An Empirical Investigation of the Role of Collaboration
In the Wind Industry Supply Chain

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Dedication

To my loving mother who always worrying about me and cheering me up in difficult moments.

Lena Sukiasyan
Summary

- **Abstract** – Today, Supply Chain Management (SCM) is considered as a strategic capability designed to improve the performances of a corporation and to secure its position on the market. Because of the current economic slowdown, this capability is receiving full attention and is beginning to be widely explored and implemented. This research explores the specificities of the wind industry, especially in terms of relationship management within the supply chain.

- **Purpose** – The author explores supply chain practices in the wind power industry and contributes to the knowledge of supply chain management by suggesting the integration of collaboration management components. The purpose of this paper is to investigate the level of supply chain collaboration, and to see to what extent they are applied in SCM of the respondent’s.

- **Design/methodology/approach** – This paper is based on a survey conducted in firms across Western and Northern Europe and Asia,

- **Practical implications** – This paper enhances the commonly used supply chain models by suggesting supply chain integration through extended managerial components. It suggests industry practitioners to construct long-term vision in terms of supplier/buyer relationship, in order to build a continuous flow within the supply chain.

- **Originality/value** – This paper provides intrinsic information about supply chain management in the wind power industry. The main focus however deals with the opportunity of implementing collaborative elements in SCM.

- **Keywords** – wind power industry, supply chain management (SCM), collaborative supply chain management (CSCM), collaboration, management components.

- **Paper type** – Master thesis.
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Lena Sukiasyan

“The answer, my friend, is blowing in the wind”

Bob Dylan
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1 INTRODUCTION

This first chapter introduces the reader to the importance of Supply Chain Management in business research today. Boosted by the current economic conjuncture, this discipline is taken even more seriously than before by concerned organisations, equally market leaders and others. Finally the chapter shall acquaint the reader with the specificities of the wind power industry.

Throughout the study, paragraphs presented in italics provide conclusive comments and thoughts about the previous paragraph or section.

1.1 Background

1.1.1 Why wind power?

Today’s formidable quest for reducing our environmental footprint and minimising anthropogenic impact on climate has more specifically lead to reconsider the question of power generation, i.e. the generation of electricity for our households, fuel for our cars, planes, ships, etc. It has become evident that this should be acted upon as early as now to prevent, or at least minimise, the effects of the use of fossil fuels on climate and ecosystems. Thus considering of renewable energy is very important not only for personal direct benefits but also for other reasons. One of the most important economic benefits of wind power is that it reduces the exposure of our economies to fuel price volatility. Even being more expensive per kWh than other forms of power generation still does not make it disadvantageous. And this makes more sense when the industrialised world is becoming ever more dependent on importing fuel from politically unstable areas at unpredictable and higher prices. Moreover, it should be kept in the mind that our fossil fuels reserve is very limited for using during a period of years (Azau and Rose, 2009, p.18-19). This makes us to turn to renewable sources of energy and particularly push forward wind energy oriented policy and invest money for generating a strategically proven energetic future. (Krohn et al., 2009, p. 8).

From the environmental point of view wind energy can be identified as a renewable source of clean, non polluting energy, emitting no air pollution of greenhouse gases. As another advantage of wind energy can be mentioned a practical side of it to which can be referred wind turbines sizes that take up less space than the average power station. The development of the wind energy leads to a creation of job places through the different projects that are initiated by companies operating in this field (http://renewable-energy-sources-portal.com). Furthermore, the recent environmental developments whether it is damages brought by effects of global warming or oil slick spreading in Gulf Mexico(Walsh, 2010) has shown another perspective. Particularly, keeping the line towards renewable energy and in this sense the line of the wind energy seems to be more than reasonable and environmentally acceptable for our society.

In contrast to other renewable sources of energy wind energy is available in every corner of our planet, which cannot be stated for the solar energy or water, which prioritize this source of energy. This perhaps, will lead us to more actively consider
wind energy as a long-term renewable energy source. Thus, the interest in this area is also motivated by the wish to investigate what can cause a backward movement for such a brilliantly-started industry, hoped to further develop and which is still expected to provide 14-18% of electricity for EU by 2020 (Azau and Rose, 2009, p.18).

Throughout the coming sections of introduction I shall describe the wind industry, starting with its structure itself as well as its main actors, followed by a presentation of the challenges and the role of Supply Chain Management (SCM) before finally explaining the purpose and delineating the overall scope of the research.

1.1.2 The structure of the wind industry

Figure 1 below presents an outline of the structure of the wind industry. From bottom to top, the main actors are second tier suppliers, first tier suppliers, wind turbine manufacturers, wind farm developers, wind farm operators and wind farm owners. In fact, it is not always that simple to distinguish the last three actors (in the darker boxes) at the top as some companies can sometimes carry out two or even three of these roles and would then be developers, owners and operators at the same time. Third tier companies are service providers that offer maintenance contracts for wind turbines and can thus be included in the global structure of the wind industry.

Appendix 1 provides the reader with further information about the components integrated to a wind turbine, therefore enhancing the understanding of the wind industry supply chain and its actors. Appendix 2 will present some of the main actors in the industry.
Owners
They are often utility companies who have financial interest in having wind farms in their energy portfolio through the sale of the electricity and because of renewable energy obligations. Smaller projects can be owned by private companies. The largest projects are often owned by a consortium of companies. Others are sold to banks on completion.

Wind farm operators
They are responsible for the day-to-day operations and maintenance of the wind farm. Specialist operating companies exist although many developers are able to offer an operations service.

Wind farm developers
They are primarily responsible for the inception of the wind farm though to final completion or to the construction stage (depending on what contract strategy is used). Therefore, they undertake all planning and licensing work for the project. Some larger developers play a more active role through the construction phase, and are able to offer operations and maintenance services. In some cases the developer will sell the fully approved or completed project to a final owner, often a utility company or financial institution. Some projects are developed by the end owner of the wind farm, such as utility companies who may set up a subsidiary company to undertake the project.

Turbine manufacturers
Here, the design and assembling stage of wind turbines take place, where components are mainly bought-in. A good number of manufacturers are based in Germany, Denmark, Spain, China and the US. They are responsible for the supply of wind turbines. Some companies offer an engineering, procurement, installation and commissioning, also called the EPIC option. Others just act as suppliers of wind turbine technology to be integrated into a wind farm by others.

First tier suppliers
They provide components or services to turbine manufacturers or balance of plant suppliers, for example gearboxes, generators, transformers, cables, towers etc.

Second tier suppliers
As suggested by their appellation, they provide components and/or services to first tier suppliers. Most commonly: parts of machinery, flanges, electrical components, fixings, etc.

Third party companies
They are services providers who take care of maintenance of wind turbines. They are mostly from Denmark or Germany.

Figure 1. Structure of the wind industry.
1.1.3 Facing the challenges

Before exploring the characteristics of the wind industry, it is important to take into account the current economic situation. Indeed, times of economic slowdown, recession or severe crisis have always had a catalytic effect on business theories and concepts as organisations are looking for solutions to address specific structural issues. Performance becomes an all-time objective expected to save companies from sinking. The appearance of some issues, which have been brought by the recent crisis as well shows how unpredictable the market can be and therefore the importance of having extra levers in this case has more than vital meaning for overcoming any occurring uncertainty in this market. Experts still point out essential challenges that are awaiting the wind energy sector, mainly due to the booming demand and current reverse globalisation (Shirk, 2009). Particularly, the growing demand for wind turbines is causing the lead times and therefore ceasing some of projects. I would like to list some of the challenges faced by wind industry: (Aurbey, 2007, pp. 27-28, ABS Energy Research, 2008, pp. 214-217)

- rising raw materials costs,
- fuel costs,
- demand issue
- cost of risk (long global supply chain inventory costs),
- container and shipping costs,
- exchange rate fluctuations,
- skills shortages.

All above mentioned challenges are very much related to the supply chain in the wind industry. Therefore, I will turn attention to the concept of Supply Chain Management (SCM). Firstly, however I would like to mention about some limitations undertaken during the research, which more detailed explained in the coming section.

1.1.4 Designation issues

I would like to draw the reader’s attention to the fact that due to the dyadic nature of supplier-buyer relationships, there is a need to differentiate actors that can be designated either as suppliers or buyers because of their role in the supply chain from the buying or selling functions within one company. For instance, wind turbine manufacturers are buyers for first-tier suppliers, and are themselves suppliers for wind farm developers. So, to insure the readability of this study, I shall use the denominations provided by Figure 1 to refer to specific actors of the wind industry, and shall discuss each of these actors’ ‘buying function’ or ‘selling function’. The discussion of the all actors will facilitate and shed more light on current issues disposition and their further salvation. Nevertheless, considering some constructive limitations such as time and cost constraints I am going to focus on wind turbine manufacturers and respectively wind farm developers and exclude other actors in aforementioned wind industry structure (see Figure 1). In my opinion these two actors deserve more attention and discussion due to their close interaction and as well as to their location in the core of the industry therefore having direct influence on each
other. Later on in the aim of dissertation I explain my choice and consequently aptness of the undertaken research.

1.1.5 A new breath of air for wind industry supply chain management

Supply chain management (SCM) was originally incorporated in order to reduce costs, but later its function was enhanced and oriented towards high quality earnings and revenue increase. Looking at practices in the supply chain can help to understand how companies are facing the above mentioned problems. Nowadays, supply chain management is considered as a core function for every corporation since it is perceived as a vital ‘know-how’ for overcoming challenges. SCM is a relatively recent discipline and has started to draw researchers’ attention for over the two last decades. Over this lap of time, various definitions of supply chain management have been put forward, and just as variously include organisational restructuring, relationship management considerations and many other components as it will be seen in the next chapter reviewing supply chain management literature. Bernard La Londe, for instance defines supply chain management (SCM) as the “delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing through consumption” (1998).

Wind turbine manufacturers, along with the wind farm developers, belong to the electro-technical industry and over the past decade or so, globalisation has helped such companies thrive and continuously improve their competitive positions. In the meantime, supply chains have become longer than ever before, in the hope of cutting input costs and increasing sales. Thus, organisations have to face continuous improvement in their supply chain management practices, models and components. The further consideration of SCM approaches has lead to another notion of it, which discussed in the theory as CSCM (Collaborative Supply Chain Management).

Particularly, Mehrjerdi (2009, p. 128) explains SC (Supply Chain) collaboration as some force that puts firms in a position of achieving better performance. Hence, for achieving it all members should make all necessary arrangements of collaborative practices, play according to rules and follow all ethical principles for making things go well, etc. Moreover, the collaborative SCM means that companies that are within particular SCM should actively work together towards achieving common objectives Mentzer et al. (2000). Mehrjerdi (2009, p. 128) emphasizes two crucial elements that should be presented in collaborative domain: information and trust. He pointed the fact that information helps to gather and analyze necessary data in every stage of SC and ultimately make appropriate decisions on strategic, planning or operational problems within SC (ibid). The role of information and particularly information exchange was underlined in management components of SCM, where according to Moberg et al. (2004, p.17) information exchange is measured as an integration component among firms and departments. Stank et al. (1996) in their turn expressed the opinion that a positive relationship has been found between information exchange and perceptions of suppliers’ performance. The next crucial domain of collaboration is trust, which is considered as a decision to rely on a partner and hence the expectation that the partner will act in accordance to mutual agreement (Currall and Inkpen, 2002). Metzer et al.
(2000) link it to levels of relationships commitment. In empirical part as well was adopted the levels of supply chain collaboration mentioned by Lambert et al. (1996), which has allowed to find out what kind of levels are applied by respondents. Based on theoretical concepts and collected empirical data the analysis was accomplished with the supposed conceptual framework that might facilitate the SCM of this current industry.

1.2 Purpose

1.2.1 Aim of dissertation

The wind industry has faced some challenges, which have different underlining message, but many of these strings bring to Supply Chain (SC) issues within the industry. Particularly, industry is facing production capacity and resilience to grow on a sustainable basis. This is followed as well with the wind turbine prices rise, which consequently harms the industry’s competitiveness with other forms of generation (www.renewableenergyworld.com, April 2009).

The rapid growth that has taken a short period time for this relatively young industry has encouraged the market entry of numerous developers and manufacturers with multiple competing business models. At the meantime, the industry’s nascent supply chain has also struggled, which ultimately caused demand issues.

Furthermore, the harming wave of still existing economic downturn and financial turmoil will accelerate the industry’s steps toward becoming more competitive, productive, and capable of delivering long-term sustainable growth and all these outcomes will bring much inconvenience for customers (ibid). Thus, industry’s number one task should be co-ordinating and assessing of supply chain for meeting tight schedules that are set before it. Therefore, it can be argued about the importance of collaboration factor consideration, which might be the “necessary key” that will improve the current wind industry SCM. Collaboration highlights such elements like joint decision making, joint problem solving, sharing of risks and having trustworthy relationships, which are increasing the percentage of valuable solutions. Furthermore, the integration of such elements will strengthen wind industry SCM, positively influence on overall performance and improve business processes, which consequently will allow industry actors to be capable to response on challenges. The trust factor as well plays quite significant role in relationships building, which is privileged in collaboration domain. Hence, trust will increase the reliance on partners while making decisions.

In this study I pursue aim to investigate the wind industry supply chain and hope to provide practitioners with a more complete comprehensive view of the supply chain dynamics and show the significant role of certain management components and collaboration while implementing SCM. Consequently, my aim will be to discover to what extent wind turbine manufacturers and wind farm developers implement collaborative policies and how these can be improved in order to enhance corporate performance and minimize the complexity inherent to this industry.
Through a qualitative case study, I aim to find a possible answer to the following question:

**How can wind turbine manufacturers and wind farm developers make use of collaboration in their supply chain?**

The main purpose of the hereby study will be:

- To build and share knowledge on how wind turbine manufacturers and wind farm developers can use collaboration to enhance supply chain performance.

### 1.3 Scope of thesis

The thesis is based on the following:

- Theories collected from different sources including books, articles and internet publications.
- Thesis has a qualitative nature and tends to investigate the issues within wind industry supply chain.
- Due to the fact that thesis is a qualitative study, which philosophy is based on word interpretations, I rely on the information provided by the respondents. Nevertheless, I want to acknowledge that I have taken in account the importance of the consideration of the data quality criterion in the research.
- I acknowledge that I am focusing only on wind turbine manufacturers and respectively wind farm developers. In addition, I want to draw the reader’s attention to the fact that considering the supply chain from the first tier/second tier suppliers’ point of view would unveil another perspective that is not presented in this work. Thus, please acknowledge this annotation carefully whilst further reading this paper.
- The thesis tends to investigate whether some core management components and collaborative policies are considered by wind industry actors.
- The thesis is outlined according to the abductive method, which is a particular combination of deductive and inductive method and tends to find out to what extent theoretical approaches are applied practically.
- Finally, I am not intended to generalise the assumptions, as this research is focused on observation of some actors of the windy industry and has an exploratory nature.
1.4 Disposition of the paper

- **Introduction**
  - Problem identification
  - Aim of dissertation
  - Scope

- **Literature review**
  - Key concepts
  - Related theories

- **Research methodology**
  - Research philosophy
  - Research approach
  - Research strategy
  - Research design

- **Practical methodology**
  - Choice of the subject
  - Preconceptions
  - Data collection
  - Sampling
  - Respondent grid
  - Interview guide
  - Conduction of the interviews
  - Data analysis method
  - Ethical considerations
  - Quality criteria

- **Empirical findings**
  - Discussion of respondents answers

- **Analysis**
  - Based on findings and theoretical part

- **Conclusion**
  - Limitations of the research, final implications and further research suggestions
2 LITERATURE REVIEW

In this chapter, author is reviewing the existing literature with intention to gain more deep understanding of the topic and theories relevant to the area, therefore learning the different approaches that have been developed.

