., 1996: 74-75)

Supplier Evaluation

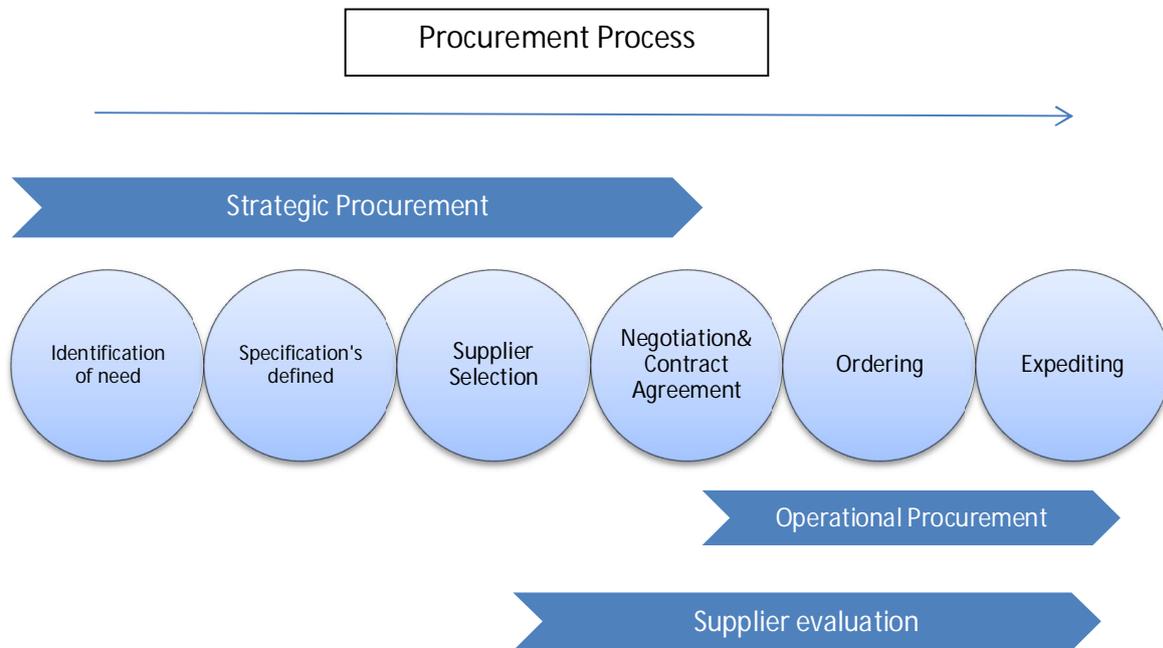
The final step in the procurement process is the supplier evaluation. This step is not present in Dobler's (1996) purchasing list and it actually shows the development and importance of purchasing and its position within the strategic function of the company. Experience with suppliers should be documented. Quality and delivery performance should be measured and recorded. (van Weele, 2002: 69).

Each step in the process must be consecutive followed and each result documented in order to structure and validate it. KPI's should be implemented in order to monitor performance and supervise deviations from standards and requirements. Chao et al. (1993) highlights the importance of supplier evaluation by evaluating purchasing performance through measuring the quality of materials purchased, on-time delivery , and the actual vs target cost of materials.(Durst et al. 2013)

3.1.5 Process framework

By reviewing three of the framework models for purchasing and procurement processes available in the procurement literature the next step is to establish the process model that will be of relevant use throughout this thesis . The process model is illustrated in the next figure.

Figure 7- Procurement Process framework



Source: Adapted from Van Weele(2005)

Van Weele's view of procurement process seems to be the fundamental approach as it covers the most important steps and has a simple and structured way. Furthermore all these models seem to share the same first step of need identification. In this phase the importance of identifying the customer's need as comprehensive as possible with an early involvement of the purchasing department will provide a better flow of information in the next steps of the process. For the process to be effective the completion of a step influences the next step. Therefore each step is dependent on the outcome of the previous step to determine the success of the process.

The process is therefore divided between two functions strategic procurement and operational procurement making the cooperation between the two very important for the process to be effective. The strategic function will have the responsibility of cross functional coordination and dealing with long term sourcing decisions based on the procurement strategy. Furthermore the

strategic function should be involved in the supplier selection and qualification phase and having the authority of deciding the right supplier base and negotiate the right prices and conditions. Contract management and negotiations also falls under the strategic procurement responsibilities.

The operational function as the name also illustrates would be responsible of ordering and expediting with a short term view. Main involvement and close cooperation will be with production. The operational procurement will order and track the materials making sure lead times and delivery terms are met by the suppliers. The department will also be in close cooperation with the production function that will take over the planning function of the materials being sourced externally.

Least but not last the process last function covers the supplier evaluation and development being part of several steps both in strategic procurement and operational procurement part of the process. This step should be considered as a repetitive step throughout the process.

Operational procurement would have the task to collect and record the data for the supplier's performance. KPI's of delivery and quality performance should be measured and tracked. The strategic procurement's should have the overall responsibility of using the data towards making the strategic decisions. The decision if the supplier is considered strategic and resources should be allocated in its development or if the supplier is not performing and thus making the decision for phase out should fall under the strategic procurement's umbrella. All decisions made from a strategic perspective should be according to a joint cross functional effort involving specialists from other departments: quality, engineering and logistics.

4. Supplier management process

The existing literature provides different definitions and views on supplier management. There are three main activities that define supplier management: effective supplier selection, innovative supplier development strategies and important supplier performance assessment (Kannan and Tan 2002).

Tight supply chains develop into partnerships in which sourcing is spread across company boundaries and has a clear focus of reducing cost, increasing shareholder value and improving

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quality. At the centre of an effective supply chain, sourcing principles like *“harmonize individual self-interests, align value, adopt compatible technologies, address the problem of distorted information and peruse complementary core competencies”* form the basis of an efficient supplier management system. (Spekman et al., 1999)

The past is also a factor that can lead to the definition of supply management and highlight the importance of supplier management. A lot of manufacturing companies use to base their purchasing decision by considering only the price and very little qualitative data. The close cooperation with suppliers would benefit their firm strategy and bring down the cost per unit while increasing quality. (Goffin et al.,1997). The strategic perspective is highlighted by the shift from transactional to relationship oriented business.

Van Weele(2002) also views supplier management from a strategic perspective. He defines the main element of supply management as *“strategy”* that defines what type of relationship the companies should be involved in with theirs supplier.

Furthermore it is important to highlight that supplier management is not only defined by the relationship that companies develop with their suppliers but also includes *“pre-commercial interactions such as supplier registration, supplier identification/qualification during the sourcing process, multi-dimensional supplier segmentation, and selected supplier risk management process”* (Smith 2014)

Lasch et all (2004) argues that the supplier management process is responsible for the establishing the supplier-buyer relationship and connection. Supplier management is described as a multi-level process. The first step is the supplier identification and limitation or supplier pre-qualification. Furthermore supplier selection requires for the buyer to make a choice based on qualitative and quantitative data and use it to select the most appropriate suppliers. Taking into consideration supplier segmentation, which usually takes place after the supplier is selected, the buyer then classifies the selected suppliers. Based on this classification or segmentation of the best suitable strategies for handling the different segments are chosen by the buyer (Razaei & Ortt 2012)

To create the best strategy for supplier management segmentation of suppliers must be considered. Developing a close relationship with suppliers would result in a strategic partnership

while a more distant approach might be suited for other vendor relationships, ex an “arms-length” approach. Both approaches can be suited for different supplier segments. Therefore supplier segmentation will be further explained later on in thesis.

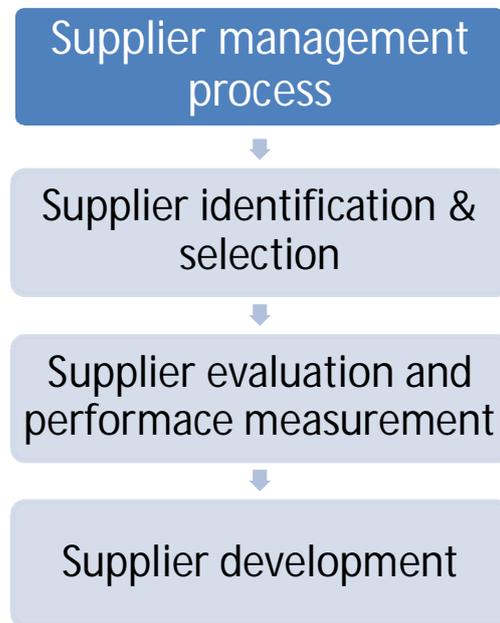
The main point when developing the supplier management framework is that the supplier management framework must be aligned with the corporate strategy of the company. Both strategic and arm’s length relationships will be considered and further elaborated.

The first step of the framework is the supplier identification followed by shortlisting a number of potential suppliers and creating an approval list (Lasch et all 2004). The outcome of this step would be to asses who is the best suited to perform which sets of activities.(Spekman et all 1999) Cost of quality and delivery performance have been important factors in selecting the right suppliers nevertheless specific criteria of the purchasing product is highly relevant(Kannan & Tan 2002). Furthermore the selection criteria’s must be aligned with the strategic goals of the company.

After the suppliers are selected the need to measure their performance against their requirements is necessary. The suppliers’ base is therefore measured against different required criteria’s discovering that some of the suppliers might not perform according to the requirements and their contractual agreements. Considering this scenario the buyer has two options: find another suitable supplier or help the existing supplier to improve its performance in the areas where there is clear need of improvement. (Rezaei & Ortt 2012).

Based on this description of steps the supplier management framework is presented in the next figure (fig 9) and will be used throughout this thesis.

Figure 8- Supplier Management Process



Source: Adapted from the existing literature on Supplier Management

In the next part each step of the process will be described.

4.1 Supplier selection

According to Monczka et al(2009) there is no single source purchasing strategy that can apply to all purchasing requirements therefore the purchasing strategy used for a material or service is highly influenced during the supplier selection process.