2.1 Supply Chain Management (SCM)

The wind energy industry, like other industries, is supported by numerous other businesses in the supply chain. Currently faced challenges in the wind industry are visible reflection of the SC issues. Thus, a smooth functioning of the supply chain is crucial for future development of the wind industry. Consequently, my interest will be attached to the examination of SCM theory, which seems to be up-to-date in this sense. The empirical findings of this thesis have been interpreted and analysed in accordance to SCM and CSCM theories. The aim pursued by this section is to provide the reader an insight into SCM theory and approaches that it propagandises. To understand supply chain management, I have tried to reflect on the following questions – What is SCM? What is the conceptual framework of SCM and which elements are integrated in the SCM framework? Why can collaboration strengthen the framework and consequently organisation?

Considering the importance and the aptness of SCM for the wind industry I have decided to observe the entire development of this theory, which has given me a theoretical support for my later empirical research. Later on I have utilized some theoretical concepts for investigating to what extent its practices has been applied in the wind industry. Apparently, that the discussion of the basic statements of the theory should not be withheld in this undertaken research as it reviews the constant development of it and finally leads to Collaborative SCM theory. Below will be presented and discussed the literature that will shed the light to the entire SCM history, where gradually will be considered the notion of SCM thus giving a reader complete insight about the theory development.

The supply chain management concept has gained an interest in the early 1980’s and was later engaged in practical use within many organisations (Lummus & Vokurka, 1999, p.11). Lead by the increasing specialisation, many organisations got involved in the search for suppliers, where they pursued low cost and at the same time quality materials rather than their own source of supply. The implication of this notion is that the entire network of supply chain should be designed and controlled to enhance the overall performance. According to Lummus and Vokurka the organisations have assessed the fundamental outcome of this approach and realized that a company dealing with another company, which stands in the next phase of the chain can benefit only when other representatives show appropriate performance (Lummus, Vokurka, 1999, p.11).

In 1995, realising the importance of above mentioned assumptions, a Boston-based consulting firm developed a supply chain model, where have been mainly underlined the material and information flow between manufacturers and their trading partners.
Lummus and Vokurka have listed the points, which should be under manufacturers’ direct consideration while doing a business (Lummus, Vokurka, 1999, p.12):

- Sharing information between vendors and customers
- Giving priority to vertical integration rather than horizontal
- Replacing mass production with customer oriented production
- Emphasizing the importance of flexibility in organisational processes
- Competitive pressure to introduce new products more quickly
- Processes coordination across many sites, etc.

The passing message here is to show that the managers in companies across the whole chain should take an interest in the success of the other companies and make the chain competitive. It helps coordinate easily their actions with their trading partners by using and assessing the information concerning the market future trends. Moreover, the figure above explicitly shows the importance of the information flow and its influence of demand formation, which as a result can affect on the whole production process and respectively on further profit.

Lummus and Vokurka (1999, p.13) stress the importance of managing the link between each knot in the chain pursuing to achieve a synchronization of the entire supply chain. Hence, the latest strike in the economy has shown that there can be hidden dangers in the chain. Particularly, Allen has stressed the assumption (Allen, 2009, p.26) that a lot of suppliers are facing financial collapse, which in fact introduces supply vulnerability into the equation. He emphasizes the importance of monitoring and planning of responses, which can be a tool for overcoming hard situations. Evidently, this approach wasn’t stressed in the list of the Lummus and Vokurka, hence uncovering other perspectives. This thread can lead to the sub-contractors who might play a key, but at the same time invisible role and harm the “health” of the supply chain (Allen, 2009, p.26).

There is no universally accepted definition of SCM, but the passing notion of it seems to be the same. In the early definitions of SCM, it is described as logistics, which is taken across inter-organisational boundaries (Cooper et al, 1997, p.1). Below I am presenting the definition proposed by Bernard La Londe, which describes (SCM) as the “delivery of enhanced customer and economic value through synchronized management of the flow of physical goods and associated information from sourcing through
consumption” (1998). In essence, SCM integrates supply and demand management within and across companies (Moberg et al, 2004, p.15).

SCM is also categorized into the following levels: scope of the supply chain, inter-organisational integration, objectives and finally the evolution toward an integrated supply chain (Cooper et al., 1997, p.2).

- **Scope of the Supply Chain**

According to Houlihan the scope of SCM is the flow of goods from supplier through manufacturing and distribution chains to the end user (Houlihan, 1985). Other scholars discuss activities and functions that should be included in SCM. For instance, Ellarm and Cooper maintain planning and control activities and the integration of information systems (Ellarm, Cooper, 1993). The definition made by Lambert et al. (1998) to the best advantage shows the notion of SCM scope, which basically incorporates all firms in the supply chain by including such processes as planning, implementation and control of multiple businesses.

- **Inter-organisation integration**

Implementation of SCM will require coordination across organisational boundaries, such as integration of processes and functions within organisations and across the supply chain. Especially organisational relationships tie firms to each other which apparently tie their success to the chain. Evidently, that the real competition is rather in supply chain against supply chain than company against company (Christopher, 1992). It is evident that above mentioned coordination requires collaboration between partners and likely mutual involvement in processes and functions, which ultimately leads to strong relationships. Thus building and managing relationships among members should be addressed as an important task while considering supply chain.

- **Objectives of SCM**

The objective of SCM is to lower the total amount of resources needed for providing the required level of service to a specific segment (Cooper et al., 1997, p.3).

- **Towards an integrated supply chain**

After forming an integrated supply chain an organisation is still on a half way to its success, as the main concern in this stage are methods of establishing of the supply chain. Researchers have proposed different models based on a number of stages, which encompass either three or four stages. I have called my attention on the framework suggested by Cooper and Ellarm (1993), which is a three stage model. The first stage in the model is a mapping stage, which in fact analyses lead times and inventory levels throughout the supply chain, consequently indicating the current competitive stage of the chain and potential improvements. Second stage is about positioning, which identifies opportunities for collaborative activities between chain members. And the final stage is concerned with the selection of action and consequently aimed to increase the competitiveness of the chain (Cooper & Ellram, 1993).
2.1.1 Conceptual Framework of SCM

I have pored over the SCM concept and distinguished it from the logistics and gave the historical background of the concept development, where SCM concept actually embraces all business processes cutting across all organisations within supply chain. The conceptual framework is observed with intention to investigate the matter of three components that together bind and build SCM. I particularly pay attention to SCM management components, which show the level of integration and management of a business process link, as adding more management components or increasing the level of each component can increase the level of integration of the business process link (Cooper et al., 1997, p.2). Thus, for each company it is important to figure out the key critical supply chain.

I strongly believe that presentation of the framework showed below will clarify and set the future priorities in execution of this research. The wind turbine manufacturers and developers should assess the opportunities of SCM appropriately. Moreover, this investigation is important in the sense of discussing of some management elements that as well appears in CSCM (trust and information) and could strengthen the SC of wind industry actors. SCM gives an opportunity to be competitive, productive and able to run the long-term objectives and meet customers’ requirements. Therefore, the outcomes from the prudent consideration of SCM can have invaluable benefits for the wind industry, which has to meet the tight schedules that are set before the industry.

In that regard, I am intended to look at the SCM framework structure, which encompasses three major elements developed by Cooper, Lambert and Pagh (1997, p.5) and which identifies the business processes that must be integrated and managed across firms and within supply chains. In their work, the authors especially insist on three core components of the framework, which are the following: SC business processes, SC management components and the SC structure of the supply chain (ibid).

![Figure 3. Elements in the Framework of Supply Chain Management. Source: The International Journal of Logistics Management (1997)](image)

Thus, business processes are activities that produce a specific output of value to the customer. The management components are the components by which the business processes are structured and managed. And finally supply chain structure is the configuration of companies within the supply chain (Cooper et al., 1997, p.5).
These interrelated elements will be discussed more detailed starting from the processes in the supply chain.

- **Processes in the supply chain**

The business process management concept gained popularity in the early 1990’s and Davenport (Davenport, 1993) defined those processes as a structured and measured set of activities, which are designed to produce a specific output for a particular customer or market. Zani (Zani, 1997, p.64) defined it like a structured approach, which serves for analysing and continually improvement of fundamental activities such as manufacturing, marketing, communications and other major elements needed for company’s operation. Supply Chain Council suggests that business should be managed based on key processes–plan, source, make, deliver and return (Stewart, 1997). Hammer (2001) states that particularly the business processes integration across the firms in the supply chain, can be perceived as the most important achievement. Lambert even goes further and stresses that managing business processes through process integration within and across members of the supply chain can significantly facilitate transactions and relationship structures (Lambert, 2004). Chen *et al.* clearly argues that business processes and supply chain integration are dynamic processes and eventually companies need to put continues effort for alignment them in accordance to current situation (Chen *et al.*, 2009). I think that this statement explicitly illustrates that managers should bear in their mind two things: link relevant business processes smoothly and reduce unnecessary steps by simplifying supply chain. Hewitt identified up to fourteen business processes (Hewitt, 1994), however there are seven processes, which consider the main principles.

Here I am referring to examples provided by Centre for Competitive Excellence, which is presented below (Cooper *et al.*, 1997, p.6):

- **Customer relationship management**, which identifies key customers and later develop and put into action programs with key customers,
- **Customer service management** is based on information systems, which is basically provides product information to the customer,
- **Demand management** states that there is an obvious link between flow of material and demand, therefore the role of forecasting is the core principle in this process,
- **Order fulfilment** provides the accuracy within the delivery time, with intention to exceed customer need dates
- **Manufacturing flow management** makes an effort towards right mix of products and defender of principle “producing according to customer needs”
- **Procurement** aims to make relationships with strategic suppliers, hence focusing on the manufacturing flow management processes and new product development
- **Product development and commercialization** is oriented on encompassing suppliers and key customers into the product development process and consequently reducing the time to market

- **Structure of the Supply Chain**

All firms participate in a supply chain starting from raw materials to the final customer and this chain should be managed thoroughly. In this sense the managing depends on
several factors. For instance, it can be the complexity of the product, availability of suppliers or raw materials availability (Cooper et al., 1997, p.9). Based on these attributes it can be easily noticed that manufacturers deal with different chains and these chains look like a tree with spread root system. Consequently, firms face the issue discussing which of these numerous roots should be managed and how to keep the line of relationships (Cooper et al., 1997, p.9). The preference is given to the key suppliers or customers, as they require close observation and managing for avoiding further problems that come along with it.

Apparently, the presence of many components in product will consume more time on establishing appropriate relationships and further partnership. Thus, firms have to choose the level of partnership in accordance to particular supply chain links. The implication followed from above mentioned is that the relationships should fit to current circumstances.

2.1.2 Supply Chain Management Components

All components of the SCM framework play a unique and significant role in the organisation’s performance. Nevertheless, management components remain a core element in SCM implementation (Moberg et al., 2004, p.16) and deserve a more precise investigation as they form the skeleton of the entire SCM framework. Hence there is a need to pay special attention to management components since they determine how the business processes and consequently the supply chain are managed and structured. Thus, I am intended to focus more on this section by trying to investigate the notion of management components.

SCM suggests various possible components that must receive managerial attention when managing supply relationships. Different scholars emphasize different components that should be integrated in SCM. Houlihan (1985) stressed the following components: planning and control structure, product flow facility structure, information flow, values and attitudes, organisational culture and management methods. Meanwhile, Hewitt (1994) listed the following: process (work) structure, information flow, decision authority. More recently, specified list includes: planning and control, work structure, organisation structure, product flow facility structure, management methods, power and leadership structure, risk and reward structure and finally culture and attitude (www.scmlowdown.com, May 2009).

Although scholars identify different management components, I have called the attention to the most popular and applicable approach suggested by Cooper et al. (1997), where they divide components into two groups: physical and technical (1st group) and managerial and behavioural (2nd group). The first group in its turn includes: ‘planning and control methods’, ‘work flow/activity structure’, ‘organisational structure’, ‘communication and information flow structure’. The second group includes: ‘management methods’, ‘power and leadership structure’, ‘risk and reward structure’ and ‘culture attitude’ (ibid). According to Moberg et al. (2004, p.17) all nine components represent managerial variability, which increase integration of the processes, improve overall logistics and performance and evidently are the success drivers of the organisation.
The physical and technical group of management components basically shows the most visible, tangible, measurable and easy-to-change components (Lambert et al., 1998). For instance, Moberg et al. (2004, p.17) have outlined information flow component, which as well has three related variables: information exchange, perceived information quality and commitment to advanced information technologies.

- **Information exchange** can be mentioned as a critical component in SCM, which is measured as an integration component among firms and departments (Moberg et al., 2004, p.17). Moreover, researches showed that increased information exchange between manufacturers and third-party international logistics providers has significantly affected customers’ perceptions about logistics as well as responsiveness. A positive relationship has been found between information exchange and perceptions of suppliers’ performance (Stank et al., 1996). The entire investigation concerning information exchanging has leaded researchers to assumption that it positively effects on logistics performance (Moberg et al, 2004, p.18).

- **Information quality**: Evans et al. (1997) mention that it is crucial for managers to receive the right information at the right time. Whipple et al. (2002) examine information quality in terms of accuracy, timeless and proper formatting. Moberg et al. (2004, p.18) in their turn state that the necessity in accuracy is unarguable as unreliable information will hinder supply chains ability to meet customers demand. The same authors emphasize that information delivery should be done in timely manner as order cycle times can be reduced significantly in this case (ibid). Particularly using of Internet allows to deliver information quickly and in convenient format, which makes its’ use easy for everyone.

- **Commitment to advanced information technologies** shows current advantages of know-how’s in terms of faster information exchanging within supply chain members, which leads to efficient performance (Moberg et al., 2004, p.18).

Components of managerial and behavioural group define the organisational behaviour and influence how physical and technical components can be implemented (Lambert et al., 1998). Moberg et al. (2004, p.19) examine SCM commitment as it tends to be the success driver for an organisation. The same authors stress that the strength of relationships can be defined in terms of trust and commitment level (ibid). Hence, I will call my attention to the notion of commitment and its role in SCM.

**SCM Commitment** is described as the recognition by an organisation of the systematic, strategic implications of the tactical activities involved in dealing with different flows in SC (Moberg et al., 2004, p.19). Moberg et al. (2004, p.19) are stating that the ability of managers to build good relationships is more than crucial while supporting the implementation of physical and technical management components, particularly when it concerns to information exchange and information flow structure. Thus, strength of relationships can be defined by the levels of trust and commitment, which are basically used for assessing SCM strategy. Some scholars view commitment as a key component in successful relationships between organisations (Morgan et al., 1994), since such a commitment towards relationships considered as a facilitator of logistics (Kent et al., 2003). Hence, relationships in this concept can be perceived as a key to success. Furthermore, firms with higher levels of commitment are more successful in SCM.
activities implementation, which is basically followed with the better performance (Moberg et al., 2004, p.19). At the meantime Lambert et al.(1998) are pointing that trust and commitment are the main determinants of relationships. Particularly trust is needed in supply chain relationships with the increasing emphasis on collaboration factor and information exchange. Moreover, trust has been identified as a key that leads to supply chain collaboration. Trust also has been positively linked to levels of relationship commitment (Metzer et al., 2000). According to Moberg et al. (2004, p.20) both trust and commitment between companies should lead to stronger relationships, which ultimately lead to higher levels of logistics performance and strong SC.

In this perspective, it will be reasonable to focus the interest towards collaboration, as it propagandises more advanced levels of relationships. Particularly, collaboration implies the idea that two or more organisations share the responsibility of exchanging common planning, management execution and performance measurement information (Antony, 2000). Thus, looking at collaboration will enable to visualise the importance of the role of relationships in SCM and will show the possibilities for better performance and development for the organizations within the SC.