Purchasers depend on different sources of information when searching for a sourcing alternatives such as how well does the current supplier base satisfy the purchasing need, deliver according to quality and lead time , match the target of cost and performance. Moreover the complexity of the search is highly dependent on the complexity of the material or service that needs to be purchased. The following categorization introduced by Monczka et al (2009) shows the correlation between complexity of the material that needs sourcing and the search for a supplier:

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• *High capability of current suppliers + High strategic importance of requirement = Minor to moderate information search*

High capability of current suppliers + Low strategic importance of requirement = Minor information search

• *Low capability of current suppliers + High strategic importance of requirement = Major information search*

• *Low capability of current suppliers + Low strategic importance of requirement = Minor to moderate information search*

In today's dynamic business environment a lot of companies are dealing with a multitude of suppliers that can promise manufacturing the same product at the same quality, delivery time and price. A lot of suppliers who promises to fulfil all these requirements fail to do so because they are influenced by different factors like: change in demand, lack of knowledge in the procurement of raw materials, lack of a good quality system and delivery issues.(Kumar et all 2002). For the companies to be able to identify the right suppliers they need to consider factors like quality, delivery performance and cost as barriers to successful sourcing.

Closely aligned with the corporate strategy Van Weele (2005) proposes a number of steps to be performed during the supplier selection phase:

- Determining the method of contracting
- A preliminary qualification phase of the suppliers and deciding on the "bidding list"
- Preparation of the request for quotation and analysis of the bids received
- Selecting the suppliers

Supplier selection will not be addressed further in the thesis as the focus will be directed towards supplier development.

4.2 Supplier evaluation and performance measurement

Effective supplier management and development can be achieved through engaging in different actions that are set to improve a worldwide network of wisely screened and selected supply chain partners. The main objective of these actions for a company's management is the continuous improvement of the supplier's capabilities. Supplier performance that is positive today may not be sufficient in the same market tomorrow. (Monkzka et al 2009, p 308) . Unless companies are able to increase the supplier base performance at world-class levels they can easily be overtaken by their competitors. Furthermore as Krause (1996) argues that the main function of purchasing is to maintain a network for capable suppliers. The companies of today focus on core competences and become more dependent on their suppliers to meet the "ever-increasing" competition.

As the dependency on suppliers increases for companies to be able to meet the customer requirements and expectations, firms are under pressure to avoid problems with their supply chain partners and to keep the "high performers" especially among their strategy suppliers. (Gordon 2005). In practice supplier development activities have a wide range from informal supplier evaluations and a request for performance improvement to more detailed efforts that include training of the supplier's personnel and tooling or equipment investment in the suppliers operations. (Krause et al 1996).

The evaluation of suppliers should be done in alignment with the organization's strategy and based on the right KPI's. Supplier evaluation results offer the buying firm the possibility to have general and as detailed needed information about the supplier's performance. Therefore making sure that the right KPI's which the supplier will be measured against are set makes this step of the supplier management process very important.

Gordon (2008) highlights the following points of interest of the buying's firm:

- Financial health includes factors such as profitability, sales and cash flow. The financial data can be made available via different credit reports and banks, ex: Dun & Bradstreet report. As data is more accessible for companies which are traded on the market to get the right financial information sometimes the best way is to ask for it directly from the

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supplier. This factor is more important when dealing with long term supply chain partners. Moreover the challenge that the buyer phases is to track the major problems by understanding the suppliers business processes and performance metrics.

- Operational performance metrics usually cover more areas such as: quality and on time delivery performance, lead times and order management, responsiveness and inventory turns. Some of these KPI's can be accessed either from the buying's firm or suppliers system, or through conduction internal and external satisfaction surveys at the end of the fiscal year.
- Business processes and practices can be observed and reviewed to see how the supplier is conducting daily business and how it ensures that it produces the best product or service at the best value , on time and the quality required by the customer. This information can be obtained through site visits at the suppliers or through questioners making it very important in creating a long term relationship based on mutual benefits. By evaluation business processes through qualitative and quantitative measures problems at the suppliers can be detected and in the future prevention methods introduced.
- Enabling behaviours or cultural factors such as customer focus, agility and continuous improvement are enabled through introducing programs such as Six Sigma and lean management.
- Risk factors can't only be discovered by using past performance to determine the future performance. An important factor in evaluating suppliers is to understand the different types of risks (financial risk, operational performance risk, risk coming from cultural factors and business processes and practices) and finding the best way to mitigate them in the right time. Looking beyond the financial figures enables companies to focus on the business processes, leadership structure at the suppliers and take necessary actions to reduce the appearance of any risk factors.

The factors introduced by Gordon cover the main evaluation criterial when measuring supplier performance. Research shows that in the past the focus of supplier evaluation has been on three main evaluation factors: quality, delivery and price. White et all(2002) argues that qualitative measures are to be considered as critical in supplier evaluations. Their research discovered that the basic measures of evaluating price, quality and deliver performance can be extended with the

buyer –supplier relationship and a good process mechanism. Moreover companies have to create their own evaluation criteria's.

Gordon(2005) proposes different methods that can be used:

- *Accepting a third-party standard, such as ISO 9001 and its sector specific derivatives or good manufacturing practices.*
- *Benchmarking performance against industry leaders.*
- *Measuring performance against best practices, such as the Malcolm Baldrige National Quality Award criteria.*
- *Developing KPIs and scorecards based on system data or internal customer feedback.*
- *Developing your own certification or evaluation and measuring performance against it.*

Supplier evaluations should be done as a periodical exercise; supplier performance should be recorded periodically and organized properly. Through supplier evaluations and performance measurement companies can identify risks and develop improvement strategies for their supply chain partners. Performance measurement can help in identify also segmentation groups for suppliers by classifying them into the “low performers” and the “high performers”. Feedback on evaluation should be provided to suppliers so they can track and measure their internal KPI's .

4.3 Supplier development

Existing literature on the supplier development topic is extensive and presents different theoretical views on the subject. This section of the research will only present and discuss some of the most renowned authors and the theories they present.

Supply chain management has increasingly become a source of competitive advantage.(Krause 1996) As firms focus more on core competences and outsource non-core products to external suppliers they become more dependent on their suppliers to meet their demands and keep up with their competitors. To compete in their specific markets, the buying firm should ensure that their supplier's “*performance capabilities*” match or surpass the buying firms competitors. Krause (1996) defines supplier development as “*Any effort of a buying firm with a supplier to*

increase its performance and /or capabilities and meet the buying firm's short and /or long-term supply needs''

In the current literature we can distinguish between two types of approaches to supplier development: *reactive* and *strategic* (Krause 1996). The reactive approach is less structured and it is only implemented as a result of bad performance from the supplier side and it is mainly concentrated on improving the operational performance. In contrast to this approach which can have positive impact on a short term basis, the strategic approach can be used to develop sustainable capabilities at the suppliers. The strategic approach is directed towards identifying critical commodities that require supplier development activities.(Krause 1997) Furthermore by adopting a rather process oriented approach then a reactive, result oriented approach to supplier development the buying firm can achieve long term stable competitive advantage.

Sanchez-Rodriguez et all (2005) has highlighted the importance of categorizing supplier development activities based on the involvement level of the buying's firms. They propose the following classification of supplier development activities:

The basic supplier development activities require the minimum investment of the company's resources and are considered as first step in the attempt of improving the supplier's performance and capabilities. The supplier development activities include evaluating supplier performance and providing feedback to suppliers about the results of the evaluations (Monczka , 1999) and sourcing from specific limited suppliers. Other activities like part standardization and supplier qualifications are also included in the basic supplier development activities.

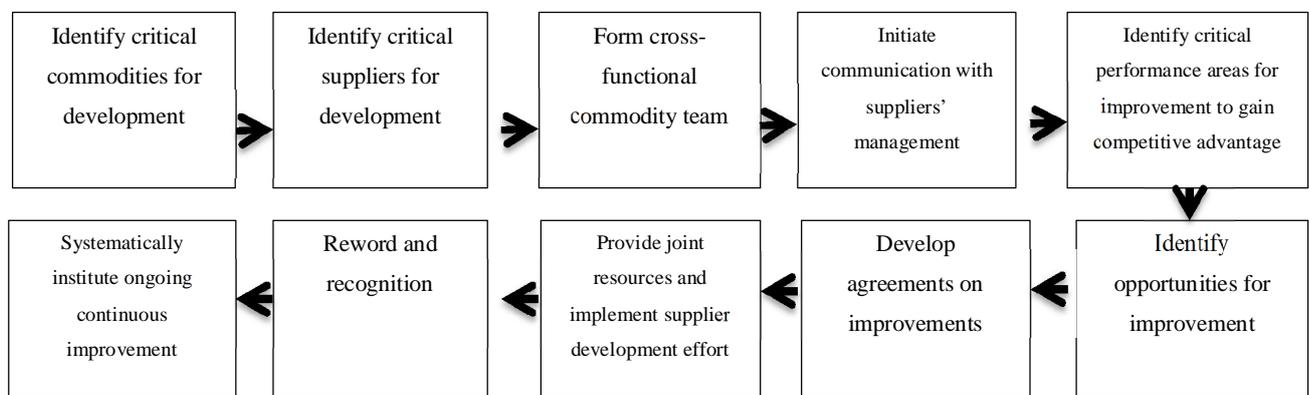
Moderate supplier development activities require more company resources (capital, personnel and time) than basic supplier development actions. These activities require moderate buyer involvement and implementation actions and included visiting suppliers factories to determine and asses their processes, reward policy based in supplier achievement in improving quality and supplier certification (Krause 1997). Moreover the buying firm considers and implements design improvement suggestions provided by the suppliers in the attempt to reduce cost and increase competition.

Advanced supplier development activities are characterized by a high involvement in the suppliers activities of the buying firm by allocating greater resources that the basic and moderate

development activities would require. Supplier development practices that have resulted in high levels of implementation complexity include supplier training programs, higher involvement of suppliers in the design phase of new products and increasing buyers involvement and communication.(Monczka 1999). Higher transparency and sharing of cost and quality related information are also part of the advanced supplier development activities.