2.2 Collaboration within the supply chain

Exploring the concept of collaboration within the supply chain appeared as an obvious step in this research that will enhance the observations of the wind industry supply chain. Through the following sections I hope to develop the understanding of the elements of collaborative supply chains in order to better assess the undergoing relationships in the industry and the degree to which these elements are applied.

2.2.1 Collaborative Supply Chain Management (CSCM): a new strategy

Practitioners define collaboration as a means by which all companies in the supply chain are actively working together towards common objectives. In a collaborative supply chain, partners’ own supply chains are intricately interwoven (Kunti, Dias & Jeksani, 2007, p.2). These supply chain partners collaborate towards information, knowledge risk and profits’ sharing (about the product being procured) which drives to a better visibility across the collaborative supply chain. Sharing implies understanding how other companies operate and make decisions. It is more than just simple co-operation. Collaboration defines mutual goals and hence takes organisations far beyond written contracts.

According to Frazier (1983), collaboration is the level to which partners are capable of working together in a joint fashion in order to achieve their respective goals. Collaborative supply chain management or CSCM is a strategy that was first outlined in the 1990’s and was destined to enable a smooth information flow and the sharing of knowledge and profits. To achieve its objectives, CSCM looks at the different processes occurring all along the supply chain. This new strategy has mostly been developed by authors such as Mentzer et al. (2000) according to whom CSCM is implemented when all companies in the supply chain are “actively working together as one toward common
objectives by sharing information, knowledge, risk and profits which could involve on how other companies operate and make decisions”. All supply chain protagonists, i.e. suppliers, manufacturers, customers in the wind industry need to implement a certain number of components to secure this strategic partnership.

According to Mehrjerdi (2009, p. 129) there are two important things in collaboration domain, particularly:

- Information
- Trust

**Information**: The role of information technology should not be underestimated as it enables to gather and analyze necessary data in every stage of SC. Moreover, using of information technology help to make appropriate decisions on strategic, planning or operational problems within SC. Stank et al. (2001) mention that successful collaboration requires a change from standard business practice and especially when it concerns to information exchange. Furthermore, free exchange of data, operating plans and financial information is needed for having a desirable benefit of collaboration (Quinn, 1999).

**Trust**: Trust should be considered as a decision to rely on a partner with the expectation that the partner will act in accordance to mutual agreement (Currall and Inkpen, 2002). Thus, both cooperation and trust help to improve performance. Mehrjerdi (2009, p. 129) mentioning that the SC system is depended on high level of trust. Particularly when trust is high and managers can depend on each others’ information then consequently decisions can be made easier and faster and hence, products, services, ideas, and information can flow freely to help design, implement, and manage initiatives that create added values (ibid). But when trust is low, an alliance can still exist (Das and Teng, 2002), however that alliance’s effectiveness will likely be hindered (Kwon and Suh, 2004; Lewicki et al., 1998).

Barratt (2004) emphasises the importance of linking internal (functional) collaboration that occurs within an organisation to external collaboration which underpins inter-organisational processes. None of the less, I have chosen to especially direct my attention do the inter-organisational dimension as I shall mostly look at the relationships that link wind turbine manufacturers and wind farm developers while looking at the supply chain.

### 2.2.2 Types of collaborative supply chains

The growing CSCM literature has resulted in the emergence of theories outlining different types of collaborations, which need to be clarified.

- **Structure of collaborative supply chains**

Collaborative supply chains can be differentiated in structural terms and can alternatively be vertical, horizontal or lateral. Vertical collaborations emerge when at least two organisations that have different roles in the supply chain share their resources and information in order to serve similar end customers. Horizontal collaborations on the other hand occur when at least two competing organisations cooperate by sharing...
private information or resources such as joint distribution centres between two retailers. Finally, lateral collaborations tend toward flexibility considerations and combines capabilities from both vertical and horizontal methods (Leavitt, 2000).

There exist other types of collaborative supply chains, some of which are based on the degree to which exchange procedures are specified in advance (Lambert et al., 1999), on alliances such as retailer-supplier partnerships, third party logistics or distributor integration (Simchi-Levi et al., 2003, p.143-164).

- **Levels of supply chain collaboration**

![Levels of supply chain collaboration diagram](image)

‘Arm’s length’ relationships are purely transactional and do not have any degree of collaboration. There is a low level responsibility and reciprocity.

‘Communication’ can therefore be considered as the lowest level which focuses on the supply chain’s physical constraint in order to improve productivity and enable information sharing through simple IT applications. It facilitates decision-making and may result for instance in improved delivery rates and lowered inventories.

‘Coordination’ is expected to synchronise flows and create a routine in decision-making processes to improve speed and accuracy. It encompasses both physical and policy considerations.

‘Intensive collaboration’ requires actors to improve the strategic management decision-making and encourage innovation in the chain. It also favours open dialogue amongst protagonists of this level of collaboration. This level of collaboration exceeds basic logistics’ considerations and further deals with policy constraints.

Finally, ‘partnerships’ imply financial linkages, i.e. sharing of investments and/or profits. Partnerships include elements such as knowledge sharing and research and development sharing. Some authors consider partnerships as a special case of supply chain collaboration that can involve extended financial linkages that are not necessarily collaborative or that can overtake pure supply chain considerations (Kampstra, Ashayeri & Gattorna, 2006, p.314).

However, supply chain collaboration differs from joint ventures or strategic alliances, which will imply a level of shared ownership (Lambert et al., 1996). Supply chain collaboration also differs from vertical integration, which suggests common ownership of many supply chain members (Cooper et al., 1997).
2.2.3 Components of Collaborative Supply Chain Management

Frayret’s research (2002) identifies six generic patterns of collaboration, resumed in the following table:

<table>
<thead>
<tr>
<th>CSCM components</th>
<th>Principle</th>
<th>Practical examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Outsourced local decision making</td>
<td>Increase the level of responsibility of suppliers</td>
<td>Supplier quality programme, supplier involvement, seller-managed inventory...</td>
</tr>
<tr>
<td>Improved local decision making</td>
<td>Enhance and align local decision making</td>
<td>Information sharing, joint capacity management...</td>
</tr>
<tr>
<td>Decision objective alignment</td>
<td>Joint objective planning and objective alignment</td>
<td>Collaborative forecasting, collaborative promotion planning</td>
</tr>
<tr>
<td>Pooled resource and capacity sharing</td>
<td>Resource pooling and sharing, and joint investment</td>
<td>Shared pallets, mediated resource sharing, joint facility, joint R&amp;D(Research and Development)</td>
</tr>
<tr>
<td>Supply chain process reengineering</td>
<td>Internal business process redesign and alignment</td>
<td>Supply chain event management, supplier training and evaluation, process postponement, joint cycle reduction, performance metrics</td>
</tr>
</tbody>
</table>


Aforementioned patterns of collaboration include the outsourcing of decision rights, the identification of common goals etc, which are intended to coordinate supply chain decisions, the pooling of resources, the use of technologies thus strengthening the supply chain. The table tends to show the principle of working of collaborative approaches and the results that can be achieved while applying them.

2.3 The need for a new framework in the wind industry

As it was previously said, the wind industry is a growth market that is still in its youth. Supply chain patterns are still not consolidated and there is a need to develop a more specific approach that will significantly curtail the challenges set before this industry. From the concepts examined, I feel there is a need for industry actors to increase their efforts for creating and developing privileged relationships with their suppliers and
customers. While collaboration within the supply chain offers a panel of possibilities that wind turbine manufacturers and developers could implement. This assumption can be supported with the examples presented in the table of Frayret (2002), since some of the elements have enough capacity to overcome the issues underlined in the table presented below. Particularly, exchange of information will give an opportunity to be aware of the partners and the market changes and consequently react immediately. Long term collaboration in its turn will enforce trustworthy relationships and give a sense of assurance in partners while changes take place in the market. And finally joint trainings will allow avoid maintenance issues that could arise during cooperation.

<table>
<thead>
<tr>
<th>Supply chain issue</th>
<th>CSCM solution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Booming demand for wind turbine</td>
<td>- Exchange of information</td>
</tr>
<tr>
<td>Rising costs</td>
<td>- Long-term collaboration</td>
</tr>
<tr>
<td>Skills shortages</td>
<td>- Supplier training and evaluation</td>
</tr>
<tr>
<td></td>
<td>- Joint training</td>
</tr>
</tbody>
</table>

Table 2. Comparing SCM and CSCM solutions

Thus, the CSCM has shown that the efforts towards building collaboration will be able to give necessary responses to facing issues.
3 RESEARCH METHODOLOGY

This third chapter first describes the topic selection process as well as the author’s preconceptions before defining the research philosophy, approach, strategy and design. Furthermore, it explains the research method adopted for collecting data in the view of completing this thesis.

3.1 Choice of subject

Ecology first came into the public debate in the early 1970’s, and has been spreading its ideas and concepts ever since. But never before has it been such an overriding preoccupation for public opinion, recently disappointed by the weak outputs of the Copenhagen summit in December 2009. Nevertheless, the fact that Mankind’s own future, and possibly that of millions of other living species are at stake, is gradually causing governments, companies and individuals to re-think their entire lifestyles.

Nowadays, we more and more get involved in environmental issues, which make us to reconsider our attitudes and think about minimising those impacts. Hence, the consideration of the question of power generation and in this sense renewable energy is not less important. A variety of renewable energies can be exploited in that perspective: biofuel, biomass, geothermal, hydroelectricity, solar energy, tidal power (sometimes called moon power), wave power and finally wind power, the latter being which I wish to concentrate upon. But world population is growing therefore putting additional pressure on power distribution grids and aggravating the urgency for finding ecological solutions. Moreover, today’s economic downturn has set a series of obstacles that supply chain managers will have to by-pass or eradicate.

It is because of this concurrence of the growing interest in ecology and the current economic hazards that I as the author of this thesis felt the need to explore the challenges set before the wind industry. Eventually, my interest focused on supply chain management when I realised the complexity of the wind industry structure and its relative youth compared to other long-time established industries. But most importantly, I realised that in comparison to other industries, the wind power industry seems, not suffered from the economic crisis (WWEA, 2010). Despite economic woes, the wind industry is still showing impressive growth. According to Bloomberg New Energy Finance 9% increase is expected in 2010 (http://www.chinadaily.com.cn, March 2010). Meanwhile, the industry has to overcome some issues raised within supply chain management. Those issues come along from the very beginning of the supply chain and basically include job creation, maintenance, natural resources costs and till assembling of a turbine (www.renewableenergyworld.com, April 2009).

3.2 Preconception

First and foremost, it should be mentioned that I am a management student and free of any links with the studied sector (i.e. the wind industry). The lack of personal interests can represent a form of guarantee that the answers provided by this study will not be biased by any form of preconception. The knowledge was built during obtaining a master’s degree in management and further consolidated by my own readings and
capacity to criticise formulated theories. Throughout the entire paper, the reader will be informed about whether he or she is dealing with pure data or processed information.

3.3 Research philosophy

Saunders et al. (2007) describe research philosophy as “the development of knowledge and the nature of that knowledge”. The selection of research philosophy affects the entire study design and therefore it is important to do a precise choice by looking at the different research philosophies. Consequently research philosophy starts from the discussion of two mainstream perspectives: ontology and epistemology. It should be mentioned that the selection of the philosophy totally depends on the context of the research and research question (Saunders et al., 2007). Thus, choosing of the philosophy can be done through understanding of the nature of the current research and the discussion of the approaches.

3.3.1 Ontology

Saunders et al. (2009, p. 110-119) describe ontology like the researcher’s view of the nature of reality of being. It particularly discusses if social entities should be considered as objective entities, where the reality is external from its social actors or as a socially constructed built up from the perceptions and actions of its actors (Bryman & Bell, 2007, p. 22-23). Aforementioned views are referred as objectivism and constructionism. Objectivism in its turn is an ontological position which states that social phenomena exists independently from its social actors and that individuals can’t influence the outer world (Bryman & Bell, 2007, p. 22). Constructionism in accordance to Saunders et al. (2007, p. 122) accepts the idea that “social phenomena are created from the perceptions of consequent action of social actors”, which in fact implies the interaction among the social actors and their individual preferences and actions to have influence on reality.

The purpose of this research was to understand whether collaborative practices are considered in SCM in the particular companies. Hence, I am looking on social actors (wind turbine manufacturers and wind farm developers) subjective opinions, views, concerns since they can be different and in this sense can provide a new insight to a researcher. This will allow better understand their personal perspectives concerning collaborative SCM approaches implementation. Therefore, I am pursuing an aim to look on the subjective nature of human being with a view on reality as socially constructed. For this reason it seems that the ontological position of social constructivism is more appropriate for the current study.

3.3.2 Epistemology

Epistemology illustrates the study of knowledge and science and consequently forms the acceptable knowledge and whether or not the social science can use the same principles of study phenomena as the natural sciences (Bryman & Bell, 2007, p.16). There are three approaches that describe how knowledge is developed and judged as being acceptable: positivism, realism and interpretivism. For choosing the right path for this investigation these approaches will be discussed below.

Positivism holds a position that the goal of knowledge is simply to describe the phenomena that we experience. In other words, this paradigm exerts the idea that the
surrounding world is external and objective while the observer is independent from the observant (Bryman & Bell, 2007, p.16). Evidently, the knowledge in positivism approach is pushed ahead by investigating the social reality and through observing objective facts. Therefore, positivism entails the principle that the role of theory is to generate hypothesis that ultimately allows develop laws. From the epistemological perspective, research is neither affecting nor affected by the research (Bryman and Bell, 2007, p. 16-17, Saunders et al., 2007, p. 103).

**Realism** in this sense illustrates the mixture of both positivism and interpretivism. According to Sauders et al. (2007, p. 84) realism views the nature of reality as “independent of human thoughts and beliefs”. In this case the way of human beings perceives the world is affected by the processes occurring in social environment. Therefore, realism apply to natural science methods of data collection and analysis (positivist approach), but at the same time it applies to interpretations as the rules cannot be relevant all the time (Bryman & Bell, 2007, p. 18).

**Interpretivism** on the other hand holds the view that such complex disciplines like business or management cannot follow definite laws in the same way as it is possible in the physical sciences. Hence, the broad and rich insight into a complex world cannot be generalised, particularly in business research, where each situation is unique and can be different depending on circumstances and individuals. In interpretivism, knowledge is developed and theory is formed through developing ideas inducted from the observed and interpreted social constructions (Bryman & Bell 2007, p.8).

All these considerations have leaded to the assumption that the answer of this research question is basically context dependent and therefore it cannot be perceived as a universal solution for all industry participants. Hence in this study, I have adopted the interpretivism epistemology. Furthermore, the study attempts to understand the perceptions of the respondents concerning collaborative perspectives in SCM, which means that in the study has been considered the personal interpretations and experiences of the respondents. The undertaken research as well tends to understand the social world through the interpretation of that world through its participants (Bryman & Bell, 2007, p.416). This in its turn implies on the fact that this research will be based on the learnings and interpretations of the subjective meanings that will be get during observing the supply chain management practicing in the wind industry. I believe that this approach will allow infer implications and conclusion in this pursued enquiry and finally achieve the objectives of the research question.

### 3.4 Research approach

This section discusses the different research strategies usually adopted in business scientific studies. Research strategies frame the questions associated with important issues and delineate the needs for the research as well as the method chosen to address those questions.

#### 3.4.1 Relationship between theory and research

For making an appropriate choice it is necessary to distinguish qualitative and quantitative data collection approaches.
Quantitative Research

In quantitative research the attention is focussed on quantification of data collection and it is mainly applied in deductive approach as it allows to link theory and research by testing the theory. From the table above it can be estimated that quantitative research entails positivism and emphasizes naturalist or objective approach of reality. The quantitative research suggests that a hypothesis is deduced from the theory and respectively tested. Moreover, this approach is associated with the measuring of the concept. First of all, it outlines fine differences, between people in terms of the characteristic in question. Furthermore, measurement gives a consistent device for making distinctions and finally it provides the basis for more precise assessment of the degree of relationship between concepts (Bryman & Bell, 2007, p.158). The measuring of a concept can be done by using a huge variety of indicators, for instance personal salary, age, annual turnover, number of employees, etc.

Qualitative Research

In contrast to quantitative research qualitative research emphasizes words rather than numbers and participants point of view thus giving privilege to meaning. It is mostly used in inductive studies and usually follows subjectivism and interpretivism. According to Bryman & Bell qualitative research tends to understand the social world through an examination of the participants and consequently interpretation of that world (Bryman & Bell, 2007, p.402). This approach as well views social reality as a constantly changing and emergent resulting from the behaviours of its actors or other words it refers to constructionism. Nevertheless, the data which is collected by qualitative study is hard to replicate or generalize (Bryman & Bell, 2007, p.423-424).

Taking into consideration the specification of this research it can be assumed that qualitative study is more suitable approach in this case. This particularly can be supported with the fact that the current study takes in account the perceptions, opinions and finally views of different people and therefore can be partly reproduced thus giving a proof that quantitative approach cannot be suitable here as it focuses on replication, which obviously are not possible in the frame of this research. This study as well

<table>
<thead>
<tr>
<th>Research approach: role of theory</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Deductive- testing theory</td>
<td></td>
<td>Inductive- generation of theory</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Research philosophy: epistemological orientation</th>
<th>Quantitative</th>
<th>Qualitative</th>
</tr>
</thead>
<tbody>
<tr>
<td>Positivism</td>
<td>Naturalist social science or objectivism: social reality is independent of social actors</td>
<td>Constructivist social science: social reality is developed through interaction and is constantly emerging</td>
</tr>
</tbody>
</table>

intended to find out to what extent collaborative practices are considered in SCM by respondents, which is more likely to have a qualitative inclination. Leaded with the aforementioned assumptions and particularly referring to the specifications of the constructionism and interpretivism as well as the exploratory nature of this research I dare to insist on applying qualitative approach in this study.

3.4.2 Deduction vs. induction

For researchers, it is useful to consider the relationship between theory and research in terms of deductive and inductive reasoning since they both play a significant role whether it concerns to choosing of research strategy or analyzing the data (Bryman & Bell, 2007, p.15).

In deductive study researcher deduces hypotheses from what is already known regarding the particular phenomena, which basically can be proved or rejected in accordance to collected data (Bryman & Bell, 2007, p.11-12). Besides this approach entails natural science methods and the data is collected through surveys and questionnaires, which are usually analyzed by using statistical methods (Saunders et al., 2009, p.127). Therefore this approach is quite easy to replicate and it is objective by its nature.

In contrast to deductive approach inductive approach first of all is based on gathering empirical data and particularly the data that is used to detect patterns and develop tentative hypothesis, which further developed into general theories (Saunders et al., 2009, p.118-119). Inductive approach tends to investigate more subjective phenomena and has an exploratory nature and in addition uses small samples, which ultimately brings to some difficulties while replicating the findings (Bryman & Bell, 2007, p.14-15).

Because of the explorative aspect of this research, it seemed impossible to base the present research either on pure deduction or on pure induction, so I felt the need to find a compromise to these two radical research strategies. According to Saunders et al. (2007, p.118), it is the nature of the topic chosen that influences what approach should be chosen. Therefore, researcher may decide to combine both approaches because of the topic of the research.

In this research neither of the approaches has been purely applied, as none of them can be totally applied to undertaken research. First of all, this study does not aim to test any hypotheses, but rather aims to find out to what extent theory is applied on practice and gives some final suggestions, which carries inductive characteristics. Nevertheless, for connecting relevant theories with the empirical part and making the flow logical deductive approach as well was implied. This choice was reasoned with the fact that this study contains a body of knowledge and thus it will be logical to base the empirical part on the appropriate theoretical framework that deductive approach can provide. Moreover, the study underpins the qualitative approach, which in its turn accepts and encourages utilizing of both deduction and induction in the research. Therefore, the research approach combines both deductive and inductive approaches, which is called abductive approach.
3.5 Research strategy

In the hereby research, a qualitative approach was adopted after discussing the ontological and epistemological considerations. Now I will move on to the selection of a suitable research design that will provide the framework for the collection and analysis of data. Bryman and Bell (2007, p.44) and Saunders et al. (2009, p. 141) stress that research strategy is based on the constraints that can be most probably encountered while doing a research (data, time, location or money). Yin (2008, p.8) for making more visible the constraints supposed the table, which makes the choice of particular methods quite clear.

<table>
<thead>
<tr>
<th>Method</th>
<th>Form of Research Question</th>
<th>Requires Control of Behavioral Events?</th>
<th>Focuses on Contemporary Events?</th>
</tr>
</thead>
<tbody>
<tr>
<td>Experimental</td>
<td>How, Why?</td>
<td>Yes</td>
<td>Yes</td>
</tr>
<tr>
<td>Survey</td>
<td>Who, What, Where, How many, How much?</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Archival Analysis</td>
<td>Who, What, Where, How many, How much?</td>
<td>No</td>
<td>Yes/No</td>
</tr>
<tr>
<td>History</td>
<td>How, Why?</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Case study</td>
<td>How, Why?</td>
<td>No</td>
<td>Yes</td>
</tr>
</tbody>
</table>

Table 4: Source: Cosmos Corporation (1998)

The table above shows three conditions and their relation to the major research methods. Apparently, that “how” and “why” questions are more explanatory and likely to lead to the use of case studies, histories and experiments as preferred research methods. The same Yin (2008, p.8) stresses that questions dealing with the operational links need to be traced over time, rather than mere frequencies or incidence.

*From the perspective of undertaken research, I believe that the case study design best fits the purpose of this research, as it pursues to answer on “how” question. Moreover, this approach gives a unique opportunity to collect data for more than one particular case at a definite point in time (Bryman & Bell, 2007, p.55). The main interest here are the variables linked to collaboration and performance in organisations found in the wind industry. To better assess these variables, I shall study more than one organisation, in the hope to unravel the link between the selected theory and the data*
collected. Moreover, through the case study design, it is possible to examine the relationships between the variables. The chosen method for collecting data perfectly suits for conducting semi-structured interviews with several respondents, at a precise point in time. This specific design seems perfectly suited to pursued objectives for carrying an exploratory and descriptive study of the wind industry.

### 3.6 Data Collection Methods

Collection of evidence is the cornerstone of research strategy; and the essence of empirical research relies on the production and accumulation of evidence to support its findings. Several approaches to the collection of evidence are available to researchers and the choice depends upon the research strategy being followed as well as the research question itself.

Primary sources relate to the data that collected by addressing directly the originator of the evidence; that is to say to practitioners themselves (or people directly concerned with supply chain processes). Secondary sources on the other hand are related to the information that has been already published and gives a basic knowledge for undertaking the further research. In this case, I have collected data from the primary sources by conducting interviews with the wind turbine manufacturers and wind farm developers.

Qualitative research, as explain Bryman and Bell (2007), is usually linked to methods such as focus groups, group interviews, one-to-one interviews or ethnography. In this research project, the method adopted to gather data is one-to-one interviews. It was initially expected to reach out for at least two respondents working for wind turbine manufacturers and two wind farm developers in order to study the different views and perspectives and hence reduce potential bias. There are three main types of interviews: unstructured, semi-structured and structured (Saunders et al., 2007). Unstructured interviews are much like casual conversation, but with the interviewer having the lead and guiding the direction of the discussion. This method offers the possibility for both interlocutors freely express any ideas or questions that might emerge. Structured interviews on the other hand follow a strictly delineated plan according to which the interview should be carried out.

According to the purpose of this study, I think that choosing of the semi-structured interview type is an appropriate choice for this study. Since this method enables the interviewer to have a clear vision of the topics that should be covered but also gives the opportunity to ask broader questions in a spontaneous manner. I believe this spontaneity will enrich the study as these impulsive remarks might have been lost in structured interview. To help myself in conducting interviews, it was designed an interview manual meant to guide through the discussion and to make certain no points were left out. This interview guide can be found in Appendix 3.

### 3.7 Sampling

The sampling of informants in this study resulted from a convenience sampling strategy, which is a non-probability type of sampling (Bryman & Bell, 2007, p.197-202).
Non-probability sampling roughly designates all forms of sampling that are not conducted according to the mathematical rules of probability sampling. Convenience sampling entails using available sources of information.

The purpose of this study is to investigate to what extent collaborative elements are implemented in the wind industry supply chain and how applying a collaborative strategy can improve the performance of the companies that take part in that supply chain. Therefore, the aim was to reach out as many participants as possible and if possible of various roles in the supply chain: wind turbine manufacturers and wind farm developers. First and foremost it has been made a list of the companies that are involved in this particular industry. By using internet sources have been found companies web-sites and emails have been sent to those organisations in which were asked for a phone interview or face-to-face interview. Using of this strategy however limits the possibility to generalise the findings as respondents are simply a group of managers who are available to the researcher and do not represent managers as a whole.

However hard I tried to reach wind turbine manufacturers I had but few answers at all, a great majority of which were negative. Nevertheless, it was managed to balance this study as I have collected opinions of both actors of the industry: wind farm developers and wind turbine makers. Evidently, that more responses would enrich the research, but as they have explained they did not have enough resources to spare some time and I was made to feel that I was intruding their usual operational processes.

3.8 Interview

3.8.1 Interview Guide

According to the guideline for the non-standardized type of the interview (Bryman and Bell 2007, p.474, Sauders et al., 2007, p.312) researchers can develop a list of questions beforehand which will cover all necessary topics and later on conduct interview. Nevertheless, questions during the interview can be reshaped or rise another question (ibid).

The manual is divided into several parts, which is done in accordance to the literature review and they are following:

- Wind-industry today’s challenges
- Relationships within the supply chain
- Nature of the relationship
- Collaborative consideration

The questions have been designed as open-ended and consequently interviewees were allowed for elaborating answers on their own. Moreover, the questions have been discussed with the supervisor, for keeping both triangulation purposes and confirming the suitability of the questions. This as well has pursued the aim to clarify whether any changes are needed in terms of wording or consistency, before presenting it to interviewees. In the end of the guide it was asked about the information concerning participants and general information about their company.
3.8.2 Conduction of the Interviews and Respondents 
grid

All steps were prepared and reviewed by author in accordance to the recommendations mentioned by Saunders at al. (2007, p.320-327). Interview process has passed the following steps:

- First of all, in advance permissions of conducting interview(s) from respondents,
- In the next step I have sent interviewees interview guide and in case of the calling or face-to face interview I have booked date and time for conducting it,
- The interviews began with introducing of myself,
- The interviews ended with kind request to the interviewees to allow contact them again in case if further questions will arise after revising the information

The interviews were conducted in English by using different types of conducting (face to face, calling). During the interview notes have been taken in order to analyze the data and later on make transcriptions. Moreover, it should be mentioned that some of the respondents have been re-interviewed, which was basically related with the fact that there have been done improvements in the interview manual, which required to reach respondents additionally. As an author I have tried to simplify question and avoid any sophisticated reproduction of them, therefore making them as much as possible clear for interviewees. While conducting interviews has been taken in account skills of interviewing such as clarification, active listening and paraphrasing were used to clarify interviewee answers and obtain relevant information. Before each interview beginning in the notes has been mentioned both dates and the starting time of interviews, and consequently ending time as soon as interview finished.

The respondents who agreed to participate in this study are Mr Lars C. Johansson from Umeå Energi, Mr Stefan Skarp from Skellefteå Kraft, Amrit Singh Thapa from Mirlung-Electro Mech Concern and the last participant has requested to remain anonymous and keep company name confidential, but allowed to mention position. I briefly present the encounters with each of the respondents in the following table. A more thorough description of their respective position and company is provided in Chapter 5 Empirical Findings where I present the empirical data collected. In regards to the main wind industry protagonists are presented in Figure 1, Umeå Energi AB and Skellefteå Kraft AB are both utility companies or what I initially referred to as ‘developers’. And Mirlung Electro-Mec Concern as well as Company A belongs to the ‘wind turbine manufacturers’ in the same figure.
<table>
<thead>
<tr>
<th>WT manfc. and devlp.</th>
<th>Respondent name</th>
<th>Respondent position</th>
<th>Company</th>
<th>Years of experience</th>
<th>Interview type</th>
<th>Date and duration</th>
</tr>
</thead>
<tbody>
<tr>
<td>WT Devlp.</td>
<td>Lars C. Johansson</td>
<td>Operativ Chef</td>
<td>Umeå Energi AB</td>
<td>7</td>
<td>Face-to-face</td>
<td>2010/05/06 40 minutes</td>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Face-to-face</td>
<td>2010/06/09 23 minutes</td>
</tr>
<tr>
<td>WT Devlp.</td>
<td>Stefan Skarp</td>
<td>Head of the Engineering &amp; Development department (Avdelningsschef Teknik &amp; Utveckling)</td>
<td>Skellefteå Kraft AB</td>
<td>10</td>
<td>Calling</td>
<td>2010/05/12 48 minutes</td>
</tr>
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<td></td>
<td></td>
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<td></td>
<td></td>
<td>Calling</td>
<td>2010/06/03 35 minutes</td>
</tr>
<tr>
<td>WT Manufc.</td>
<td>Amrit Singh Thapa</td>
<td>Proprietor / Chief Engineer</td>
<td>Mirlung Electro-Mech Concern (MEC)</td>
<td>4</td>
<td>Calling</td>
<td>2010/05/17 23 minutes</td>
</tr>
<tr>
<td></td>
<td></td>
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<td></td>
<td>Calling</td>
<td>2010/06/05 22 minutes</td>
</tr>
<tr>
<td>WT Manufc.</td>
<td>Respondent A</td>
<td>Category Manager</td>
<td>Company A</td>
<td>3</td>
<td>Calling</td>
<td>2010/06/10 26 minutes</td>
</tr>
</tbody>
</table>

Table 5. Respondents’ grid.

3.8.3 Data Analysis Method

Data analysis illustrates and simultaneously integrates theoretical and empirical data. In other words data analysis is the process which forms the findings after analyzing collected data based on theoretical background. While analyzing data you are crossing with both original types of it quantitative and qualitative. Quantitative data analysis is focused on numbers, figures and basically depends on statistical significance and as a rule performed when all data is collected (Saunders et al., 2007, p. 472). Nevertheless, this research is based on the qualitative strategy, which is based on large number of verbal data, from which has to be selected applicable one for the analysis.

I have tried to follow general procedure concerning qualitative data analysis, as it allows be effective while analyzing collected data from interviewees. The data has been categorized in accordance to interviews belonging and was considered from the point of view wind turbine manufacturers and wind turbine developers. The development of analysis has been based on comparison between the two actor groups (wind farm
developers and wind turbine manufacturers). Such a choice was reasoned with the fact that the number of respondents was limited and consequently it will be easy to compare and draw conclusions. This as well allowed elaborate some differences inherent to these both actors, thus exploring what are their concerns. The theoretical concepts have served as a base for understanding of how they are implemented on practice. Hence, theoretical considerations and available empirical implications have inspired on proposing conceptual framework that might facilitate the SCM in the current industry.

### 3.9 Ethical considerations

When conducting business research; there are four main ethical principles to consider: the potential harm of participants, the lack of informed consent, the invasion of privacy, and deception (Bryman & Bell, 2007, p.132-142).