As presented earlier supplier development activities can be categorized based on the buying's firm involvement and also can be illustrated as an easy to follow process. Krause et all (1997) introduces the following strategic development process for suppliers.

Figure 9- Supplier strategic development process



Source: Krause , et al.,1998

Supplier development is now seen as a complex organizational activity that requires a more active involvement from a number of functional areas. (Hahn, et all., 1990). Both approaches presented share similar views on how a supplier development program should be initiated and implemented by the buying company. Therefore the process that will be further described and used throughout this thesis considers both views and other relevant information from the existing literature covering the supplier development topic.

- *Identify critical commodities and suppliers.* Companies that take a strategic approach to supplier development usually focus on identifying critical commodities and suppliers that should be developed with the scope to create a world-class supplier base that can provide the buying company with competitive advantage. (Krause, et all., 1998). The supplier

development program can be different depending if it is directed towards new or existing suppliers. In this research the focus will be on existing suppliers by taking a strategic approach to supplier development periodically without it being initiated by bad supplier performance. To identify the critical commodities, supplier segmentation can be used to classify the high- risk and high volume commodities that are usually part of the supplier development program. Next strategic suppliers are evaluated on order to determine which of them require development. In this case supplier performance data is needed for analyses. Some leading companies track supplier performance data on a ‘*plant-by-plant*’ basis ranking the suppliers from best to works and target the suppliers that don’t live up to the set objectives in quality, delivery time , cost and technology. (Handfield, et al., 2000)

- *Forming cross-functional teams.* The buying firm before approaching the supplier must ensure that the internal organization is in line with the development initiative. Moreover to implement certain development measures the expertise of specific functions is needed to carry out these activities. (Handfield, et al., 2000). The cross functional team is composed with qualified personnel from the following departments: quality, engineering, operational and procurement (Krause et all 1998)
- *Communication with the supplier.* Once the cross functional commodity team is formed they approach the supplier’s top management by addressing three main areas for improvement according the Handfield, et al., 2000. First strategic alignment must be set not only from a business and technology perspective but it should also include buyer-supplier alignment that will focus on customer requirements in the entire supply chain. Second supplier measurement will focus on the total cost perspective by including purchasing and other important functions such as engineering, quality and manufacturing. Last but not least a professional approach towards the supplier by involving key experts and a good development plan will create a good environment that will encourage good communication and development.
- *Identify areas and opportunities for improvement.* At the meeting with the supplier evaluation results are presented and areas of improvement are identified together with a proposal of next measures to be implemented.(Krause et all 1998). After the opportunities are identified, managers evaluate them in terms of resources, time requirements,

feasibility and return of investment. During the opportunity evaluation criteria like the willingness of the supplier and buyer to implement the changes must be considered, together with the importance of the product , life-cycle and standardization.(Handfield et al 2000)

- Define details of the agreement and implementation plan. After the potential for improvement is defined a plan to cover the implementation action should be created. The agreement should include deadlines for achievement and milestone, together with defined roles for both the supplier and the buying company. KPI's to monitor the success of the plan should be decided such as percentage of cost saving to be achieved, percentage of quality improvement and delivery performance together with technology availability and system implementation targets. (Handfield et al 2000).Before the project starts each member of both teams should know the designated roles and task and deadlines for completion.
- Monitor status and modify improvement plan if needed. For the development plan to work strategy must be in line with the events of the project. To keep the project on the right track and in line with the agreed deadlines, managers should monitor progress periodically and exchange information. Revising objectives after millstones may result in the need for reviewing and changing objectives together with the realisation that extra resources might be needed . (Handfield et al 2000)

5. Conclusion to the Procurement and Supplier Management Process

As both supplier management and procurement process have now been discussed and their elements described it is now possible to compare both processes and highlight their similarities and differences. To be able to see the link between the two processes and how they interact the following table is presented.

Table 2- Supplier Management and Procurement Process comparison

Supplier Management Process	Procurement Process
<u>Not applicable</u>	<i>Identification of Need and Specification</i>
<u><i>Supplier identification and selection</i></u> <ul style="list-style-type: none"> ➤ Potential supplier identified via different search criteria's ➤ Prepare RFQ ➤ Preliminary qualification phase ➤ Determine contacting method, negotiate ➤ Select suppliers 	<u><i>Supplier selection:</i></u> <ul style="list-style-type: none"> ➤ Identify potential suppliers ➤ Sending request for information and quotes ➤ Analysing received quotes ➤ Create list of potential suppliers
<u><i>Supplier evaluation and performance assessment</i></u> <ul style="list-style-type: none"> ➤ Detailed supplier performance measurements. KPI's on financial risk, operational performance, business processes, cultural factors and risk factors 	<u><i>Supplier evaluation</i></u> <ul style="list-style-type: none"> ➤ Operational KPI's to measure delivery performance and quality
<u><i>Supplier development</i></u> <ul style="list-style-type: none"> ➤ Supplier development activities through direct or indirect supplier strategies 	<u><i>Supplier development</i></u> <u>Not applicable</u>
<u><i>Ordering</i></u> <u>Not applicable</u>	<u><i>Ordering and expediting</i></u>

Source: Self Made

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The main observation is that both processes share similar steps that are executed at the same time. The procurement process first step regarding the need identification and creating the product specifications is not part of the supplier management process, with the exception when a supplier is involved in the early development of a product or project. The second step that covers sourcing in the procurement process is similar in the other process. Nevertheless the supplier selection criteria are covered in more detailed in the supplier management process as different search techniques are applied to screen the local and global markets for potential suppliers.

The difference is noticed in regards to supplier selection. The supplier management process has a more comprehensive approach to supplier selection, as criteria's like quality, delivery time, and cost are considered when selecting suppliers.

Supplier evaluation and assessment are similar and follow the same steps, the difference is that supplier evaluation in the procurement process only focuses on operational KPI's (delivery time and quality) compared with the supplier assessment within the supplier management process that provides more detailed KPI's. Supplier assessment in the supplier management process does not only looks at quality and delivery performance from an operational perspective also considers risk factors, looks at the financial health of the supplier, how well their internal processes work and considers cultural behaviour characteristics important.

The last step in the procurement process refers to the operational task of ordering and receiving the purchase goods and it is not present in the supplier management process due to its practical and non-strategic nature.

Furthermore one very important difference between the two processes is that supplier management covers fully the supplier development step of the process. Supplier development is very important as it focuses on strategic important suppliers and how to enhance their capabilities to create the competitive advantage that the buying firm needs. It has been highlighted that the procurement function has shifted from an operational function to a more relationship based approach towards suppliers. Therefore the purchasing process depends on the supplier management practices to create a competitive supply chain.

6. Defining the procurement and supplier management strategy

The strategic role of procurement has been recognized and is part of numerous organizations through building internal and external relationships and using a more integrative process approach all the way to coordinating the flow of material from suppliers into the company to meet the lead time and requirements of the end customer. Strategic procurement management is linked to the corporate strategy and the goals of the company (Emmette and Crocker, 2009).

Strategy is divided on a number of levels in the organization. 1) Corporate level strategy, 2) business level strategy or “competitive strategy” 3) operational strategy. Thus the corporate strategy is mainly concerned with the overall scope of the organization, operational strategy or procurement strategy is mainly interested on how the different parts of the company will deliver the corporate and business-level strategies through resource, process and people allocation. (Johnson and Scholes 2008).

In supporting the corporate level strategy the procurement strategy will have a focus on cost reduction, improving and developing the supplier base, reduction of lead time and supply base (van Weele 2002).

Gadde & Hakansson (1994) consider three important steps before deciding on the purchasing strategy:

- Make of buy decision
- Supply base structure
- Decision on the supplier –buyer relationship.

6.1 Make or buy decision

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In the past purchasing has not been involved in decision making at a corporate level. Today purchasing involvement has increased and ‘‘make or buy’’ decisions are part of the corporate strategy. (Gadde & Håkansson, 1994).

If the ‘‘buy’’ decision is made there are four main sourcing alternatives:

1. *Single sourcing*. The supplier has the complete know how and technology to produce the material and is granted the full purchasing volume.
2. *Dual sourcing*. Two suppliers share based on a certain percentage the total volume that needs to be purchased.
3. *Multiple sourcing*. More suppliers share the purchasing volume.

From a positive perspective the decision to outsource offers the company the possibility to focus more on core competences and outsource the rest of the operations.(Van Weele, 2005). This way the company will invest the available resources towards customer satisfaction and risk mitigation and use the third party resources more effective.

From a negative perspective outsourcing activities make a company vulnerable by being dependent on the performance of their supplier base. The risks include: confidential information being shared, legal implications and cost associated with outsourcing activities and performance monitoring. (van Weele 2005).

6.2 Segmenting the supplier base

In today’s dynamic environment the companies need to make sure they have the right suppliers for the job that can innovate and reduce costs and deliver in time at a high quality standard. Kumar et all(2012) proposes to categorize suppliers into tiers such as strategic, preferred and approved suppliers that can help the company make sure that the sourcing decision made is in line with the firms strategy.

Strategic suppliers are considered long- term business partners that are engaged in utilizing strategic and operational capabilities of both firms. These suppliers bring a high value to the firm and have a limited possibility for substitutes.

Preferred suppliers usually lack complexity in the market and bring a value to the purchasing firm as categorized between low and high. These suppliers have the least amount of total cost associated with them.

Approved suppliers are reality involved in the development phase of a product and bring little or no added value to the company. Raw material or standard material suppliers fall under this category. These suppliers should be selected on the basis of their support in reducing the logistic cost of the firm.

Classifying the supplier base into these categories can help the purchasing firm to consolidate the supplier base and potentially identify suppliers that should be eliminated. (Kumar et al,2012)

The next step would be to structure the supply base. This can be achieved in a two-step process: first to reduce the number of first-tire suppliers and second, to segment the existing base of suppliers.

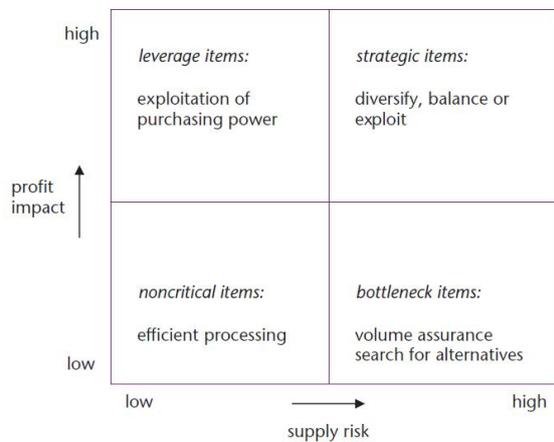
Supplier segmentation is very important when the correct strategy must be applied to the right supplier market as suppliers represent different interests for the company. One of the firsts to develop a supplier segmentation theory was Kraljic (1983) as he presents a useful portfolio technique of segmenting the supplier base of a company.

Kraljic (1983) analyses the purchasing turnover and the supplier base against two criteria's:

1. Importance of purchasing to profit: The higher the purchasing volume, the higher the impact of the purchasing on the profit of the company. The profit impact can be measured in terms of purchasing volume, total cost or the impact of quality on the business growth of the company. (Klarjic,1983)
2. Supply risk: this is measured against criteria such as supply shortage, material availability, make-or buy opportunities, supply market structure, storage risks and substitution availabilities. (Klarjic,1983)

Kraljic differentiates between four categories of purchasing: bottleneck items, noncritical items, leverage items and strategic items depending on the profit impact on one axis and the supply risk on the other axis, see fig 6.

Figure 10- Kraljic matrix



Source: Adapted from Kraljic 1983

All these categories would then require a different purchasing strategy.

Bottleneck items. Bottleneck products are described by having a high supply risk and a low impact on profit. Usually the products are single sourced and can only be obtained from one supplier that holds the manufacturing know-how. This in return will result in higher price and deliver terms. (van Weele 2002)

Noncritical items –low risk. Are usually items with a low purchasing value per item with many alternative suppliers and with a few technical issues from a procurement point of view. (van Weele 2002)

Leverage items. These products are standardized based on different quality requirements. They can be sourced from different suppliers and share a large share of the cost price of the end product. A product price increase in this case would result in a relative cost impact when the product has been produced. (van Weele 2002)

Strategic items considered as high volume products with customer specific technical requirements. Most of the time they are single sourced products and can't be shifted to a different supplier on the short term without incurring transactional costs. Furthermore they represent a significant share of the final product cost . (van Weele 2002)

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The matrix developed by Kraljic (1983) and presented earlier, introduces a four stage approach as a way of developing sourcing strategies for single or multiple products.

By following this matrix, professional purchasers can make a difference between the several supplier relations and create an appropriate strategy for each category seen in the matrix and result in having an effective supplier management (Nellore and Soderquist, 2000).

“ Three general purchasing strategies are recommended: exploit (in case of buyer dominance), balance (in case of a balanced relationship), and diversify (in case of supplier dominance).”(Caniels and Gelderman 2005).

No matter the chosen strategy, the impact will always be reflected in the profit of the company. The main idea of this model is to minimize the supply risk and enhance the buying power. (Gelderman and Van Weele 2005)

Van Weele (2002) has developed four supplier strategies based on the cooperation level of the suppliers that compliments Kraljic(1983) segmentation criteria's. Suppliers are divided in segments based on the strategic approach: partnership, competitive bidding, secure supply and system contracting.

Partnership: this strategic approach fits with the purchasing of strategic products. The most important aspect of this relationship is that in the selection process the suppliers are benchmarked based on their references, financial risk, their research and development potential, production and engineering capabilities together with the quality of their logistics services and quality systems. A slight change in their pricing will have an immediate impact on the end cost of the product thus increasing the supply risk.(Van Weele 2002). Close cooperation and alignment is suited for these suppliers. Open book policy is recommended for providing a better cost transparency. Resources from the buyer side are invested for programs to achieve cost reduction, product development and quality improvements.

Competitive bidding is recommended for leverage products. Long term supply contracts are not recommended since the supplier base and products are easily replaceable. The strategy will therefore be to purchase at the smallest price while keeping the required quality level and delivery conditions. Periodically outsiders will be introduced to reduce to avoid price

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arrangements between the present suppliers. Active market research is an essential part of this strategy (Van Weele 2002)

Secure continuity of supply. This strategy is recommended for bottleneck products being focused on securing supply and flow of material if necessary at additional cost. By developing alternative products and suppliers the dependency on these products is reduced. A risk analysis will determine mitigation plans on a short to long term period. The cost involved in these activities like stock or logistics agreements sometimes exceeds the price profit. (Van Weele 2002)

Systems contracting are suited for routine products. Measures like standardizing the product portfolio, reducing the supplier base and engaging in systems contracts are taken. Simple ordering procedures should be in place and developed by the buyer, The aim of this strategy is to reduce the administrative and logistics complexity together with cost. (Van Weele 2002)

Dyer et al (1998) proposes a different segmentation criteria of suppliers based on two different types of relationships strategic partnerships and durable arm's- length relationships. The model was developed with the scope of avoiding "one fits all" approach to supplier segmentation and to stress on the importance of companies to focus on core competences and outsourcing of the other non-added value activities.

Strategic partnerships (quasi-hierarchies) are necessary when suppliers offer strategic added value contributions. The products that a strategic supplier offers are differentiated from the industry standards and require customization. Due to the benefits of customization like higher quality, new and different product features these strategic inputs require an important degree of coordination between the supplier and the buyer's organization. The buyer is therefore responsible to achieve a higher level of communication with the supplier and make sure that know-how is shared properly between the two organizations. Furthermore exchange of personal between the two organizations should be facilitated by the buyer. Trust, commitment and mutual dependency are part of this type of relationship. (Dyer et all. 1998)

In this specific relationship technological know-how should be shared transparently between the two companies. The supplier should demonstrate a high degree of capability to strengthen its competitive position. To select these types of strategic suppliers the buying company should be able to benchmark effectively the supplier capabilities.

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Durable arms's length relationships (quasy-markets) are recommended for standard products that are available from a larger supplier base. The supplier –buyer interdependency is low and there is less need of coordination between the two organizations.

Dyer et all (1998) differentiates between the traditional arms-length and durable arm's length relationship. The main difference is that the quasi market approach is directed towards long term cooperation with a limited number of suppliers compared with the traditional arm's length relationship which allows a bigger supplier base without benchmarking the supplier capabilities and total cost of the product. The quasy market approach encourages benchmarking in the supplier selection phase to determine the total cost of ownership of the few selected suppliers.

The buyer does not allocate a large number of resources to work with durable arm's-length suppliers. The need of investment and development of the relationship is low and the cost of the final product is less influenced by this relationship. (Dyer et all. 1998)

The advantage of this approach is that competition is kept between two or three relevant suppliers through repetitive benchmarking and the supplier base is kept as long as competitive pricing is available. The shift ability costs to new suppliers are low.

The next table illustrates the combination of the three frameworks to achieve a structural supplier management practice.

Table 3 Supplier Management Strategy based on segmentation criteria

Product Segements	Strategy	Goals	Actions	Supplier management approach
Bottleneck	Secure material availability	Reduce the supply risk and ensure material flow	Continues search for improved supplier base. Implement accurate forecast of future demand. Supply risk analysis. Develop preventive measures(buffer stock, consigned stock)	High investment is needed in the development of the supplier . Capabilities are benchmarked. Periodical involvement of different departments needed (e.g. Procurement-sales, engineering-engineering, production-production, qulaity-quality) Communication and trust are necessary.
Strategic	Partnership	Ensure long term relationship based on trust and commitment. Create "win-win" scenario.	Offer stable forecast of demand. Supply risk analysis. Implement 'should cost" analysis. Vendor ranking. Carefull supplier selection. "Roling" material schedule	
Non critical	System purchasing	Reduce supplier base. Minimize logistic resources and improve operational transactions	Cluster materials in stadardized groups.Implement easy to follow order process.Reduce logistic processing and material hadling . If suitable implement kanban system.	Low investment necessary. Benchmark activities define the supply base. Few resources and low cost need when supplier base is shifted Know-how transfer is minimal therefore a low interaction with the vendor is needed(e.g. Purchasing to sales)
Leverage	Competitive bidding	Ensure best price on a short term basis	Use of "target pricing". Shift supplier base to obtain best price. Search for alternative suppliers or products. Optimize order quantities	

Source: Adapted from Kraljic (1983), Van Weele(2005) and Dyer et all(1998)

6.3 Buyer – supplier relationship

The last important factor that defines the purchasing strategy is the buyer-supplier relationship. The cooperation between the buyer and supplier has moved from a transactional to a long –term *relationship that now puts the ‘emphasis’ on building relationships (Goffin et al, 1997)*

Long term relationships where described as ‘‘partnerships’’ in the 1990’s (Ferguson et all 1994). Implemented by the Japanese automotive companies supplier partnerships has become the pillar for implementing a lean supply chain.