The interviews were designed and conducted in a fashion that would least harm the respondents. I tried to respect their wishes according to the time resources they had and let the interviews choose the conditions in which they wanted to be interviewed (choice of date, location). As much as possible I tried not to put the interviewees under any pressure or stress, as any kind of harm to the respondent, either physical harm, harm to the respondents’ self-esteem, stress, harm to employment, or inducing the respondents to perform illegal acts, is not acceptable (Bryman & Bell, 2007, p.133).

In the begging the research has been started with my partner and in this sense some of the interviews have been conducted together, but due to her personal issues she could not continue her participation in this study. During the study, we always informed the people about who we are and what were our intentions for reducing the possibilities of uninformed consent (Bryman & Bell, 2007, p.137-138). Later on I have continued doing interviews based on the same principle as it is an important moment that respondents should be well informed before participating in a study. By doing this, I have also dismissed any possible deception (Bryman & Bell, 2007, p.141, since I have tried to answer to any questions that the respondents were asked. Yet, one of the respondents has requested to stay anonymously, which was fully respected in this study as this research has no intention to harm any of its participants (Bryman & Bell, 2007, p. 132).

In this sense there will be mentioned only the positions that respondents hold in their companies. This was done for avoiding causing any embarrassment to the participant, thus assuring the confidentiality of gathered data and privacy (Bryman & Bell, 2007, p. 139). Finally, I assured the interviewees that the responses would only serve the purpose of this thesis.

### 3.10 Quality criteria

Gauging the quality of qualitative research study begins with interrogating its credibility. The qualitative approach is usually criticized due to its interpretation nature. And this is reasonable as qualitative research has subjective nature, which in fact concerns with understanding from the author’s perspective (Bryman & Bell, 2007, p. 423-424). Moreover, it is not always possible to generalize the results, thus for assessing the quality of qualitative research there are proposed two approaches: trustworthiness and authenticity (Guba and Lincoln 1994, cited in Bryman & Bell 2007, p. 411).
3.10.1 Trustworthiness

Trustworthiness in its turn consists of four criteria (Bryman & Bell, 2007, p. 411):

- credibility
- transferability
- dependability
- confirmability

- Credibility

This criterion mainly entails that the study is conducted according to the ‘canons of good practice’ and submitting research findings to the participants for confirmation (Bryman & Bell, 2007, p. 411). The credibility of the study was mainly assured by going over the findings with the respondent at the end of each interview to obtain a certain validation.

- Transferability

Transferability shows whether or not findings ‘hold in some other context, or even in the same context at some other time, is an empirical issue’ (Lincoln & Guba, 1985, p.316). And the same stated by Bryman and Bell (2007, p.413), where they describe transferability as a possibility of transferring the findings of a study to another context. Nevertheless, in case of qualitative research it is quite hard to do that as it requires from researchers to provide very rich and detailed data for being able to transfer it for another setting. In this case I am not intended to give a broad view to my findings, but rather to show to what extent collaboration is applied in SC’s in the particular companies. In addition I provide the reader with sufficient database for him or her to make judgements about the transferability of the findings: i.e. precise date of interviews, information about the respondent and the company, the country, the economic situation, etc. However, the limited possibility of transferability does not seem to have a bad influence on the whole study as it suggests interesting solutions and can serve as a source for starting a further research.

- Dependability

This criterion here entails ensuring that maximum information about the research process is available to peers, in an accessible manner (Guba & Lincoln, 1994) in order to enable them to assess how far proper procedures have been followed. The dependability entails the factor of auditing, which in fact is time consuming and therefore wasn’t adopted in this study. Furthermore, the reader was provided with the background for the problem formulation, the process for selecting the respondents and the overall strategy for conducting this research, which I hope will help the reader assess the quality of this work. I strongly believe that my supervisor from the very beginning of the research has reviewed and leaded me through the research process and ensured that I have undertaken all needed procedures throughout the research. Considering the small scale of the research I think that to certain extent dependability criterion has been met.
- **Confirmability**

Bryman and Bell (2007, p.414) stress that the confirmability shows to what extent others can confirm the results. Qualitative research is depended on researchers’ interpretations, which means that confirmability should ensure that researcher has not allowed his personal values or inclinations to affect the findings and consequently further research results (Bryman & Bell, 2007, p. 411). As a researcher have tried to keep good faith, although I recognise that pure objectivity is impossible in business research. Nonetheless, I have tried to prove throughout the description of this research project that I did not allow any personal values of theoretical inclinations disrupt the quality of this work and findings. Therefore, I believe that I have minimized any possible inclinations in this research.

### 3.11 Authenticity

Again, Guba and Lincoln (1994) suggest criteria of authenticity, in addition to the four just above mentioned:
- fairness,
- ontological authenticity,
- educative authenticity,
- catalytic authenticity,
- tactical authenticity.

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- **Fairness**

Whether or not the research fairly represents the viewpoints of the area study, is a crucial quality element. As specified while describing the scope and the purpose of this study, I chose to focus on organisations that belong to the wind industry. Every single one of participants fulfills that criterion and their opinion which collected represents to a certain extent the opinions that circulate within this particular industry.

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- **Ontological authenticity**

Ontological authenticity looks at whether or not the research helps practitioners arrive at a better understanding of their environment. It is my hope that the theoretical and managerial implications above stated will enhance their understanding of the workings of the wind industry supply chain, as I initially hoped at the start of this study. I believe that the findings do highlight the need and the importance for organisations to implement far more collaboration in their supply chain strategies.

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- **Educative authenticity**

This criterion assesses whether or not the study helps participants to better appreciate the perspectives of other members of their business setting. I see collaboration as realistic and efficient way to secure and improve supply chain processes and an opportunity for all to learn from one another. The responses collected offered different visions regarding the type of relationships they contemplate having with other members of the industry. In that sense this study offers a certain level of educative authenticity and also possibilities for further educative outcomes.
- Catalytic authenticity

The catalytic criterion entails that the research might spark off certain reactions among the participants. I find this criterion difficult to assess in the immediate weeks following interactions with respondents. To verify the catalytic authenticity of this study, I suggest further studying the latter after a certain laps of time, to see if any elements of collaboration have been implemented during that time. From the interviews I however felt a degree of uneasiness while asking questions about collaboration and a great difficulty to give an exact definition of this notion. My guess is that elaborating collaborative strategies along with other members of the supply chain never appeared as a valuable solution, and the importance I was giving to it sometimes surprised the respondents and hopefully caused them to rethink their position regarding collaboration.

- Tactical authenticity

This last criterion questions whether or not the research has empowered members to take the steps that are necessary for engaging in action, i.e. does it provide sufficient information to further the catalytic impetus above described. Throughout the study I have provided the conceptual framework to help wind industry protagonist face the challenges that lie within the supply chain. This framework was based on and empirical findings and a literature review that examined and explained the various concepts approached hence providing certain guidelines for practitioners. However, as I have already suggested, supply chain practices are unique to the organisation that applies them, therefore limiting the importance of the tactical criterion in this study.
EMPIRICAL FINDINGS

The fourth chapter reports the findings, or empirical data, gathered throughout the interviews. The reader is invited to refer to the interview manual provided in Appendix 3. A short description of the company and of the interviewee precedes the presentation of the qualitative data.

4.1 The respondents’ profile

4.1.1 Umeå Energi AB

Umeå Energi AB is a company that produces, distributes, and sells energy to approximately 57,000 private and corporate customers. It also provides telecom services and is a successful broadband company. Its main characteristic is to have strong environmental policies and in that perspective, the company plans to base the whole of their energy production on renewable energy by 2018. They employ about 270 employees and have an annual turnover of over SEK 1 billion (www.umeaenergi.se). The respondent from Umeå Energi was Mr. Lars C. Johansson, project manager for the wind energy department (Projektledare vindkraft) who amicably agreed to respond to the request. His experience in this field spans over 7 years.

4.1.2 Skellefteå Kraft AB

Skellefteå Kraft AB is a utility company owned by the municipality of Skellefteå. The corporate company’s business has been hydro-power for the last 100 years (n° 4 in Sweden). Skellefteå Kraft operates its own power plants and plans to buy and build its own facilities in the future.

Their wind power supply chain is approximately constituted as follows:
- 77% of the costs are allocated to the wind turbines
- 23% of the costs are allocated to the foundation, cables, etc.

The interviewee from this company was Mr. Stefan Skarp, Head of the Engineering and Development department (Avdelningschef Teknik & Utveckling), who kindly agreed to answer to questions during two phone interviews. The department he has been the head of for the last four to five years mostly deals with electricity production and trade. Before reaching his current position, Mr Skarp was a project manager. His experience in the wind industry spans over ten years.

4.1.3 Mirlung Electro-Mech Concern

The supplier respondent Amrit Singh Thapa holds the position of Proprietor / Chief Engineer in Mirlung Electro-Mech Concern and has four years experience in the wind industry field. Mirlung Electro-Mech Concern (MEC) was founded in 2006. It was developed to meet the increasing demand for Alternative Source of Energy – Wind/Solar research, products and solutions. Their achievements during this short period of time were good and show a possibility of future better development. They have already actually completed a number of projects and stably holding the market
leader position in providing wind power solutions, LT/HT electrical switchgear, electro-
mechanical works and distribute transformer works. Furthermore, they are oriented on 
implementation of sustainable electric power generation that benefits directly to remote 
windy villages/locations and the environment of Nepal.

4.1.4 Company A

The respondent has requested to keep the name of the company anonymous. However, 
it should be mentioned that the company is one of the big operators in the wind 
manufacturers market. Moreover, the company as well is selling, installing and 
providing other services in wind turbine manufacturing market. The company operates 
manufacturing plants in many countries and thus has employees all over the world.

4.2 Findings

The interviews were organized with the sense of getting more information and by listening 
both sides and having complete opinion about current situation. Moreover, the respondents 
are quite experienced and they have tried to share this experience as much as possible. In 
the beginning of the interview respondents have been asked more general questions and 
later on they have been leaded to the main interest of this study- collaboration. This 
approach allowed see whether they realize the importance of collaboration or have ever 
used it.

4.2.1 Wind farm developers:
Stefan Skarp (Skellefteå Kraft),
Lars Johansson (Umeå Energi)

Regarding the wind industry’s current situation

According to Mr Skarp (Skellefteå Kraft), the economic crisis has not hit the wind 
power sector as harshly as the automotive sector for instance. The big challenge consists 
in adapting to the rapid growth. As electricity prices went down, the need for electricity 
also declined thus limiting the companies’ investment capability. Moreover, the support 
scheme assured by the Swedish Government was also reduced. Both Mr Johansson 
(Umeå Energi) and Mr. Skarp agreed on the fact that the demand has been lowered 
which meant better prices and shorter delay times. Both companies seized this 
opportunity to invest in wind turbines at advantageous prices.

Relationships within supply chain

Skellefteå Kraft’s wind turbine suppliers are Winwind, Enercon and more recently 
Nordex. Until three years ago, the company’s purchasing schemes were under public 
procurement regulations. Companies had to display public offers in order to choose 
suppliers. But two and a half years ago, a European court case created a precedent by 
deciding that publicly owned actors that produced electricity don’t have the obligation 
to follow these rules. From then on, utility companies were allowed to resort to 
negotiation to choose a supplier. So for 13 offers, you can lower them down to one by
naming your own conditions, in this case, it becomes a one year long process (supplier chosen: Nordex).

According to Mr. Skarp the European court precedent has created a positive impact on competition by opening up proper negotiations between buyers and their potential suppliers. From then on, the wind energy sector is ruled by free agreements. This reinforces the buyers’ power upon the still very powerful wind turbine manufacturers. Mr. Johansson told that their main suppliers are Vestas and Enercon, however sometimes they deal with Siemens.

Nature of relationships

Mr. Skarp (Skellefteå Kraft) has mentioned that they use different contracts, but he specified that majority of the contracts is based on European standards, particularly Swedish contracts ABA99 and ABT 06. The contracts include clauses regarding guarantee as well as maintenance. These contracts are the industry standard. When choosing suppliers, Skellefteå Kraft mostly looks at the price and carries out a life-time analysis: price per KW/h produced, cost efficiency, long-term supply of spare parts, maintenance costs. Counterpart analyses are also part of this process. Interestingly, Mr Skarp specified that purchasing policies are not integrated to the Skellefteå Kraft’s handbook, they are the result of the company’s own experiences in other domains. The quality system is totally adapted to their activities and therefore differs from that of other businesses. During procurement periods, Skellefteå Kraft hires business consultants who bring their own expertise on such questions. Answering to the question regarding trust Mr. Skarp has mentioned that they ensure the processes with their suppliers thanks to contracts. However, he has signified as well that the factor of trust is based on the assurance that the supplies (i.e. wind turbines) will be delivered on time and expect a certain level of quality. Mr. Skarp told that they do not practice information sharing and they rather care about the quality of the product in a better way. Nevertheless, they watch out for production process and possible delays that can occur since they think that this could harm the entire company development. In other words the timeline management has an outstanding position for the company.

Mr. Johansson (Umeå Energi) has mentioned that relationships are simply limited within the frame of contracts. Umeå Energi also considers the price as the first priority. But they as well pay attention to the general categorization of the turbine (i.e height etc.), contracts’ conditions including guarantee and what kind of services would be provided by the suppliers. Nowadays, their main suppliers are Vestas and Enercon. However, working with Vestas is more beneficial for the company. Mr. Johansson has mentioned that while working with Vestas they use ABA 99 contracts, but in case of Enercon they have to accept Enercon version, which mainly takes in account the perspective of Enercon and does not consider much the buyer opinion and in this sense embarrassing them.

He as well emphasized that trust has formed during their long relationships. Nevertheless, he specified that formation of trustworthy relationships with the partners has taken a lot of time and before achieving today’s level they have passed through many challenges.
He additionally specified that sometimes there are arising some trust issues particularly when they are dealing with the land owners or when they get permits for starting a new wind farm, such as geographic issues, road or forest issues. However, he assumed that he could not consider today’s relationships as too trustworthy. Mr. Johansson told that they practice very simple information sharing, which basically concerns contracts’ conditions sharing.

Collaboration within the supply chain

While asking about the implication of collaboration both Mr. Skarp (Skellefteå Kraft) and Mr. Johansson (Umeå Energi) have pointed out that the collaboration for them is seen more as some level of “close communication”, while at the meantime they have found it hard to distinguish or specify any level of collaboration. However, both have seen it more as a level of communication while choosing from the proposed list presented at the interview. Moreover, both respondents (Mr. Skarp and Mr. Johansson) could not specify to what extent the function of collaboration could be helpful or could prevent some issues that their companies would face in the future. This is because they can hardly imagine what tools of collaboration are necessary to apply and how they can properly use them. Thus, they realize that collaboration might bring advantages, particularly in this slow-down period, but they do not have a precise vision for applying it. Mr. Skarp confirms that use of collaboration might have a positive effect and could regulate the entire flow of the supply chain. However, understanding its meaning is not completely clear to Mr. Skarp and because of this the way to implement collaboration is vague for him. He emphasized that he does not exclude the possibility of improving the overall capacity of the company. Here he thinks that collaboration would lead to mutual objectives achievement and would allow have stable relationships. Yet, he does not seem to be aware of how collaboration can be helpful in joint problem solving or in sharing of risks. In addition, he has added that even consideration of procurement processes are done in a legal fashion because they do not want to get too involved with their suppliers. For example, they do not want to be responsible for technical or any other faults due to the fact that they are very cautious about what the contracts stipulate and other regulations. But when it comes to mutual objectives both sides realize their commitment will lead to success. Nonetheless, Mr. Skarp said that it does not always work out and sometimes there can be deviations, as it depends on what kind of policies companies currently follow.