There are two main types of relationships. One can be described as keeping a close and friendly relationship and second alternative would involve less personal contact between the buyer and seller. (Gadde& Håkansson 1994)

Furthermore business to business markets are defined through long lasting relationships between buyer and seller (van Weele 2002). The exchange of products and knowledge in industrial markets is linked with integration dependency between them. “ It is the interaction between the market actors that provide the market with it’s central mechanism” (Ford & Hakansson, 2006)

6.4 Supplier development strategy

Research shows suppliers future capabilities in the long term may not meet the buying’s firm expectations therefore the buying firm is increasingly using supplier development programs and strategies to increase their suppliers performance. (Monczka et all 1995). Different supplier strategies can be used to improve the supplier’s performance. First type of strategies according to Krause, et al., 2002 are categorized as “*externalized supplier development strategies*” because the buying firm uses the external market to determine the suppliers that need performance improvement. These strategies require very little or no involvement of the buying’s firm and they are:

1. *Competitive pressure* is applied by the buying firm through benchmarking activities and introducing competitive bids for a range of products. This strategy can be also applied when dual or multiple sourcing is available and when switching the supplier base is possible. By sourcing from multiple suppliers companies can keep their suppliers competitive when it comes to quality and delivery performance(Spekman 1988)
2. *Supplier Assessment* covers supplier evaluations with a focus on providing a clear feedback to the supplier about the buying’s firm expectations and their performance compared with their competitors. Furthermore the buying firm will provide guidance to the supplier to improve their performance.
3. *Supplier Incentives* are provided based on the suppliers performance and have a scope of making the suppliers improve performance. Some incentives include increase purchasing

volume and prospects for future business with the best performing suppliers (Monczka 1993)

The externalized supplier development strategies can be either used individual or as a combination. They represent either a reward based approach to the best performing suppliers through increasing volumes or through applying pressure and using supplier evaluations to highlight bad performance that in the end will be reflected in a decrease of volumes.

Internalized supplier development strategies require a direct involvement of the buying firm in the supplier's activities by direct resource investment.

4. *Direct Involvement activities* require that the buying firm internalizes the cost of improving the supplier together with resource investment. Some of the activities initiated by the buying firm are training and education of the supplier's personnel and temporarily allocating buying's firm personnel to the supplier. Direct involvement activities are usually decided for supplier with strategic development potential. The buying firm is aware and takes the full risk once the investment in the development of the supplier is made as there is no opportunity to reverse the process. On the long term the direct involvement of the buying firm in the supplier's activities can bring improved quality and delivery performance. Moreover there might be cases when the relationship with the supplier will end prematurely and resulting in no return of investment made by the buying firm. (Krause et al 2000).

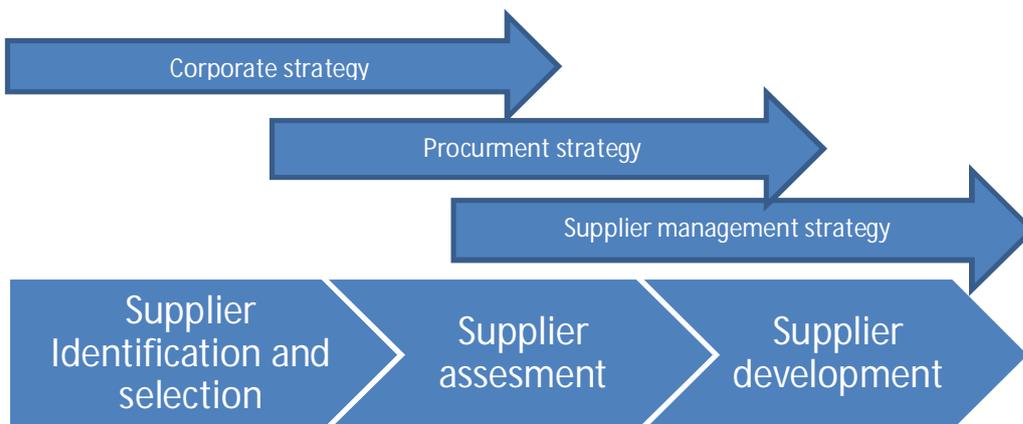
The supplier strategy that the buying firm chose to adopt it is very dependent on how important from a strategic point of view the supplier is. For strategically important suppliers with a long term cooperation plan, direct involvement activities when required would not be necessarily considered risky, whereas the same activities would mean a higher risk when engaging them with non-strategic suppliers. Competitive pressure and supplier insensitive can be used as leverage to boost the performance of suppliers where there is a minimal substitution cost. For both strategic and non-strategic suppliers, supplier assessment and evaluation activities are considered obligatory towards supplier development activities and strategy implementation.

6.5 Conclusion to the strategy formulation

Formulating the procurement and supplier management strategy shows the dependency on the corporate strategy. Make or buy decision is a top down process handled within the management of the company. Segmentation criteria's for suppliers are based on analysing and benchmarking of supplier capabilities, financial risk analysis and quality systems. Furthermore appropriate supplier management strategies are selected for each segmentation criteria and developed within the process steps of the supplier management sequence.

The following illustration shows the correlation between the procurement and supplier management common practices and the links to strategy.

Figure 11-Strategic Flow



Source: Self made.

Strategic procurement is linked to the goals and corporate strategy of the company. To support the corporate strategy the procurement strategy will focus on cost reduction, improving the supplier base and lead time reduction (Van Weele 2002). Lasch et all 2004 argues that at the core of the process to achieve supply chain integration, procurement should impact at the senior level management. Decisions should be made by managers that share the same vision.

The make or buy decision made at the corporate level offers the company the opportunity to focus more on core competences and outsource the rest of the activities. Segmenting the supplier bases can assure an alignment between the sourcing decision and the firm's strategy. Moreover it can help the company to consolidate the supplier base and focus on developing the strategic suppliers and eliminate the non-strategic ones. Klarjic,1983 emphasises the importance of portfolio and product segmentation. The bottleneck segments require a strategy based on securing the material availability and reduce the supply risk , whereas strategic segments require a strategy based on partnership and communication transparency .Last but not least strategy formulation and implementation it is highly dependent on the supplier buyer relationship to achieve a positive outcome

7. Strategic Procurement at Siemens Wind Power

In the next section the procurement process at Siemens Wind Power will be examined and compared with the procurement process framework. Furthermore to understand how supplier development can become an integrated part of the procurement strategy requires that the corporate business and procurement strategy be studied. Understanding how the company's strategy works will also enable the possibility to understand how well each strategy level is aligned and directed towards reducing the supply risk.

7.1 Procurement Process at Siemens Wind Power

Even tough supplier management can be seen as a separate process previously it has been discovered that it can also represent an integrated part of the procurement process. Both the supplier management process and the procurement process have different steps that applied together ensure an effective supply chain. Therefore supplier management can be seen as an integrated part of the procurement process. To understand how the procurement process works will enable the possibility to understand how well supplier management is intergraded within the process.

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The research findings show that the procurement process at SWP is applicable in the same way for purchasing direct, indirect materials and capital goods. The main objectives of the process are achieving the highest possible Contribution to Net Income (CNI) for the company, creating and maintaining competitiveness, increasing the procurement competences and a continuous improvement of the procurement process through an implementation of common methods and tools within the company. (SCMC 2007)

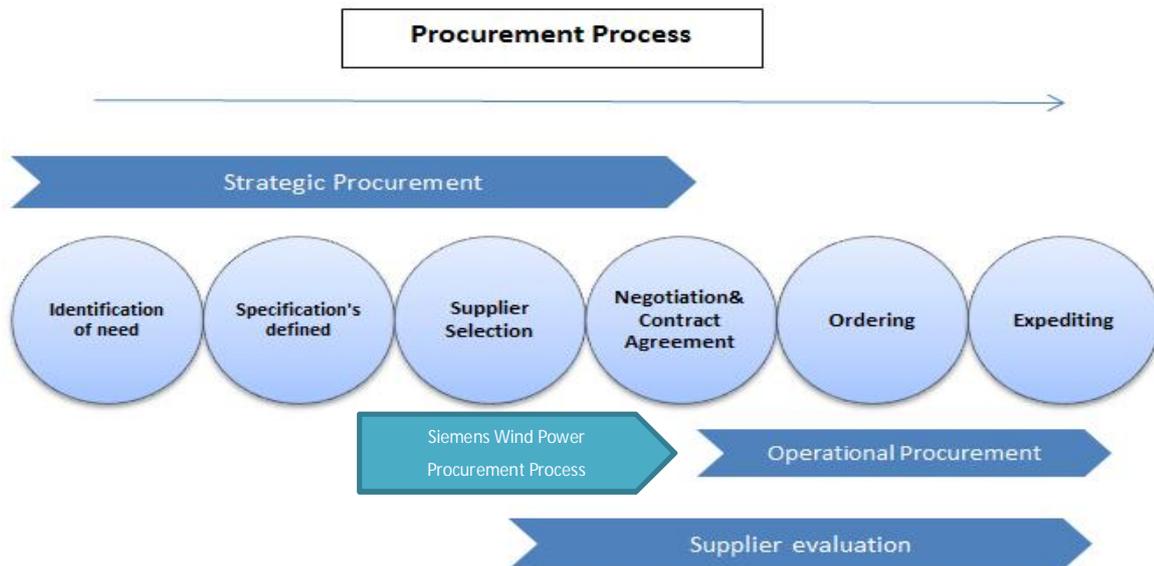
Through early involvement of procurement in the development phase of products according to the SWP Procurement process shown in Appendix 1, costs are minimized through technological and tooling optimization at the supplier. This step is also describes as the Need identification in 3.1.5 Process framework

As part of the process the supplier strategy is defined based on demand, market and supplier analysis that is always connected to the procurement strategy. Negotiation and contract agreement are also part of the process. Both steps are also presented in 3.1.5 Process Framework.

The sourcing decision is made cross-functionally and it based on the decision made by specialists from procurement, quality, engineering and logistics.

Analyzing the process it looks like the SWP Procurement process covers only the strategic part of the overall procurement process and it includes supplier management practices through supplier selection, evaluation and development. The process does not include the operational steps of ordering and expediting. The following illustration shows the theoretical framework of the procurement process and how different steps are integrated in the company's procurement process.

Figure 12- Procurement Process integration



Source: Self Made

Siemens Wind Power procurement process covers only the strategic part, and as illustrated does not include the need identification step. Although procurement is involved in the early development phase of the product it is not part of defining the specifications. Currently all suppliers are delivering parts according to specifications and drawings made by SWP where the company owns the designs.

Sourcing decision is made cross-functionally even if this is not clearly illustrated in the process. Different departments are involved in the decision making and use supporting processes as for e.g supplier management process, the awarding process, engineering change management process (that handles engineering documentation changes of parts) etc. The supplier management process is reflected and defined as support function for strategic procurement.

Clear links between the process steps and involved functions should be visible to provide a better flow of communication within the organization.

3.2 Corporate and Procurement strategy

The corporate strategy has a foundation in the “Vision 2020” strategy. There are three main pillars of the Vision “2020” (Siemens AG 2015):

1. *A clear Mission* that expresses the company’s self-understanding and defines its aspirations
2. *A lived ownership culture* in which each employee takes responsibility of the company’s success.
3. *A consistent strategy* within the power generation and electrification fields and for a well prepared future and a digitalization age.

The mission of the company is “ *We make real what matters by setting the benchmark in the way we electrify, automate and digitalize the world around us. Ingenuity drives us and what we create is yours. Together we deliver*” (Siemens AG 2015)

Through Vision “2020” Siemens AG will focus on the areas of electrification, automation and digitalization, where the company sees potential for success. The strategic direction will not only focus on two quarters of the reporting season but on the years or maybe decades that will come.(Siemens AG 2015):

- *On short term* the company will focus on driving performance and business excellence. The focus will be on getting back on track the business that are not reaching the full potential now and make them competitive again.
- *On medium term* the focus will be on strengthening successful business along the value chain of electrification and allocate resources to strengthen the strategic growth areas.
- *On long term* the company will search further growth opportunities in new fields.

The Vision “2020” is also based on measurable goals that must be achieved in order to for the strategy to be successful:

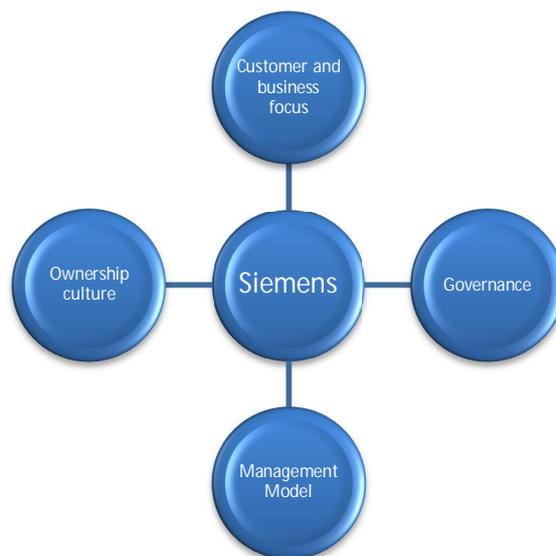
1. Implement stringent corporate governance. Achieve 1 bil euro’s in savings until 2016
2. Create value sustainably. Get the low performance business back on track

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3. Execute financial target system. Grow faster than main competitors by achieving the capital efficiency target an ROCE of 15% to 20%.
4. Expand global management. 30% of division and business management to be based outside Germany.
5. Be a partner of choice for the customer. Increase customer satisfaction with 20%
6. Be an employer of choice. Achieve 75% approval rating in the categories Leadership and Diversity as part of the employee engagement survey.
7. Foster an ownership culture. Increase with 50% the number of employee shareholders.

Based on above arguments in the next figure the Siemens Corporate Strategic framework is presented.

Figure 13- Siemens Strategic Framework



Source: Adapted from Siemens AG 2015

To be successful the company not only needs targets but also a comprehensive strategic framework. (Siemens AG 2015) . The frameworks empower the ownership culture through the entire company, customer and business focus through right resource allocation, improving processes and achieve effective management.

The strategy is further broken down on to the sector level and division level based on the nature

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of their business. The strategic purpose of SWP is related mainly to maintaining the offshore business position as a market leader. Furthermore the company will focus on improving competitiveness on the onshore market. The goal is to achieve 40% cost reduction of the offshore output of wind energy by 2020 through the new 4 and 6MW turbines introduced in the market in 2013.

In the achievement of this goals procurement has a very well defined role. Procurement should support in achieving competitive advantage through establishing a supplier base that can deliver high quality products at a competitive cost. In addition to the above measures, the Supply Chain Management strategy is based on these main focus areas: Safety, Quality, Delivery and Cost through initiatives that encourage clean-up activities, consolidated and continuous improvement.

The company is working on creating supplier base with a global footprint, managed by global procurement offices with support from the local offices. To achieve a competitive advantage based on the supply chain as part of the procurement strategy, the company is focusing on first reducing the number of nonconformance cost from supplier failures. Furthermore SWP is working on achieving a world class procurement organization by implementing KPI's for reporting measures and supplier scorecards, introducing EDI systems and using advanced sourcing models on a global scale.

Moreover from a quality perspective, the company is introducing a new KPI to measure supplier quality performance that will support in developing the supplier base.. The quality levels are also benchmarked with the leading global quality organizations.

One important focus of the procurement strategy is to enable early involvement of procurement in the development phase of the products by close integration of the supplier base through lean supplier performance.

Various KPI's are set to be able to measure the success of the procurement strategy based on the targets received from the division level : CNI(Contribution to Net Income), e-sourcing volumes and GVS(Global value sourcing) of the total purchasing volume.

The main purpose behind the success of the procurement strategy is the success of the cross-functional cooperation between strategic procurement, engineering, supplier quality and operational procurement. Each commodity in SWP has a cross functional team involved in the

decision making process as part of the procurement process as illustrated in the below figure.

Table 4- Cross functional involvement in the procurement and supplier management processes

Cross functions	Need identification	Specification defined	Supplier selection	Negotiations	Supplier Evaluation and Development	Ordering	Expediting
Strategic Procurement	Low	None	High	High	High	None	None
Operational Procurement	None	None	Moderate	None	High	High	High
Supplier Quality	High	Low	Moderate	None	High	None	None
Engineering	High	High	Moderate	None	Moderate	None	None

Source : Self Made

Based on the relationship with strategic partners SWP procurement has led some development and innovation projects for some of the newest turbines on the market. The advantage of these projects based on the knowledge shared by the partners is the competitive advantage that SWP has gained on the market by developing unique systems that can't be replaced or reproduced by competitors.

After analyzing both the corporate and procurement strategy a short summary of the main points will be further presented.

The main characteristics of the procurement strategy are based on e-sourcing principles, global value sourcing activities. All suppliers strategic or non-strategic are approached based on the same strategy and using the same principles and e-sourcing activities. Furthermore the company lacks in the area of analyzing the supplier base and defining appropriate strategies. Only strategic partnerships are considered as focus for the company and a shift to arm's length relationships for some of the suppliers should bring added value since different suppliers should be deal with differently. Due to the large amount of activities that need to be performed with strategic suppliers, by considering all suppliers partnership sometimes the focus might not be on the relevant suppliers that can produce competitive advantage.

In the next chapter supplier management at Siemens Wind Power will be analyzed with a clear focus on supplier development activities.

8. Supplier Management at Siemens Wind Power

Supplier Management at Siemens Wind Power is the same process that is followed by all business units and divisions of Siemens AG. The only difference is the supplier management strategy as it is unique for each business that Siemens does.

The research has showed that for the process to be successful at SWP a specific supplier strategy should be established based on the corporate and procurement strategy. Supplier performance measurements and activities should be at a central focus of the supplier management process. As it is today the supplier management process presented in Appendix 1 is integrated in the company and has as main purpose to optimize the supply chain through reducing risks and through applying the same evaluation methods for the company.(GSCM 2011)

The process begins with supplier selection and qualification and a moves forward to the supplier strategy formulation through cross functional sourcing decision and then continues through supplier evaluation and development and ends either with the phase out of the supplier or continuing business. At this point the process will start again. Moreover each step of the process is explained in Appendix 1 and further in the thesis compared with the theoretical framework presented earlier in chapter 4.

8.1 Supplier Selection and Qualification

The first step in the process is selecting and qualifying the best suppliers that can produce and deliver the parts at the right quality, delivery time and cost. This step is therefore very important and usually takes more time than the other steps to be performed. A new product development, low performance from the existing suppliers, a need to increase the GVS share or a strategic decision to increase the supplier base are considered reasons to trigger the start of this step in the process. The detailed process is described in Appendix 1

8.2 Defining the supplier strategy

Based on the literature review supplier strategy is at the core of the supplier management process and should start to be defined with the first step through the make or buy decision and part of the selection process. The research at SWP has highlighted that in the process defining the supplier strategy is done after the qualification process and therefore reducing its applicable efficiency. Moreover the company does not define strategies on a commodity or product level.

The thesis will look into how supplier management can be structured to reduce the supply risk and how supplier development can become a part of the strategy formulation. Therefore the approach to the supplier strategy will be based on Kraljic's supplier segmentation matrix thus providing a structural approach in describing the appropriate supplier strategies.

Based on Kraljic's(1983) segmentation criteria that looks at the importance of the purchasing volume and its impact on the profit and the supply risk the 10 commodities. To keep the anonymity the commodities were structured from Commodity A to Commodity J .