Mr. Skarp added that he is aware of the bottlenecks items that are faced by wind turbine manufacturers. He thinks that it is as well connected with the issue of positioning since companies as Nordex and Enercon never collaborate with each other, which means that they cannot work out facing issues that could be common for the industry as nothing binds them together. He assumed that collaboration and mutual help in the current situation could be a solution for overcoming SC issues. Mr. Skarp did not have any troubles with maintenance because from the very beginning they have organized their own professional team that has been trained for the hydro power station. Thus they were independent and did not need to collaborate each time about the maintenance services. Mr. Skarp also mentioned the possibility to contract with third party suppliers, mostly from Germany or Denmark who provide maintenance services. He thinks that this is an important factor while developing wind farms as the absence of team or support from the suppliers can cause serious problems in their activity. Mr. Skarp emphasized that in the long term he realizes the significance of transparency. Their company’s concern
here is mainly the availability of spare parts because they currently feel this shortage. He believes that the wind industry could follow the path of the automotive industry. For example, when it comes to finding spare parts IT (Information Technologies) enables buyers to find buyers themselves and bypass the manufacturers' supply chain. He assumes that it might make SC stronger and flexible.

Mr. Johansson (Umeå Energi) thinks that collaboration cannot imply to any negative influence referring to booming demand, on contrast he reasons that he would rather consider it as an additional resource for overcoming current issues. He feels that this is an important factor in relations strengthening, but does not know how its approaches could appropriately be implemented for achieving pursued goals. Mr. Johansson said that they are always trying to find the middle ground and committed to build good relationships, which ultimately will bring them to mutual objectives implementation. However, Mr. Johansson specified that not always their commitment work out as it is sometimes one side commitment. He brought the example of recently rejected contract with Nordex. Although they have negotiated for a long time, but Nordex has followed its own policy and did not try to comply. Mr. Johansson is aware about problems that are presented in wind industry supply chain. He pointed that wind turbine manufacturers are not collaborating with each other like Enercon, which is a close company and hardly goes to any negotiations. He additionally added that he even had a problem in the beginning of their wind farm project. The thing was that wind turbine suppliers have required to separate their wind turbine locations and cable lines and all these have caused a little bit appalling atmosphere during their cooperation. Thus, he assumed that collaboration could be a good tool for achieving to mutual objectives as together they would have enough strength to influence the market of raw materials and overcome currently faced issues.

Maintenance topic turned to be a little bit complex for Umeå Energi as they rely on the maintenance teams of wind turbine manufacturers. Mr. Johansson referred these maintenance difficulties to the shortages of trained staff and the incapacity of the manufacturers to assure this part of the contract and provide the maintenance services by request. Moreover, the companies who are providing these services have separate contracts with the company. Apparently, they earn more money and they turn this situation to a good account for them since they realize that Umeå Energi depends on them and maintenance plays a significant role in company functioning. Hence, this has made them to organize their own maintenance team, but as the practice has shown they still sometimes need manufacturers’ maintenance team support.

Stefan Skarp’s (Skellefteå Kraft) hopes and expectations mostly resided in seeing an increase in the number of Swedish suppliers over the coming years. Today, there are about three to four suppliers, but according to him there are at least ten in total who would be capable in producing certain parts in a close future. Due to the country’s politics though, there would be little chance in seeing a Swedish wind turbine manufacturer. Countries like Denmark and Germany have created opportunities for the creation of wind turbine manufacturers by developing large national wind parks. If the Far East were to enter the market, it might change the balance between the powerful wind turbine manufacturers and their buyers, as the latter have no longer any obligation to support national companies. But this might not be enough to increase competition and lower prices as it would be risky and costly to order wind turbines from a country as far as China for example (cost of transport, cost of risk). Mr Skarp has proposed some
suggestions concerning SCM improvement. He thinks that SCM could be improved on both buyers’ and wind turbine manufacturers’ sides. When dealing with wind turbine manufacturers, buyers should have a long-term view and consider further collaboration. At the same time, buyers should always do new procurement and look at the different offers available in order to boost competition. Wind turbine manufacturers ought to have a better control over strategic components such as gearboxes and raw materials. Recently, gearbox companies have been switching owners and wind turbine manufacturers have tried to secure their supply chain by acquiring these companies. By doing this, they have increased the risk of bottlenecks in the supply chain and have reduced competition (a disadvantage for buyers). He pointed that at Skellefteå Kraft, the whole supply chain is taken into consideration while analysing the market: right from raw materials (steel price for instance). Specific components can represent quite a high investment risk, for example permanent magnets that come all the way from China. The tools the company uses to keep track of these market evolutions seem satisfactory to Mr Skarp in this perspective. Even when the company is not in a particular procurement period, these analyses are driven and keep track of any evolution all the time.

Mr. Johansson (Umeå Energi) on the other hand, expressed hopes about China entering the market. According to him, it would put sufficient pressure on other manufacturers to cause them to drastically lower their prices and better respect contract clauses (especially concerning maintenance). According to Mr. Johansson observations supply chain management can be improved through more coordination and cooperation, which first of all manufacturers should do between each other, particularly when it concerns to mutual objectives.

4.2.2 Wind turbine manufacturers:
Amrit Thapa (Mirlung Electro-Mech Concern),
Respondent A (Company A)

Regarding the wind industry’s current situation

Mr. Thapa (MEC Concern) has mentioned that as a supplier he would not say that the financial crisis has affected MEC too much, however it didn’t pass unnoticed. He mentioned such challenges as the booming demand, increasing sizes of turbines and the complexity of new designs of turbines. Mr. Thapa also expressed his concern about the role of cutting-edge technologies and new innovations. He believes that underestimating this trend could represent a failure strategy for companies that would then lag behind technological advances. He also mentioned cost efficiency as a key success factor for wind manufacturers as it could lead to low demand from the customers. Moreover, he thinks that the facing demand issues could be met by breakthrough technologies, which would allow be one step forward, while keeping a competitive price.

Respondent A (Company A) thinks that nowadays industry’s challenges are more to do with market rapid changes. As a main concern Respondent A has specified producing of the right quality at a competitive price. Respondent A pointed that in their company they have faced some issues with the coming of financial crisis. Particularly, has been specified the longer lead of times, which has affected the whole industry and their company was not an exception in this case.
Relationships within supply chain

MEC’s main suppliers in terms of raw materials are companies from India and China, while other equipment is supplied from European countries. But the rest is completed in Nepal by using their internal sources. Therefore they are partly depended on external sources. Mr. Thapa has mentioned that their main suppliers are located in Nepal at the same time he emphasized that they are the leaders in the local market and keep getting more contracts and intended to spread their production more to overseas thus doing a huge step forward to external market development.

Suppliers of the Company A are external and there are around ten and mainly supply the low voltage components for the company. However, there was not specified any supplier name as this information supposed to be confidential.

Nature of relationships

Mr. Thapa said that they have different contracts with their suppliers, but he did not specify the type of contracts that are common in the company. Nevertheless, he thinks that for further development it is important to go beyond these borders and have more close and reliable relationships that will ensure the trustworthiness between them. Regarding suppliers choosing, Mr. Thapa referred that company’s outsourcing policy is based on cost efficiency that they have got due to some factors. First of all, he signifies the location of the country that allows spend less on transportation costs of raw materials and equipment as they importing them from India and China. He stated that the whole wind turbine is constructed in Nepal, which makes them more competitive and allows reach other external markets. In MEC trust has a vital meaning and plays a significant role while making important decisions concerning choosing of raw materials suppliers. Moreover, he thinks that trust will open other possibilities for them and will be a useful tool while responding to market dynamics. Mr. Thapa thinks that information sharing is a valuable tool and has all chances to facilitate their business partnership. Besides it is a good monitoring tool, which keep you updated especially nowadays when it is hard to get stability. Nevertheless, he pointed that sharing of information is a matter of confidentiality and depends of circumstances. But they are trying to develop this approach in their company.

Respondent A (Company A) pointed that they are in good relationships with their partners. In their company they pay attention to global strategic suppliers, who are influential and have strategic meaning for the company. Contracts that they use in the company depend on who is a buyer and what kind of regulation is used for this particular case and therefore it is hard to specify any of them. It was emphasized that choosing of suppliers is done in accordance to their sourcing policy. They give a lot privilege to the trust factor as it is a key to success. Moreover, being one of the leaders in the industry and evidently dealing with a big variety of suppliers and buyers already implies on signifying the factor of trust since unreliable relationship can be dangerous and cause supply chain disruption. What concerns to information sharing then it depends on what kind of information is shared. If it is something confidential or strategic, then it is perceived as secret information and consequently won’t be shared. I will particularly refer to the following quotation “We don’t tell our customers everything, but we kindly share the information that they need to know”.

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Collaboration within the supply chain

Mr. Thapa (MEC Concern) has put in the meaning of the collaboration good relationships that one should keep with its partners, which in his opinion will facilitate the entire flow of the work and will strengthen the factor of trust and reliance between partners. He mentioned that he regularly communicate with their suppliers and keep eye on them. While distinguishing the possible level of collaboration he indicated communication level. He thinks that this level is more close to what they put in this meaning. Nonetheless, he carefully added that for adopting to wind energy challenges they have to review their relations and be aware of what kind of opportunities and positive reflections they can expect if they apply to higher level of collaboration. He especially pointed out that the future extension of company and promotion of the alternative source of energy would certainly require different negotiations and building of relations both with current and possible partners. In this sense, he sees a lot of benefices in collaboration. But he thinks the manufacturers need time and some practices for understanding those benefices. He did not think that collaboration could have any negative effect and could not harm either the company or the whole production flow. Consequently, he assumed that collaborative relations could be only helpful and would improve the entire capacity of the company, thus making SC stronger. He claims that in this case it could be easy to respond to market dynamics, as strong relationships make closer partners and enable them to support each other. He proposed that the decision synchronization and alignment could help coordinate actions between chain members and easily achieve mutual objectives.

Thus, for Mr. Thapa and MEC mutual objectives have crucial meaning and they always have shown a commitment while considering their partners interests. He mentioned that such a performance of interests is a part of their followed strategy. It seems to him that this approach has improved the SCM. He additionally pointed out that they always consider the feedback from their consumers as it helps them to rearrange their approaches and apply for a better one.

While asking about maintenance teams Mr. Thapa first of all has mentioned that they are constructing and assembling turbines in Nepal and has all needed spare parts for repairing. Their maintenance teams provide their services to buyers, although this is regulated by separate contract and paid additionally. He believes that collaboration might be helpful for others who experience a lack of maintenance.

For Respondent A (Company A) collaboration implies to being more open with partners, proactive and practise good relations. While answering on question concerning what levels of collaboration are distinguished it was emphasized that the levels depend on how suppliers are separated in the company. Firstly, they clearly identify suppliers to strategic and not strategic suppliers. Furthermore, they distinguish strategic suppliers in the level of intensive collaboration and think that those suppliers require more attention and time. Not strategic suppliers in their turn have been pointed under communication level. Respondent A assumed that collaboration to some extent could help to distinguish global supplier, which in their turn would be able to handle situation and be supportive. Moreover, in Respondent A opinion collaboration cannot be disadvantageous as it seems to be a unique tool that may unite the industry and at the same time curtail the issues that the industry is facing. Furthermore, it was expressed that in the current
situation wind manufacturers as well as other actors of the industry should more
precisely take in account the power that collaboration could have. Furthermore, the
examples that have been brought in interview manual (joint decision making, joint
problem solving, etc.) have all chances to be perceived as essential tools in supply chain
enhancement.

Respondent A pointed that they are already sharing mutual objectives with their
collaborators and has got a lot of advantages from such a commitment. And they are
more than sure that consideration of collaboration is significantly reducing risks in
supply chain disruption. It was stated that this assumption is based on their experience
and suppliers feedback. They have their maintenance teams, but as practice shows they
could not satisfy all requests due to many customers. Nevertheless, it was signified that
collaboration might provide solutions in this case and their skilled workers could help
wind farm developers in creation of new maintenance teams and therefore make their
partnership more reliable.

Both Respondent A and Mr. Thapa claimed that wind energy is not only alternative
source of energy but also a source of mainstream energy, particularly now when our
society is evolved in the ongoing debate of climate change. Thus, they have noticed a
big tendency in adopting wind energy in many countries. Mr. Thapa sees Nepal on the
verse of tapping wind energy as a viable source of energy. Moreover, the rural areas
where the national grid connection is unavailable, the government is promoting
alternative source of energy to electrify those areas. And in this sense it was a big
benefit for his company, which was among a few manufacturers that design and
manufacture wind turbine system using their own technology and partly indigenous
materials. Mr. Thapa thinks that after slowdown they will try to get to other suppliers
thus entering to new markets. He stressed that strengthening of Supply Chains is in their
hands and they should take in account as many as possible situations and as interview
has shown the collaborative consideration can be a key to success.

Respondent A added that the market is changing too rapidly, which was reasoned with
the fact of new entrants. Moreover, the wind turbine sizes and technology changes have
already become characteristic for the industry and this made to watch out for changes all
the time. Nevertheless, the industry will be able to overcome issues within supply chain,
but they need more to focus on the feedback from their suppliers and customers and
thus update their policy and consequently SCM in accordance to it.
5 ANALYSIS

The fifth chapter reports the results in the light of the literature review and in the end is assumed with the conceptual framework that incorporates some new elements in it.

In the previous section I have presented empirical findings, which have disclosed some interesting facts. I have interviewed four respondents and basically have considered two actors opinions, particularly wind turbine manufacturers and wind turbine developers, which implies on the fact that I have tried keep a balance in this research. The aim was to figure out to what extent collaborative elements were considered in SCM in those organizations. Meantime, I have asked some general question, which allowed find out the personal disposition of the respondents. The first section of the manual was pursuing two aims: 1) to do cross checking and find out more about wind industry challenges, 2) to see how financial crisis has effected industry and what were the consequences of it. The next section is discussing suppliers and customers of the companies. I should stress that these two sections give general information and do not interpret any particular part of the theory concepts.

The third and the fourth sections are illustrating theoretical concepts, which were in detail discussed in the literature review. Hence, the third section is discussing the nature of the relationships paying attention to the trust factor, relationships/contracts types and information sharing. The last section is devoted to collaborative considerations and intended to find out what respondents understand under collaboration, what levels of it they distinguish, etc.

All these considerations have allowed me as a researcher to draw particular conclusions and show the evidence of using theoretical concepts on practice. The gathered data has served as an inspiration for proposing a framework that outlines some findings and could serve as a guideline for both actors while improving their supply chain management. Below I will discuss the results of collected data in accordance to the sections mentioned in the interview manual.

5.1 Wind industry - today's challenges

As it was mentioned above the coming two sections are intended to find out some general information from the respondents and consequently do not interpret any theoretical concepts.

The wind farm developers have stressed that financial crisis did not hit industry. Moreover, it was a perfect time for doing investments and both Skellefteå Kraft and Umeå Energi took a chance in this case. Nevertheless, the adaptation to a rapid growth is still considered as a challenge for them.

In contrast to wind farm developers wind turbine manufacturers have struggled more and the situation for them was more complex. Particularly, they have stressed issues concerning continuously changing technologies, longer lead times and producing of the right quality at a competitive price, which ultimately has affected the whole producing process and consequently supply chain management.
For wind farm developers this period to some extent was advantageous as lower demand has allowed spent less money and did beneficial investments. Therefore, it can be assumed that for wind turbine manufacturers this period was too challenging and as a result they have suffered more than wind farm developers. Apparently, that crisis has influenced differently on these actors.

### 5.2 Relationships within supply chain

According to Mr. Skarp the European court regulation changes have given a possibility to be free in suppliers choosing, which basically has positively impacted on competition. Moreover, all these have reinforced wind farm developers thus giving them more power over manufacturers while choosing supplier. Mr. Skarp has mentioned as Skellefteå Kraft’s suppliers Winwind, Enercon and Nordex. Mr. Johansson (Umeå Energi) has specified as main suppliers Vestas and Enercon and added that sometimes they buy turbines from Siemens as well. Therefore, it has turned out that suppliers of both wind farm developers are external. In case of MEC suppliers are partly external, particularly some of the equipment and raw materials are imported, but the rest is constructed by using internal sources. In contrast to MEC, suppliers of Company A are external. Neither Mr. Thapa nor Respondent A did specify their suppliers by name.

These observations have allowed me to understand that wind farm developers and wind turbine manufacturers have external suppliers and in this sense they are dependent on external sources. Apparently, that their supply chains to some extent can be vulnerable and cause some risks of lead times.

### 5.3 Nature of relationships

This part of the questionnaire has been intended to find out about relationships that respondents has with their suppliers/buyers, what they prioritize while choosing their suppliers/buyers and weather trust plays any role in this. The section is accomplished with the question concerning information sharing and tends to find out whether respondents practicing it.

First question in this section has allowed figure out that wind farm developers (Skellefteå Kraft and Umeå Energi) mainly use Swedish contracts ABA 99, ABT 06. However, findings has shown that sometimes can be exceptions since suppliers can propose their types of contracts. Particularly, Umeå Energi has faced some problems while dealing with Enercon as they have to accept Enercon’s contract conditions, which mainly illustrates Enercon’s perspective. Obviously, that the positions of developers are not always considered.

In contrast to wind farm developers wind turbine manufacturers did not emphasize the type of the contracts, reasoning that the type depends on particular regulation. Mr. Thapa (MEC Concern) added that he would like to have relationships that will be beyond the contracts, which will increase trustworthiness between partners. Answering to the same question Respondent A (Company A) has mentioned that in their company they build good relationships with strategic partners. With this I conclude that manufacturers
realize the importance of having good relationships. Yet, Respondent A specified only strategic partners, which shows that they distinguish different relationships/contracts and with sub-contractors they are positioning themselves in another way. The theory in its turn implies that organizational relationships not only tie firms to each other, but tie their success to the chain (Cooper et al., 1997, p.2, Christopher, 1992), which means that more attention should be paid to inter-organizational integration. However, Umeå Energi is still appeared to have issues while dealing with partners and their types of contracts. This leads to assumption that theoretical implications concerning the importance of organizational relationships and their integration should call more attention by wind industry actors while developing SCM. The empirical data has illustrated that the contracts stipulations are playing a significant role in organizational relationships and should take in account both sides’ opinions and be mutually accepted.

When it comes to choosing suppliers the price stressed as the crucial factor by both developers (Skellefteå Kraft and Umeå Energi). In Skellefteå Kraft they even use consultants’ services during procurement periods. Manufacturers (MEC Concern and Company A) as well have their own polices of outsourcing, which seems to be reliable for both companies.

Since in SCM theory management components are playing unique and significant roles (Moberg et al., 2004, p. 18) I have focused on some of them and tried to find out how they were illustrated in the particular companies. Cooper et al. (1997) divide management component into two groups: physical and technical (1st group) and managerial and behavioural (2nd group). Second group entails such a component as trust, which was investigated in the frame of this research. While considering the level of trust in Skellefteå Kraft and Umeå Energi I have figured out that it seems to be on moderate level in these companies. In case of Skellefteå Kraft it is based on assurance that exists between them and suppliers. As for Umeå Energi, then it should be mentioned that it has experienced some issues while building trustworthy relationships. Moreover, there are still arising some problems when they are starting new project and consequently dealing with new partners.

Manufacturers in their turn consider trust as a success and assurance factor for entire business development and this approach as well supported with the fact of dealing with many partners. According to them the vitality of trust is more felt when they are making decisions upon choosing suppliers. For Respondent A (Company A ) trust implies on being secure in terms of SC. In this sense the findings from the empirical seem to be consistent with the line of arguments from theory. Particularly, Lambert et al. (1998) emphasize trust and commitment as the main determinants in relationships. Besides it implies on collaboration consideration and lead to better performance and strong SC (Moberg et al., 2004, p.20, Mehrjerdi, 2009, p.129). The findings have shown that the reliance and assurance in their partners perceived as an important factor for all respondents, which is in line with another implication of the theory mentioned by Currall and Inkpen (2002). Nevertheless, Umeå Energi is still facing some challenges while building trustworthy relationships, thus referring on the fact that neither Umeå Energi nor their partners apply systematized relationships and trust does not fully integrated in their SCM. While empirical data gathered from the other respondents has shown that implementing of this approach has positively effected on these companies.
In Skellefteå Kraft they do not practice information sharing, but watch out for production process for avoiding undesired developments for the company. In Umeå Energi the information sharing as well does not seem to be considered much and limited within the frame of sharing contracts conditions.

For manufacturers (MEC Concern and Company A) information sharing implies on confidentiality and appears to be dependent on circumstances. Respondent A (Company A) particularly has specified that they share the information which they think that the customer needs to know. While information exchange, which is included in physical and technical group of management components (Moberg et al., 2004, p.17) has been outlined as an integration component among firms and departments. Hence, it can be assumed that neither developers nor manufacturers consider the importance of this component. Moreover, such a confidentiality that manufacturers have shown can keep away their customers and ultimately broke their relationships and consequently have a bad influence on performance, which is not in the line with the postulates of theory implying that information exchange influences on performance in a better way (Stank et al., 1996). Furthermore, in my own perception the information sharing most likely will increase the trust and at the meantime could serve as a monitoring tool for the companies. Hence, this theoretical approach should not be underestimated by wind industry actors.

5.4 Collaboration within the supply chain

The questions of this section were intended to find out firstly what respondents understand under collaboration, whether they distinguish any level of it, etc. This section as well aims to investigate whether respondents realize the importance of building good relationships, commitment, sharing mutual objectives, information etc. The section ends up with the overall hopes and expectations of the respondents.

The responses from empirical section have shown that wind farm developers perceive the notion of collaboration as “close communication”. Yet, both wind farm developers (Mr. Johansson and Mr. Skarp) have found hard to distinguish the level applied in their companies. However, when they were trying to indicate the level from the proposed list they both pointed “communication” as the best suitable level. Nevertheless, they both do not completely realize the real implications of the collaboration. I had a feeling that they do put in collaboration meaning simple business cooperation, which apparently could not be perceived equally to collaboration since Kent et al. (2007, p.2) consider collaboration as more than just simple cooperation.

For Mr. Thapa (MEC Concern) and Respondent A (Company A) collaboration means to be simply open, proactive and keep good relations with partners. Mr. Thapa has emphasized that if he had to distinguish a level of collaboration then he would consider it as a “communicative”. At the meantime he thinks that they have to adapt higher level as it will evidently strengthen the company and help in acquiring new horizons. In case of Company A distinguishing of collaboration depends on suppliers. Particularly, strategic suppliers go under “intensive collaboration” and not strategic suppliers seem to be under “communication” level.
The empirical findings have shown that respondents consider their level of collaboration under “communicative”. While in theory “communicative” level is related to the lowest level of the collaboration and focuses on physical constraint of SC, thus improving productivity and enabling information sharing through simple IT applications (Kampstra, Ashayeri & Gattorna, 2006, p.314). This implies that mutual reliability and attitude towards sharing information is low, which blocks the joint-decision making. Moreover, one of the respondents (Respondent A) has done a separation between suppliers while distinguishing the level of collaboration, which is not acceptable to some extent, because such a separation may cause some unpredicted issues. According to Allen (2009, p.26) statements sub-contractors have enough power for playing invisible role and harming the “health” of the supply chain. Hence, in my perception small suppliers have enough influence for making bottlenecks in Supply Chain and should not be underestimated by wind industry actors.

Both wind farm developers (Mr.Skarp and Mr.Johansson) have pointed that collaboration and mutual help can be a solution for overcoming SC issues. Yet, Mr. Skarp expressed his worries about wind turbine manufacturing companies, specifying that such companies as Nordex and Enercon never collaborate with each other. Wind turbine manufacturers (Mr. Thapa and Respondent A) as well have expressed an assumption that collaboration might help in overcoming financial slow-down. Mr. Thapa even emphasized that it would help to respond to market dynamics. He thinks that strong relationships make partners closer and enable them to support each other. He even has proposed that the decision synchronization and alignment could help in coordinating actions between chain members and easily achieve mutual objectives, which actually illustrates the basic notion of CSCM stated by Mentzer et al (2000). Both developers and manufacturers have stressed that they do not see any negative effect that collaboration could have on SC particularly in slow-down period. Hence, the discussion of disadvantages or advantages that collaboration could imply has shown that neither developers nor manufacturers see any harm of it. Nevertheless, they still need guidance and more deep understanding of collaborative approaches for further implementation in SCM.

Mr. Skarp (Skellefteå Kraft) has emphasized that collaboration could lead to mutual objectives and allow achieve their purposes and in this sense have stable relationships. Meanwhile, he pointed that they do not want to get too involved with their suppliers and very cautious about the contracts stipulations and other regulations. However, when it comes to mutual objectives the both sides realize showing of commitment will lead to success. Mr. Johansson (Umeå Energi) in his turn sees a positive affect that collaboration can have on current relationships. He stressed some issues that he had while trying to cooperate with Nordex. Particularly, Umeå Energi they were showing a strong commitment and want to find a middle ground with Nordex, but unfortunately it did not work out.

In contrast to wind farm developers wind turbine manufacturers (Mr. Thapa and Respondent A) have shown intensive commitment towards mutual objectives achievement and had succeed in it. Furthermore, they both think that collaborative element such as joint-decision making, sharing of risks etc. can enhance SC.

At the mean time theory considers commitment as a key component in successful relationships between organisations (Morgan et al., 1994) and commitment to such
relationships brings to a better performance (Kent et al., 2003, Moberg et al., 2004, p.19). Hence, commitment approaches are applied differently in case of wind farm developers. In Skellefteå Kraft they realize the importance to commitment, but still remain cautious about contracts stipulations. This shows that Skellefteå Kraft does not tend to share risks, responsibilities, etc. While Umeå Energi on contrast shows a high dedication to solve the situation, but faces one side commitment. Wind farm manufacturers on the other hand have shown preparedness to share mutual objectives and according to their responses they succeed in it. Hence, developers need to pay more attention to commitment implication and try to apply it appropriately for succeeding in joint-decisions making.

In general all respondents apart from one do not have troubles with maintenance. Particularly, Umeå Energi has faced some issues with maintenance since suppliers of Umea Energi are providing their maintenance services apart. In addition they are charging extra money for their services and such an approach is not welcomed in Umeå Energi. Later on Umeå Energi has organized its own maintenance team, but still feel need in manufacturers’ help. Mr. Skarp (Skellefteå Kraft) and Mr. Thapa did not experience maintenance problems, but think that collaboration might be helpful to those who are facing a lack of maintenance. Respondent A (Company A) pointed out that providing of maintenance services is tough and tricky task for them as they deal with many customers and have to admit that sometimes providing of maintenance services can be delayed. Moreover, in Respondent A opinion collaboration can help in knowledge sharing as their skilled workers could help wind farm developers with maintaining teams developing, which will lead to better relationships. Yet, both theory and empirical data imply that creation of joint-maintenance team will decrease the possible tension that could arise between partners and facilitate future mutual relationship between them. Since Frayret (2002) as well in his table considers supplier training and evaluation as one of the practical solutions that collaborative SCM can provide. Hence, finalizing the responses of the respondents it can be noticed that some of them experiencing troubles with maintenance. Particularly, for Umeå Energi maintenance plays significant role and absence of support from suppliers can cause problems in their functioning.

Hopes and expectations of the respondents were different. Mr. Johansson expressed hopes about China entrance in wind market, which might create a pressure on the manufacturers and lead to lower prices and better respect contract clauses. Mr. Skarp on the other hand did not seem to believe that the entrance of China can change the balance. He thinks that it cannot cause an intensive competition in the market due to the pricy and risky transportation costs in case of importing from China. Meanwhile, Mr. Skarp thinks that Swedish suppliers have all chances and capability to produce certain parts in coming future. However, the development of Swedish manufacturers depends on governmental support, which currently is following another policy. Wind turbine manufacturers pointed that wind energy claims to be a source of mainstream energy, particularly in this ongoing climate change debates. Moreover, Mr. Skarp has proposed some practical suggestions for improving SCM. In his opinion the improvements can be done from both sides: buyers and wind turbine manufacturers. He thinks that buyers should always do new procurement and look at the different offers available in order to boost competition. And wind turbine manufacturers should have a better control over strategic components such as gearboxes and raw materials for avoiding shortage of those materials. Mr. Thapa in his turn sees a great promotion of
wind energy in Nepal. Furthermore, they both think that the improvement of SC is in their hands. Thus, they should consider the feedback from their suppliers and customers and always update their policy in accordance to it for having a secure SCM.

5.5 Conceptual framework of the study

This conceptual framework illustrates some findings that have been found after conducting interviews with the respondents. This empirical study has shown that theoretical concepts are not always applied in SCM. Moreover, I have realized that wind industry actors and particularly my respondents need to develop and apply systemised SCM as in my opinion it will strengthen their SC and lead to a better performance. Empirical part has allowed detect some problems that wind farm developers and wind turbine manufactures are dealing with. Furthermore, the observation of the theory has shown to what extent its approaches are applied in practice. It is interesting to note that in some cases theoretical practices were applied, yet sometimes they were disregarded. Nevertheless, it should be kept in mind that SCM practices and strategies may still vary from one another depending on many other conditions. Hence, this study does not seek to generalize results to all wind turbine manufacturers and developers in the wind industry supply chain, but rather aims to call attention to some components that will improve the overall management of the supply chain. I have put in the table below the main differences of perception between considered two actors, which were utilized from the empirical part.

<table>
<thead>
<tr>
<th>Wind Farm Developers</th>
<th>Wind Turbine Manufacturers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slow-down: beneficial for doing investments</td>
<td>Slow-down: faced longer lead of times</td>
</tr>
<tr>
<td>Challenges for industry: adapting to the rapid growth</td>
<td>Challenges for the industry: market rapid changes, changes of technologies, etc.</td>
</tr>
<tr>
<td>Suppliers: external</td>
<td>Suppliers: mostly external</td>
</tr>
<tr>
<td>Relationships/Contracts types consideration: disregarding of developers positions in contracts</td>
<td>Relationships/Contracts types consideration: separating of contract types between partners and prioritizing of strategic partners</td>
</tr>
<tr>
<td>Trust factor: success and assurance factor, yet issues arise while dealing with new partners</td>
<td>Trust factor: being secure and rely on partners</td>
</tr>
<tr>
<td>Information sharing: not practiced</td>
<td>Information sharing: high confidentiality, depends on circumstances and customers</td>
</tr>
<tr>
<td>Collaboration level: communicative</td>
<td>Collaboration level: communicative or intensive</td>
</tr>
<tr>
<td>Commitment: one side commitment sometimes</td>
<td>Commitment: higher commitment, leads to joint decision making</td>
</tr>
<tr>
<td>Skill shortage: problems with maintenance</td>
<td>Skill shortage: problems with maintenance</td>
</tr>
</tbody>
</table>

Table 6. Comparing wind farm developers and wind turbine manufacturers.

The table above serves an illustration of findings, respondents’ concerns and thoughts. Moreover, it has allowed me to figure out to what extent the respondents are familiar
with collaborative approaches and in this sense how they need to reply for strengthening their supply chains. Thus the framework below incorporates some elements, which consideration seem to be vital for the industry.