Each commodity was looked at from a purchasing volume perspective and every commodity manager gave input regarding the supply risk of their commodity. The main areas discussed were:

- What products were they buying as main or secondary components and their impact on the production
- Number of suppliers and switching cost impact
- Type of market and entry barriers
- Bargaining power and supplier buyer relationship
- Purchasing volume

The purchasing volume was calculated as a total percentage output of the SWP spent budget based on internal data.. To categorize the supply risk a classification from 1 to 5 was used, where 5 represents the lowest supply risk and 1 represents the highest supply risk. Commodities with markets where the suppliers are limited and there is a high switching cost of the supplier

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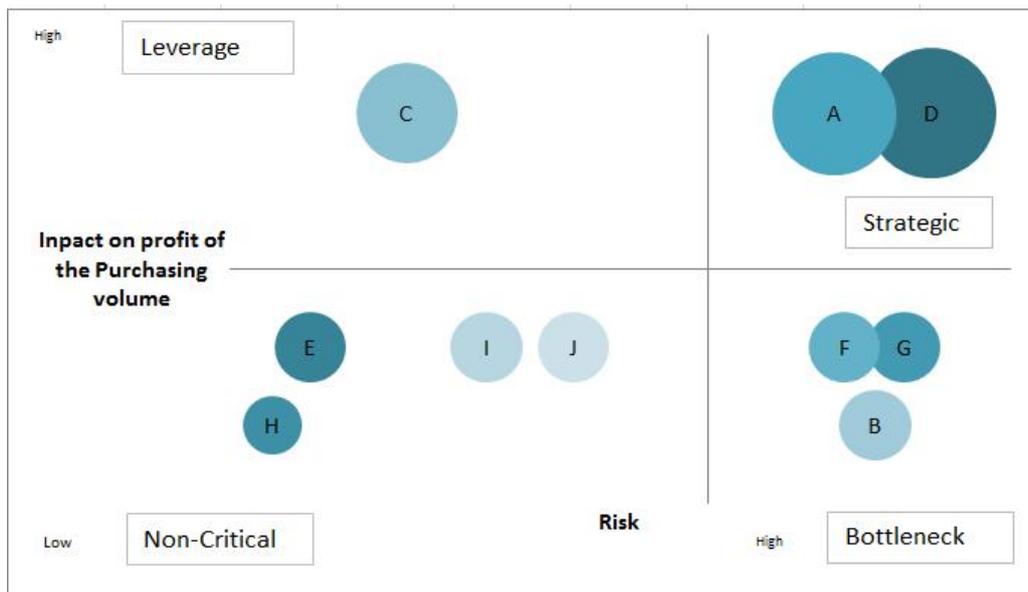
base were categorized as severe supply risk in contrast markets that were characterized by a higher number of suppliers, standard products and a low switching costs of the supplier base were categorized as low supply risk. For commodities with few suppliers but with the possibility for shift the supplier base the supply risk was described as moderate.

Table 5-Supply risk and purchasing volume importance (% of total PVO) per Commodity

Risk	Commodity	PVO %	Market type	Alternative suppliers	Switching costs	Number of Parts
1	Commodity A	13%	Monopoly	Few	High	Few
2	Commodity B	3,60%	Monopoly	Few	Moderate	Few
3	Commodity C	12,30%	Oligopoly	Many	Low	Many
1	Commodity D	14,30%	Monopoly	Few	High	Few
5	Commodity E	11%	Oligopoly	Many	Low	Multiple
2	Commodity F	7,20%	Monopoly	Few	High	Few
2	Commodity G	7,70%	Monopoly	Few	Moderate	Multiple
5	Commodity H	12%	Oligopoly	Many	Low	Multiple
5	Commodity I	9,90%	Oligopoly	Many	Low	Multiple
4	Commodity J	9,10%	Oligopoly	Many	Low	Multiple

Furthermore the data in the table is used to categorize each commodity and place it in the portfolio matrix of Kraljic. The next picture illustrates on the X axis the supply risk and on the Y axis the impact on profit each commodity has based on PVO. The size of the bubbles represents the illustration of the total PVO of each commodity.

Figure 14-Supplier segments



The findings show that most of the commodities are placed in the bottom left corner of the matrix as non-critical items. In the leverage segment we find one commodity with a high PVO impact in contrast with the bottleneck segments where we find commodities with a lower PVO and where the design of the products is owned by the suppliers. In the right corner of the matrix there are positioned two commodities considered strategic where the PVO and risk are characterized as high.

In the next part of the research each segment will be described.

8.2.1 Bottleneck segments

The bottleneck segments are identified within the Commodities F, G and B. These products share an important characteristic as they are designed and produced by the suppliers, therefore making them single sourced. The commodities that are part of this segment have a limited number of suppliers with a relative low financial impact on the profit, but with a high bargaining power due to the fact that they are single sourced owners of the design. Therefore the supply is at risk due to the dependency on the supplier and no alternative supplier that can produce and deliver the same product. Shifting the supplier base on short or mid- term is not possible due to lack of time to design a similar product and qualify another supplier. To minimize as much as possible the risk,

SWP has initiated different actions in order to ensure the supplier has the necessary resources to deliver the required product in time and at the right quality.

Based on these findings in this segment a specific strategy should be developed and applied. Securing the supply should be at the core of the strategy formulation. Delivery performance and quality performance should be closely monitored. A close buyer – supplier relationship would provide better transparency and could lead to a better risk identification and mitigation. The main scope of the commodity is to find alternative suppliers to be able to reduce the dependency on the current supplier.

8.2.2 Non-Critical items

As identified earlier these commodities are the highest in number and they compose 41% of the total PVO. These commodities are recognized for having the highest amount of components and suppliers. The supply risk is described as low due to the fact that competition exists on the market and the parts have most of the times multiple sources of supply. The products in this category are not technological complex and the design for these parts is always owned by SWP. Therefore shifting the supplier base usually comes with less cost. The technological complexity of commodities F and G is higher than for commodity B therefore with a slightly higher supply risk. The market is described as an oligopoly with multiple available sources therefore making the price as main factor of competition.

As part of the supplier strategy performance measurement is need to track on time delivery as some of these parts are purchased just in time for production without any safety stock available. Quality KPI's should also be monitored. The supplier buyer-relationship is not a definitive strategic factor as it can be kept at "arm's length". For these segment ebiddings can be introduced during negotiations and long term contracts are not recommended. The main aim of the commodities is to reduce handling costs and improve the logistic set up with the supplier through IT systems.

8.2.3 Leverage segment

In the case of the commodities interviewed just one of the commodities fits in the matrix with leverage products. The commodity deals with multiple suppliers and low supply risk and with a high purchasing volume. The market is fairly competitive with a high number of suppliers that

are competing to offer the best prices. The products are not technological complex and the switching costs are relatively low. The bargaining power of the buyer is high due to the higher competition. The supplier strategy should consist of supplier performance measurement periodically and benchmarking activities to reduce cost and increase the competitive pressure. To keep the supply risk low multiple sourcing should be applied.

8.2.4 Strategic segment

As a result of the research two commodities were identified as strategic (A and D) due to the high risk and high impact of the purchasing volume on the bottom line. Both commodities are responsible for sourcing complex and critical components that are technological complex. Both types of products sourced by these commodities are technological complex and also very big in size therefore making the cost per item high and logistic handling complex.

The supplier base is limited due to high investment capital in specialized materials and machinery, diversifying the customer portfolio is rather difficult and the suppliers are highly dependent on the wind market, therefore taking a high financial risk. The suppliers have a high know-how and are able to manage production capacities to meet the customer's demand. Additional costs usually occur due to extra transportation costs that are not budgeted. Switching costs are also defined as high due to the technological investment and specific know-how.

To reduce the supply risk the commodity must work in partnership cooperation with the suppliers. Close monitoring of the financial situation of the supplier is needed to identify any potential risks and for an early development of mitigation strategies. Supplier performance is highly important in this case and long-term development strategies are needed. Supplier development actions should be focused on improving quality through reducing all possible nonconformance costs. Negotiation approach for cost reduction is mainly focused on technological know-how and how the cost can be improved through improving and reducing time in the production processes at the supplier.

8.3 Sourcing decision

The sourcing decision is usually made cross-functional and are based on the total cost of ownership principle (ToCo). ToCo is a method to analyze total cost by including the offer price

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and all additional costs from the area of Procurement, Quality, Logistics and technology by considering also the supply risk.

The cost factors from procurement include price, non-conformance cost, lead times, and warranty.

The logistics cost cover transportation and packaging costs.

The costs from quality cover qualification costs and product and process verifications, or audit costs.

The technological costs are classified as soft values and are determined depending on the product time.

The sourcing teams include specialists from procurement, quality, logistics and technology .

The sourcing division is made and the supplier with the lowest ToCo is awarded the highest share.

8.4 Supplier evaluation

Supplier evaluation at Siemens Wind Power is done once a year and is part of the supplier management process that is conducted for all business units at Siemens. The performance of the suppliers is evaluated and recorded in the ‘‘clic4suppliers’’ (Siemens supplier database) over time.

The company’s supplier evaluation criteria’s are presented in detail in Appendix 1.

Before the evaluation starts, suppliers are selected to participate based on their strategic importance which is measured on the purchasing volume received. SWP is working on covering as much as possible of the PVO through supplier evaluations.

The advantage of this approach is that it gives the company the transparency about the past performance of the suppliers and in the future it gives the possibility to identify performance issues that can impact the company’s performance thus creating sustainability.

8.5 Supplier development

The supplier development process at Siemens is an independent process for each decision. The divisions decide on the way the process is applied, the level of commitment and involvement and the suppliers that participate. The supplier development process at SWP is composed of different activities that are triggered by performance issues with the suppliers in daily business activities.

Supplier development is part of the supplier management process and it is initiated as a result of current performance or as a result of the supplier evaluation. Currently there is no defined supplier development process in the company but some independent development activities are defined. Quality issues and late deliveries are usually the main reasons for initiating supplier development activities. Short term measures and action plans are set with the suppliers and monitored throughout an agreed time period. In all these cases only reactive measures are taken , for example when a supplier is delivering late actions like value stream mapping and analyzing the supplier lead time are initiated.

The development process as well as the evaluation process is performed once a year according to the allocated timeframe in the procurement calendar. The evaluation results are discussed internally and meetings with suppliers are set to agree and sign Target Agreements.

For suppliers that under achieve the cross functional team decides which measures to take as part of supplier development program (Siemens 2014). The benefits for driving supplier development activities are:

- Getting access to the know- how and technologies for the best suppliers in the market in support of innovation, growth and top line revenue
- Achieving additional cost savings and waste elimination
- Improving the current supplier and buyer relationship through partnership development and long term sustainability.

As discussed the first step in the process was to identify relevant suppliers for development activities and this is done via supplier evaluation results. Second cross-functional teams are formed and include specialists from procurement, logistics, quality and engineering. During the

workshop with the supplier the evaluations results are discussed and opportunities for improvement are identified. Furthermore the supplier gets a useful feedback on how they are positioned compared with their competitions.