### Figure 5. Conceptual framework for the empirical study.

<table>
<thead>
<tr>
<th>CHALLENGES</th>
<th>SOLUTIONS</th>
<th>PRACTICAL EXAMPLES</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply chain disruption</td>
<td>Visibility across the supply chain</td>
<td>Information, knowledge sharing</td>
</tr>
<tr>
<td>Shortage of spare parts</td>
<td>Securing of SC</td>
<td>Continuous procurement</td>
</tr>
<tr>
<td>Switching of suppliers, dealing with new partners</td>
<td>Establishing of reliable relationships</td>
<td>Higher trustworthiness between cooperating parties</td>
</tr>
<tr>
<td>Longer lead of times</td>
<td>Looking for new suppliers and offers</td>
<td>Flexibility and better offers</td>
</tr>
<tr>
<td>Skills shortages</td>
<td>Sharing available human resources</td>
<td>Joint training, supplier training and evaluation</td>
</tr>
<tr>
<td>Exclusively external suppliers</td>
<td>Balancing of suppliers</td>
<td>Applying for internal sources</td>
</tr>
<tr>
<td>Contract stipulation</td>
<td>Intensive negotiations</td>
<td>Consideration of partners’ perspective</td>
</tr>
</tbody>
</table>

The framework underlines some theoretical approaches that have proved their significance and importance of utilizing them and has facilitated the SCM of the respondents. Nevertheless, some of the approaches were ignored or not systemised in SCM and some on the other hand have been inspired and developed after interviews. Therefore, for having a complete picture and making visible what elements primarily have to be considered in the wind industry SCM, I have decided to discuss and put framework in the structure presented above. Below I will make an attempt to explain how these elements can solve some issues inherent to the SC of the wind industry and how their incorporation can positively influence on SCM.

1. **Information, knowledge sharing.** Taking in account the responses of the respondents concerning information sharing it was obvious that they do not much concern its importance. Moreover, manufacturers considers it from the point of confidentiality, which can negatively influence on relationships with their partners and consequently on entire performance. While sharing of information will allow have a visibility across the supply chain thus being aware of partners, monitor them and be capable to respond on changes on-time and decrease the probability of possible disruption in the supply chain and further consequences that can be followed by it.
2. **Continuous procurement.** The consideration of this element will certainly secure the SC of both actors and help to avoid unpredicted changes in the market. Furthermore, it will help to be more competitive and get new offers.

3. **Higher trustworthiness between cooperating parties.** Conducted interviews have shown that particularly manufacturers keen to build trustworthy relationships and consider trust as a success factor. Nevertheless, such a dedication in building of trustworthy relationships are not always working out for Umeå Energi and there are still arising some issues especially when they are starting new project and consequently dealing with new partners. While trustworthy relationships can make partners closer and drastically increase their performance, which has been outlined in the theory part as well.

4. **Flexibility and better performance.** Manufacturers mention as one of their challenges longer lead of times, which consequently has delayed many contracts. While looking for new suppliers will give an opportunity of having an optional solution and will still keep them competitive on the market.

5. **Joint training, supplier training and evaluation.** Discussions about maintenance have shown that both wind farm developers and wind turbine manufacturers are facing troubles, which need to be solved. The creation of joint-maintenance team will decrease the possible tension that could arise between partners and will facilitate future mutual relationships between them. Moreover, it will normalize the entire functioning and in terms of it increase the performance. Supplier training and evaluation will allow share knowledge with the partners and make future cooperation smoother.

6. **Applying for internal sources.** Since balancing of suppliers and having both external and internal suppliers will make the SC less vulnerable and addicted to different risks. Besides dependence on the performance of other suppliers is too dangerous since these suppliers in their turn can face another bunch of challenges, which ultimately will impact the ordinary functioning of the SC. Moreover, Mr. Skarp (Skellefteå Kraft) have expressed an idea that suppliers have all chances and capability to produce certain parts in coming future, which prove the aptness of internal sources consideration.

7. **Consideration of partner's perspective.** One of the developers has stressed his concern about contract stipulation. According to him the contract mainly considers the perspective of supplier which is negatively influencing on further partnership and could lead developer switch to another supplier. Hence, intensive negotiations and discussions of the contracts conditions will develop reliable relationships between partners.
This sixth and final chapter provides conclusive comments based upon the findings regarding the theoretical framework. It also assesses the theoretical contribution of the research and its strengths and limitations. Finally it suggests paths for further research.

6.1 Conclusive comments

Research question How can wind turbine manufacturers and wind farm developers make use of collaboration in their supply chain?

As it was mentioned in the beginning of this study wind industry is facing some challenges, which in their turn are impacting the entire SCM of the companies. Hence the need of consistent supply chain for the future wind energy development was obvious. Bearing in the mind the uniqueness of the industry and the fact that it is not mature I have tried to explore to what extent SCM approaches are considered in observed companies and in this sense I have referred to the collaborative elements of SCM. The study from the very beginning was aimed to consider SCM and the practices that it advertises, which consequently has lead to SCM theory that complements Collaborative approaches. It is needless to mention that with the maturity of the industry the supply chain is going to be a critical for the industry as it is both a cost and profit centre. Therefore, for the industry actors it is crucial to have structured, secure and reliable SC.

Empirical part was intended to explore whether respondents consider collaborative elements in their SCM. In the research have been outlined some of the collaborative elements, which have a crucial meaning for SCM and significantly change the performance of the organization. Later on from interviewees it has been collected data concerning those elements implementation. The findings have turned to be interesting and have lead to some implications, which have been illustrated in the framework. Moreover, participants’ responses have allowed me to determine other elements that should not be underestimated while developing SCM. These findings have been illustrated in the conceptual framework. Yet, the framework itself incorporates both empirical evidences and shows what elements from the theoretical part should be considered more detail in SCM by the wind industry actors and how they can help to prevent the challenges. The consideration of some theoretical approaches will increase the reliability and trust, lead to better relationships and integrate companies thus make the performance better and unite while facing challenges. Therefore, the notion of collaboration aims to be a key to the problems solutions within the wind industry. For example, implementation of the information sharing in the SCM structure of the wind industry actors will facilitate the collaborative process and will influence the enhancement of trust factor between wind turbine manufacturers and developers. Yet, this notion was totally ignored by both actors. Meanwhile, one of the wind farm developers was having troubles with maintenance and in this sense joint training would allow share knowledge between partners and avoid general functioning issues. Moreover, the discussions have illustrated some other concerns of the respondents that had negative influence on SCM. These expressed concerns have leaded to consideration of new elements in the framework. Particularly, I have called my attention to the notion
of continuous procurement, which has been suggested with one of the respondent. This
approach will certainly secure the SC and in this sense will allow have extra options if
changes occur in the market. Another advantage of such an approach is that it helps to
be competitive, watch out for new entrants in the market and thus get new offers.
Furthermore, I have suggested to balance suppliers as having only external suppliers is
quite risky for wind industry actors and make them entirely depend on the performance
of those companies, which in their turn can face other challenges and do not be able to
supply on time. Mr. Skarp (Skellefteå Kraft) as well proposed to start developing and
producing of certain parts that would decrease the dependability of external sources and
in this sense would help to avoid supply chain disruption. Another issue determined in
the empirical part was the ignorance of the wind farm developers’ positions in the
contracts’ conditions. While this fact can negatively influence on entire cooperation and
even terminate the negotiations. In this sense contract stipulation seems to have a vital
importance and should be considered more detailed by cooperating parties. Not less
important is the issue of longer lead times, which made manufacturers to get behind of
their supplying schedules. Thus, looking for new suppliers will allow be flexible and get
better offers. To conclude, I would like to say that the systemized integration of all the
elements mentioned in the framework will be a guarantee of stability and spur an
atmosphere of trustworthiness, thus making SC less disruptive and will lead to
implementation of organizations strategic objectives. Therefore, I hope that this
framework will give an impulse to the actors of the industry to consider supposed
elements for improving and strengthening their SCM and having stable relationships
with their partners.

6.2 Strengths and limitations of the research

Through the research I have attempted to study SCM alignment to the particular
industry and consider collaboration as an additional success driver for the organization.
In the meantime, I realize that from the very beginning the research was constrained by
time and resources limitations, which apparently couldn’t facilitate it and would cause
some weaknesses. However, I would like to stress that the research also consists of
strengths particularly it discusses a new perspective that collaborative approaches can
provide to companies SC. Regarding the strengths of the research I would like to stress
that I have identified some points that should raise the interest of the reader and may
serve a future source for investigation. One of such advantages is respondents’ diversity
as I have got opinions from the both actors: wind farm developers and wind farm
manufacturers perspectives. Such heterogeneity of participants has allowed collect
reliable, interesting and practical data by giving an insight to the issues faced in the
industry and sharing their exclusive opinion concerning asked questions. Experience
and promptness of the respondents in their turn has significantly enriched the data
collection.

Reviewing the literature concerning SCM I have utilized some its concepts and through
conducted interviews have tried to figure out to what extent theoretical implications are
applied in the empirical. The entire investigation has allowed come up with some
implications, which in their turn was expressed in the proposed conceptual framework.
Nevertheless, I do not insist that supposed framework can be helpful for each actor of
this particular industry as in this frame of research it was not able to reach other
companies functioning in this industry. However, it can be explicitly stated that this new
proposed framework can contribute the SCM and help to those who are experiencing
similar problems that were stressed by this research participants. I also believe that research can be extended and serve as a new frame for discussions and practical implementations, which in its turn will be a strong proof of abovementioned implications.

To the limitations of the study can be related time constraints, which in a sense initially narrowed the research. Another limitation was closely connected with the number of respondents as more interviews can possibly give another perspective and may change the context of viewing the problem and therefore certainly increase the quality of the research. To the limitation of this research can be related as well the discussion of only two actors from the Figure 1, while consideration of other actors’ perspective will entirely change the picture of this undertaken study. To some extent to the limitations can be related conducting of interviews in English, which could cause biases in terms of conformability of respondents while expressing their thoughts. Nonetheless, the research has all chances to strengthen its validity and reliability and be a good basis for further studying of SCM. I stress that supposed SCM framework will create a stable partnership and form trustworthiness between organizations.

6.3 Suggestions for further research

The research has some limitations, but nevertheless it gives to further researchers an interesting insight into problems inherent to the industry and a solid source for undertaking their own investigations in this area. As it was already mentioned one of the limitations of the research is using of small sample that in its turn did not allow generalize the collected data. Besides the choice of organizations was stipulated with the respond to the request, which means that in case of many responds it would possible to have another picture. Moreover, it would be perfect to get responds from all companies that actually are suppliers for the wind turbine developers, thus giving them chance to express their opinions about the same issues. The research would be as well facilitated if respondents were differentiated regionally, thus including not only companies operating in Europe, but as well Asian and North-American. Such a disposition would guarantee a wider perspective and an opportunity to generalize findings. Furthermore, the interview manual could be enlarged and be consisted of more questions thus allowing investigate internal supply chains more detailed. Further researchers can investigate the strength of collaboration and suggest new components that will improve SC in wind industry. Another aspect that will positively enrich the research is consideration of other actors from the Figure 1(page 3), which presents the structure of the wind industry thus giving an absolute picture of the situation.
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Appendix 1: Wind turbine nomenclature

Understanding how a wind turbine is built is essential to understand what exactly is at stake in the industry. The figure above presents the main components that are integrated to a wind turbine. The numerous components – 8 000 in one wind turbine – help understand the complexity of the wind industry supply chain and the need for elaborate management components.

Source: RS Hong Kong Online.
Available at: http://hongkong01.rs-online.com/hk01/img/site/campaigns/windpower/wp_diagram.gif
Appendix 2: Major wind turbine manufacturers and their suppliers

<table>
<thead>
<tr>
<th>Wind turbine makers</th>
<th>Rotor blades suppliers</th>
<th>Gearboxes suppliers</th>
<th>Generators suppliers</th>
<th>Towers suppliers</th>
<th>Controllers suppliers</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vestas</td>
<td>Vestas, LM</td>
<td>Bosch, Rexroth, Hasen, Windery, Moventas</td>
<td>Weier, Elin, Abb, LeroySomer</td>
<td>Vestas, NEG, DMI</td>
<td>Cotas (Vestas), NEG (Dancontrol)</td>
</tr>
<tr>
<td>GE Energy</td>
<td>LM, Tecsis</td>
<td>Windery, Bosh, Rexroth, Eickhoff, GE</td>
<td>Loher, GE</td>
<td>DMI, Omnical, SIAG</td>
<td>GE</td>
</tr>
<tr>
<td>Gamesa</td>
<td>Gamesa, LM</td>
<td>Echesa (Gamesa), Windery, Hansen</td>
<td>Indar (Gamesa), Cantarey</td>
<td>Gamesa</td>
<td>Ingelectric (Gamesa)</td>
</tr>
<tr>
<td>Enercon</td>
<td>Enercon</td>
<td>Direct drive</td>
<td>Enercon</td>
<td>KGW, SAM</td>
<td>Enercon</td>
</tr>
<tr>
<td>Siemens Wind</td>
<td>Siemens, LM</td>
<td>Windery</td>
<td>Abb</td>
<td>Roug, KGM</td>
<td>Siemens, KK Electronic</td>
</tr>
<tr>
<td>Suzlon</td>
<td>Suzlon</td>
<td>Hansen, Winery</td>
<td>Suzlon, Siemens</td>
<td>Suzlon</td>
<td>Suzlon, Mita Teknik</td>
</tr>
<tr>
<td>REpower</td>
<td>LM</td>
<td>Winery, Renk, Eickhoff</td>
<td>N/A</td>
<td>N/A</td>
<td>Mita Teknik, ReGuard</td>
</tr>
<tr>
<td>Nordex</td>
<td>Nordex</td>
<td>Windery, Eickhoff, Magg</td>
<td>Loher</td>
<td>Nordex, Omnical</td>
<td>Nordex, Mita Teknik</td>
</tr>
</tbody>
</table>

Notes: 1. Towers are often produced locally to where projects are built. 2. Names in bold indicate in-house supply or ownership of supplier by turbine manufacturer.

Currently, there are five markets dominating the industry: Germany, Denmark, Spain, the United States and finally India (Donnelly 2006:18). Wind energy is ranked as one of the most significant sources of energy with a high perspective of development and is regarded as a growth industry that has not yet matured.

In the above table, it is interesting to note that there are two types of supply chain in the wind industry. There are companies such as Gamesa and Suzlon that have opted for vertical integration. Other companies rely on external suppliers.
Appendix 3: Interview manual

**Wind industry – today’s challenges**

1. What do you think are the challenges for wind turbine industry today?

2. How did the financial crisis influence your activities? What kind of effects did it cause?

**Relationships within the supply chain**

3. Who are your suppliers? Are they external or internal?

4. How many suppliers do you have?

**Nature of the relationships**

5. What types of relationships/contracts do you have with your suppliers/buyers?

6. How do you choose your suppliers?

7. Is trust an important factor in choosing your suppliers?

8. Do you willingly share information with your suppliers/customers? Is the degree of knowledge sharing related to trust?

**Collaborative considerations**

9. According to you, what does collaboration imply?

10. Do you distinguish different levels of collaboration?

   - Yes
   - No

   If yes, then which one from below mentioned?

   - Arm’s length
   - Communication
   - Coordination
   - Intensive collaboration
   - Partnership

11. What are the advantages of collaboration with regards to the booming demand for wind turbines?

12. What are the disadvantages of collaboration with regards to the booming demand for wind turbines?
13. What do think could collaboration improve your overall capacity? (For instance: in join-decision making, joint problem solving, mutual objectives, shared risks and responsibilities, etc.)

14. Would sharing mutual objectives with your collaborators improve your supply chain management practices? (commitment)

15. How can collaboration provide solutions to the skill shortages in the industry (few maintenance teams)?

16. What are your hopes and expectations for the future?

**About you – Participant demographics**

a) Name (optional): ____________________________

b) Position: ____________________________

c) Years of experience in that position: ____________________________

d) Please give a general overview of your company: ____________________________