In the next step development agreement is made through common agreed measurable targets for both SWP and the supplier. The research has shown that even though a clear guideline exists on how targets should be set and measured as simple, measurable, achievable, and realistic measured in time (SMART) only a few commodities have achieved this standard. Once the targets are set for both SWP and the supplier they are documented.

As part of the last step, targets are monitored by each responsible person from all areas through a close contact with the supplier in order to monitor the process and implementation actions.

8.6 Conclusion to Supplier Management at Siemens Wind Power

When looking at the supplier development activities that should be performed with the goal of achieving world class procurement activities and characterized through a greater involvement of the company in the suppliers activities. Resource required for supplier training programs, a highly involvement of the supplier in the design phase and increase in the cooperation in the buyer-supplier relationship should be part of the supplier development activities. Strategic development activities in return could benefit the company by creating a competitive advantage through the supplier base. Currently these activities are not part of the SWP daily business as mostly the development activities are initiated on a reactive base and through short term initiatives to mitigate only current issues without looking into long term improvement benefits. Although targets are set with suppliers after evaluations, these are currently not bringing added value to the company as sometimes the same targets are set each year and for multiple commodities without a clear focus on how supplier development can be structured to achieve strategic advantage and long term sustainability.

9. Conclusion

9.1 Supplier Management a Part of the Procurement Process

The complexity of purchasing has increased exponentially increasing the influence of procurement in today's business context. The focus of the company has changed towards core competences and outsourcing of other activities. The pressure of competition is increasing thus putting an accent on the supply chain and the importance of the customer requirements as an integrated part of the company's supply chain.

The complexity of the supply chain is shown through processes that are extended beyond just the physical movement of goods to more complex activities like : purchasing, supplier management, material management, customer relationship management, planning , quality and logistics.

Products are no longer kept in stock and are now produced on customized orders, therefore an integrated supply chain and a good communication flow is needed for companies to stay competitive. The role of purchasing has developed beyond achieving cost savings to more strategic activities concerned with supplier performance management, development, achieving the desired level of quality and improving the time to market of the product. The strategic perspective is highlighted by the shift from transactional to relationship oriented business.

To manage such a complex supply chain requires pre-defined process that ensures the flow of information and goods are done according to customer requirements and lead time. The thesis has discusses the procurement and supplier management processes and has highlighted the common practices and the gaps of both processes.

In the literature review it was identified that both processes share similar steps that are executed simultaneously. The Need Identification step of the procurement process is not part of the supplier management process unless a supplier is involved in the early development phase of a product. The supplier selection criteria are covered in more detail in the supplier management process through applying criteria's like: quality, delivery time and cost as performance

measurement criteria's.

Supplier evaluation and assessment are similar although supplier evaluation in the procurement process focuses only on delivery time and quality KPI's. Whereas the supplier assessment as part of the supplier management process also considers risk factors, analyses the financial health of the suppliers, how well the suppliers internal processes work and considers cultural behavior characteristics important.

In today's dynamic environment companies need to make sure that they have the right supplies to deliver at the right cost, delivery terms and quality. Furthermore for this to be achievable supplier development is a very important process step that is fully covered in the supplier management process. Therefore the purchasing process is highly dependent on the success of the supplier management process.

As companies look into increasing profit and revenue based on the competitiveness of their supply chain, both the procurement process and the supplier management process can't be effective and successful without each other. Although supplier management can be seen as a separate process based on this research it can also be seen as an integrated part of the procurement process.

The research findings show that the procurement process at Siemens Wind Power covers only the strategic part of the procurement process defined in the literature review, although incorporates supplier management practices through supplier selection, evaluation and development. The process does not include the operational steps of ordering and expediting as these are handled by another department closely aligned with production.

Sourcing decisions is made by the commodity team through cross –functional work. Different departments (quality, engineering, procurement, supply management) are involved in decision making through the use of different internal processes.

There are three main activities that define supplier management: effective supplier selection, innovative supplier development strategies and important supplier performance assessment (Kannan and Tan 2002). Activities that are done cross functionally and that are performed by specialist from procurement, quality engineering and supply management.

9.2 Supplier Management strategy a part of the Procurement Strategy

Today purchasing involvement has increased and “make or buy” decisions are part of the corporate strategy. (Gadde & Håkansson, 1994). In supporting the corporate level strategy the procurement strategy will have a focus on cost reduction, improving and developing the supplier base, reduction of lead time and supply base. (van Weele 2002).

Supplier evaluation should be considered as a first step before anything is purchased from the suppliers and should be applied during the lifetime of the business relationship. “You cannot manage what you cannot measure” (e.g. Chan, 2003: 535) is the main idea that highlights the importance of supplier evaluation and performance measurement within the supplier management system.

Supplier evaluations and performance measurement done periodically can identify risk and develop improvement strategies for suppliers. Performance measurement can help in identify also segmentation groups for suppliers by classifying them into the “low performers” and the “high performers”. Feedback on evaluation should be provided to suppliers so they can track and measure their internal KPI's .

The findings show that supplier segmentation can assure the company that the sourcing decision is made in line with the corporate strategy and reduce the supply risk. The Kraljic's(1983) segmentation matrix was used to categorize the suppliers in SWP's commodities analyzed and categorized based on their supply risk.

The bottleneck segments were identified within three commodities (F, G and B). The commodities that are part of this segment have a limited number of suppliers with a relative low financial impact on the profit, but with a high bargaining power due to the fact that they are single sourced owners of the design. Therefore the supply is at risk due to the dependency on the supplier and no alternative supplier that can produce and deliver the same product. Securing the supply should be at the core of the strategy formulation. Delivery performance and quality

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performance should be closely monitored. A close buyer – supplier relationship would provide better transparency and could lead to a better risk identification and mitigation. The main scope of the commodity is to find alternative suppliers to be able to reduce the dependency on the current supplier.

The non-critical segments were identified within commodities with a high amount of components and suppliers. Competition exists on the market and the parts have most of the times multiple sources of supply. The products in this category are not technological complex and the design for these parts is always owned by SWP. The supplier strategy can be defined through extensive performance measurement Quality KPI's should also be monitored. The supplier buyer-relationship is not a definitive strategic factor as it can be kept at "arm's length". For these segment biddings can be introduced during negotiations and long term contracts are not recommended. The main aim of the commodities is to reduce handling costs and improve the logistic set up with the supplier through IT systems.

Only one commodity was identified as part of the *leverage segment*. This commodity has a low supply risk and a high supplier base and acts in a competitive market. The supplier strategy should consist of supplier performance measurement periodically and benchmarking activities to reduce cost and increase the competitive pressure. To keep the supply risk low multiple sourcing should be applied.

Las but not least two commodities were identified as *strategic* (A and D) because of the high risk and high impact of the purchasing volume on the bottom line. Both commodities are responsible of sourcing technological complex and critical components. The supplier base is limited and the switching costs are described as high. To reduce the supply risk the commodity must work in partnership cooperation with the suppliers. Close monitoring of the financial situation of the supplier is needed to identify any potential risks and for an early development of mitigation strategies. In this case supplier performance is highly important and long term development strategies are needed. Supplier development actions should be focused on improving quality through reducing all possible nonconformance costs.

Early involvement of engineering and of the supplier in the development phase of the product will reduce manufacturing risks, ensure a smooth knowledge transfer between the two companies and contribute in achieving an effective supply chain. The findings in the company show that this

approach is not part of the internal process and that supplier are involved to late and are not able to implement improvement ideas in time.

Supplier development strategies and practices have been highlighted in this research as important towards achieving a competitive supply chain and reducing the supply risk. In the literature review two main approaches to supplier development where identified based on Krause(1996) work: reactive and strategic. The research in the company has shown that mostly reactive approach is taken when discussing supplier development practices and implemented when suppliers are showing a bad performance. In contrast the literature review has highlighted the importance of a strategic approach that can be used to develop sustainable capabilities at the suppliers.

Advanced supplier development activities have been described by having a positive impact on the performance of the suppliers. Supplier development practices that have resulted in high levels of implementation complexity include supplier training programs, higher involvement of suppliers in the design phase of new products and increasing buyers involvement and communication (Monczka 1999).

The supplier strategy that the buying firm chose to adopt it is very dependent on how important from a strategic point of view the supplier is. For strategic important suppliers direct involvement activities are recommended as for example the supplier in the commodities identified as strategic. Competitive pressure can be applied for products categorized as non-critical to boost the performance of the suppliers and with a low cost. For all supplier categories different strategies can be applied to improve supplier development activities. At SWP the findings show that the same strategy is applied for all suppliers and there is no segmentation criteria defined.

10. Recommendations

Further research can be done on how other multinational companies perform procurement and supplier management activities. An extensive benchmark of other companies practices on supplier strategies and development. Moreover the research can be extended on what type of strategies other companies have to reduce the supply risk.

Since the focus of the thesis was on supplier management activities and how supplier development can be part of the strategy formulation and reduce supply risk, further extensive research can be done on supplier selection and qualification practices.

In regards to the company recommendation for introducing supplier segmentation criteria and include the supplier development activities as a part of the procurement strategy. The company can also apply different strategies to different suppliers based on their involvement and resources invested in the supplier.

List of Abbreviations

SWP- Siemens Wind Power

CNI- Contribution to Net Income

PVO- Purchasing Volume

SQ- Supplier Quality

GVS- Global Value Sourcing

ToCo- Total Cost of Ownership

SPR- Strategic Procurement

R4B- Ready for business, status provided to suppliers in the internal data base

R2O- Ready to order, status provided to suppliers in the internal data base

SCM- Supply Chain Management

KPI- Key Performance Indicators

GCM- Global Commodity Management

NDA- Non Disclosure Agreement

FY- Fiscal Year

RFQ- Request for Quotation

RFI- Request for information

RFP- Request for proposal

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List of Appendixes

Appendix 1- Data on Procurement Practices at Siemens Wind Power

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